Department of Biochemistry and Molecular Biology

Michigan State University

1961-2011

Clarence Suelter
Professor Emeritus, Department of Biochemistry
Director Emeritus, Division of Science and Mathematics Education

Acknowledgements

First let me say, there would be no history of Biochemistry at Michigan State without the existence of the University that was officially established in 1855. We owe the founders and their successors a debt of gratitude. It is also with much gratitude that I was granted an opportunity to begin my career as the first new member of the Department after it was officially formed on April 1, 1961. I owe Professor Tom Sharkey, now Chairperson of the Department and a former student of mine, much gratitude for his trust that I could write this History and for his suggestions after reading the final draft. Next, I want to make it clear that this History would not have been possible without the interest and assistance of all current and former colleagues, faculty, office staff and students. First, the Office Staff kept records that were extremely valuable for dates and decisions made through the years. In addition, they responded with enthusiasm to many questions that I posed to them. I particularly owe Teresa Vollmer much thanks for her untiring help in locating files and data in the office as well as her efforts to gather several items of interest. Melinda Kochenderfer and Lesley Reed were helpful in providing photographs of current faculty and staff. Mary Villarreal and Jessica Lawrence were always there when asked for data relating to the undergraduate and graduate student programs, Pat Ungren provided financial grant data, Katie Gallgher, Carol Vanderjagt, and William Yang responded to what must have been annoying questions, and Laurie Secord provided me with the key necessary to access the building as well as the Computer Laboratory. I owe them all many thanks. Two undergraduate student employees, Bria Robinson and Jacklyn Ungren, cheerfully responded to requests for help when asked. I am grateful that Dennis Minor, the 2009-2010 President of the Undergraduate BMB Club, created Appendix 5.4 “BMB Student Activities.” Vaughn Snook provided details on the startup of the BMB Research Store and Joyce Robinson provided much needed insight into the operation of the current BMB Research Store and the 2006 building renovation. Ron Norris was always glad to respond to questions regarding the building. I give thanks to many faculty colleagues for help, especially Willis Wood for responding to questions regarding the design of the new facility, to Charles Sweeley for help with the Science Career Magazine design, and to Jack Watson, Jack Holland, Dave McConnell, and John Wilson for their

responses to many questions that required clarifications. I especially thank John Wang for clarifying the medical instructional program, Christoph Benning for help with the Web of Science site, Neil Bowlby for taking the time to photograph buildings and objects, and K. “Pappan” Padmanabhan for his pleasant response to many questions seeking help on the use of software in the Macromolecular Computing Laboratory. I also thank the many alumni who responded with memories of their life in the Department.

Finally, I must thank my wife Loretta for ignoring the appearance of my office this past year as this story developed.

Clarence Suelter

Preface

As the title implies, the aim of this story is to describe the origin and growth of the Department of Biochemistry and Molecular Biology at Michigan State University for the first 50 years of its existence. The first point of the story is that the impetus to create the Department was the need to provide instruction in Biochemistry to medical students. It was not politically possible for this instruction to be provided by faculty from the Department of Agricultural Chemistry or by the Biological Chemists in the Department of Chemistry. Once the Department was created, it was necessary to obtain funds to build a new facility to bring faculty that were scattered in 4 different buildings into one place. Building a new facility enhanced the ability to attract new faculty and students who worked together to advance the field of Biochemistry, a science stemming from Biology (Bacteria, Plants and Animals) on one hand and Chemistry on the other. The instructional programs resulted in the offering of BS, MS, and PhD degrees that resulted in research publications. The faculty used these publications and research advances to obtain more research dollars to cover expenses for supplies and services, assistantships, and fellowships and to acquire up to date instrumentation and on the story goes. Where it ends, nobody knows.

Department of Biochemistry
and
Molecular Biology
The First 50 years
1961-2011

Chapter One

Before the Biochemistry Department

Biochemistry as a profession at MSU had its start in 1863 when the Department of Agricultural Chemistry was formed by the Agricultural College of the State of Michigan which was created in 1855. Because the Agricultural College grew over the years, the Agricultural Chemistry Department was split into a research support department in the Agricultural Experiment Station and an instructional Division of Biological Chemists in the Chemistry Department. Then on April 16, 1959, the Board of Trustees granted the research support group of faculty in the Department of Agricultural Chemistry the same status as all other members of the University Faculty, that is, they could teach and do research. Two years later the Department of Biochemistry was formed on April 1, 1961, by combining the Department of Agricultural Chemistry with the Biological Chemistry Division in the Chemistry Department (MSU Board of Trustee's minutes, March 31, 1961.)

Figure 1.1: Robert C. Kedzie, 1866. Courtesy of the Michigan State University Archives and Historical Collections.

Robert C. Kedzie was the first professor appointed by the Agricultural College who was interested in Biochemistry or Agricultural Chemistry, as it was known at that time. Kedzie graduated from Oberlin College in Ohio in 1847 and then in 1849 he completed requirements for a degree in medicine at the University of Michigan. After time spent in medical practice in Vermontville, Michi-

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gan (1852-1862), he enlisted in the 12th Regiment of the Michigan Infantry of the Union Army and was commissioned as an Assistant Surgeon on January 15, 1862. He was promoted to Surgeon on April 25, 1862 but because of health reasons, he resigned his commission on October 8, 1862 and returned to Michigan. Then in February 1863, he accepted a position as Professor of Agricultural Chemistry at the Michigan Agricultural College. It is important to realize that their was one Professor of Agricultural Chemistry meaning that he was the Head of the Department (Suelter, 1999; Merk, 1989; Barber, 1897).

In 1867, Kedzie was elected to the state legislature. Then because of his interest in public health, he was appointed by Governor Bagley to be on the newly established Michigan State Board of Health, a position he held for 8 years, serving as president for the last 4 years. He was also a member of the American Public Health Association and the Society for the Promotion of Agricultural Science from 1878-1889 (Suelter, 1999; Merk, 1989; Barber, 1897).

Figure 1.2: Photograph of R. C. Kedzie's "Shadows of the Wall of Death" showing the front cover of the book and one sample of the wall paper with the pigment containing arsenic trioxide and copper acetate. Courtesy of the Special Collections Library, Michigan State University.

In 1870, Kedzie began to investigate deaths of children and others who slept in rooms that had walls covered with wall paper. He soon discovered that the pigment on their wall paper contained arsenic trioxide and copper acetate. To inform the public about this discovery, Kedzie purchased 80 rolls of the arsenic impregnated paper, bound them into books that he entitled "Shadows from the Walls of Death" and sent copies to 100 libraries around the state (Kedzie, 1903)

Kedzie began a series of meteorological measurements in 1863 that he continued for over 30 years. Eventually these measurements led him to realize that the weather in

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Michigan compared favorably with the climatic conditions in Germany where sugar beets were being produced abundantly (Kedzie, F. S., 1934A). Kedzie then imported 1760 pounds of sugar beet seed from France and Germany and distributed them to farmers in all parts of the lower peninsula of Michigan with the request that they be planted and that specimens of the resulting sugar beet be sent to the college for analysis. Over 230 experimenters in 39 counties submitted beets for study. Analysis of the sugar obtained from these beets showed that Michigan beets were of sufficiently high percentage in sugar to be worthy of cultivation as a source of sugar. Additional beet seed was then distributed in 1897 and 1898. In total, 5300 pounds of sugar beet seed was distributed at no cost to farmers. The first sugar beet factory in Michigan, The Michigan Sugar Company, was constructed in Bay City, MI, in 1898. Such was the origin of the sugar beet industry in Michigan. (Kedzie, 1901; Kedzie, 1901A)

The movement to form Agricultural Colleges all over the United States soon resulted in the Morrill Land Grant Act of 1862 that was to have a major impact on the agricultural sciences (True, 1937, p. 40). This legislation provided support primarily for educational purposes; supporting experimental work was not given a high priority. Yet we

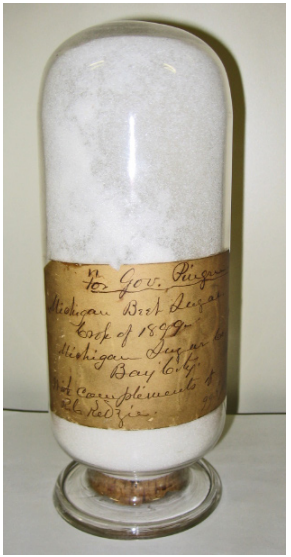

Figure 1.3: Glass container with Beet Sugar. The label reads:

For Gov. Pingree
Michigan Beet Sugar
Crop of 1899
Michigan Sugar Co.
Bay City

With compliments of
R. C. Kedzie

Courtesy of the Michigan State University Museum Historical Collections.

find that faculty at the State Agricultural College, particularly those in chemistry, botany, entomology, and agriculture, initiated experimental work or research in 1861. In fact, R. C. Kedzie authored the first report to the Board of Agriculture describing the results of chemical experiments with Michigan muck and methods of using it (Kedzie, 1863).

The research activity by faculty at the Agricultural Colleges around the country prompted the federal government to pass the Hatch Act in 1887 that provided support to the Agricultural Colleges to create the Agriculture Experiment Stations. After the Agricultural Experiment Station was formed by the Michigan State Agricultural College in

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1887, they awarded $600 to each of six professors for one third of their time: Robert C. Kedzie in Chemistry, Albert J. Cook in Zoology, William J. Beal in Botany, Samuel Johnson in Agriculture, Edward A. Grange in Veterinary, and Liberty Hyde Bailey in Horticulture. Then in 1892, the state Board of Agriculture voted that all experimental work was to be conducted by two departments-agriculture and horticulture-the other departments-chemistry, botany, entomology, and veterinary- would teach and be called for assistance. (Beal, 1915, pp. 298-305). The Adam's Act of 1906 supplemented the Hatch Act and placed special emphasis on research work (Snyder, 1914).

At this point in our discussion, it is important to know or remember that the Agriculture Division was the only administrative structure at the Michigan Agricultural College until April 21, 1885 when the Mechanical Division was formed followed by the Domestic Science Division on June 8, 1896 (1919-20 College Catalog, p. 18). So the Agriculture Experiment Station was created in the Agriculture Division shortly after the Mechanical Division was formed. R. C. Kedzie remained with the Agricultural Experiment Station and the Chemistry Department until his death in 1902 at 78 years.

As noted earlier, the Department of Agricultural Chemistry was first formed in 1863 with R. C. Kedzie appointed as the first Professor. The course in Agricultural Chemistry in 1863 involved a study of the formation and composition of soils; composition of air and its relation to vegetable growth; the connection of heat, light and electricity with the growth of plants; nature and sources of the food of plants; chemical changes attending vegetable growth; chemistry of the various practices on farms such as plowing, draining etc; and methods of chemically improving soils by mineral, vegetable, and animal manures; chemical composition of crops and their uses as food, including the chemistry of diary products; and the preparation of food for animals and man.

The course in Agricultural Chemistry was offered every year from 1863 to 1883 by the Department of Agricultural Chemistry and then by the Department of Chemistry until 1923. The 1905-06 College Catalog shows, that in addition to Agricultural Chemistry, the Chemistry Department offered Domestic Science Chemistry for women students who studied foods by quantitative methods; Experimental Agricultural Chemistry for students who analyzed feeding stuffs and farm products, fertilizers, soils, and drainage water; Chemistry of Animal Nutrition for students who

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analyzed feeding stuffs supplemented by experiments with animals to determine digestibility of various rations. The 1923 College Catalog shows that in addition to Agricultural Chemistry, the Department of Chemistry offered Biological Chemistry, Physiological Organic Chemistry, Plant Chemistry, Crop Chemistry, Fertilizer Chemistry, Food Analysis, Dairy Chemistry and other courses with biological content. While the course in Agricultural Chemistry was taught from 1863 to 1923, the Department of Agricultural Chemistry in the College of Agriculture headed up by Professor R. C. Kedzie, was disbanded in 1883 (1883-84 College Catalog, pp. 26-30). The Agricultural Experiment Station formed a Department of Agricultural Chemistry in 1944 (1944-45 Telephone Directory). Faculty in this department did not teach; they performed analytical functions or collaborated with various faculty in other departments in the College of Agriculture. Before that the Chemists in the Experiment Station were grouped under Chemistry, Experiment Station; this grouping was first noted in the 1925-26 Telephone Directory. Prior to that, the chemists in the Experiment Station had no formal organization.

Next it is of interest to examine where the laboratory work discussed above was conducted. To begin with, the Chemistry Department occupied the first floor of the first college classroom building called College Hall that was built in 1856 (Figure 1.4). Then the department moved into the first Chemistry Building, a white brick building, that was constructed in 1871 in an area now occupied by the Main Library. The building was designed for 48 working students (Haigh Jr., 1871). An increase in enrollment and the need for special instruction in chemistry in other areas compelled the board to enlarge the laboratory in 1881; this was done by adding an addition to the south. The building then came to be known as the "Chemical Fort" because of its moderate height and flat roof (Beal, 1915, pp. 268-269). Again, because

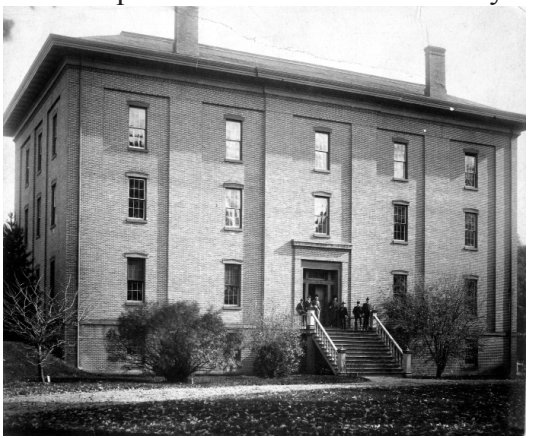

Figure 1.4: The first college classroom building, College Hall, built in 1856; it collapsed in 1918. When built, the chapel and chemistry occupied the first floor; the second floor had two recitation rooms and four offices; the library, museum and three recitation rooms were on the third floor. It was located essentially in the area occupied by Beaumont Tower today. Courtesy of the Michigan State University Archives and Historical Collections (MSU Buildings, College Hall).

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Figure 1.5: The first Chemistry Building, designed by Professor R. C. Kedzie, was built in 1871; it was enlarged in 1881, and again in 1911, and finally demolished in 1955. Courtesy of the Michigan State University Archives and Historical Collections (MSU Buildings, Physics and Electrical Engineering.).

of increased enrollments, space became a problem so that the Chemical Fort was added onto again in time for the opening of the 1911-12 college year. The new red brick addition to the east provided space for a new lecture hall on the main floor (top) with a sky light over the lecture table. The lower floor housed a new organic laboratory that provided space for more than 60 students at one time (Kedzie, 1912). However, some ten years after the last addition to the Chemistry Building, work of the chemistry department was scattered among four different buildings (Clark, 1922).

After the Agricultural Hall was built in 1909, the Chemists associated with the Agricultural Experiment Station, were moved into the entire northeast wing of the third floor by January 1, 1910. Room 301 was a research laboratory devoted to soil chemistry: a small dark room for photographic work was connected to this laboratory. The Library (Room 302) also provided space for the stenographer. The Library contained subscriptions to the Journal of the American Chemical Society, Journal of Industrial

Figure 1.6: Agriculture Hall built in 1909 (Stanford and Dewhurst 2002). Courtesy of the Michigan State University Archives and Historical Collections (MSU Buildings, Agriculture Hall folder).

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and Engineering Chemistry, Abstract Journal, Journal of Physical Chemistry, Zeitschrift für Physiologische Chemie (Journal of Physiological Chemistry), and Die Landwirtschaftlichen Versucho-Stationen (The Agricultural Experiment Station). Room 302-1 was the Chemist's private office and Room 303 was the private laboratory of the Chemist that he devoted to Soil Chemistry. A general laboratory (Room 304) was used for analytical work. All nitrogen determinations were conducted in Room 304-1 while 304-2 was the general stock room. Room 305 was used as a general utility room for preparing samples, unpacking boxes, etc (Shaw, 1910). When R. Guarth Hansen was appointed Head of the Agricultural Chemistry in 1957, his office was in 320 Agricultural Hall (1957-58 Telephone Directory). Unfortunately, Room 320 no longer exists since it was destroyed by fire and was not replaced.

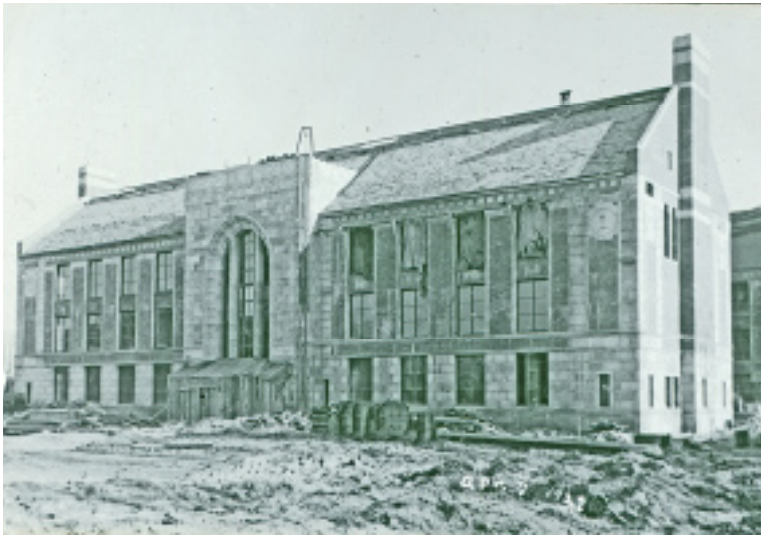

Figure 1.7: Kedzie Chemical Laboratory in early 1927. This photograph was created by the Photographic Division of the Department of Physics, Michigan Agricultural College. Courtesy of the Michigan State University Museum Historical Collections.

As noted earlier, by 1922, the Department of Chemistry had staff in 4 different buildings. Eventually this over crowding led to the building of Kedzie Chemical Laboratory in 1927 (Figure 1.7).

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Figure 1.8: Sparty. In April 1926, the Michigan State College Aggies became known as the Michigan State Spartans (Kuhn, 1955). The original Terra Cotta sculpture of “The Spartan” was created by Leonard D. Jungwirth (1903-1963) in 1945. A bronze cast, as shown, was made in 2005: the original is in the lobby of Spartan Tower.

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Chapter Two

Department Startup

Sometime during the Summer of 1956, Tom Cowden, Dean of the College of Agriculture at Michigan State University, called Professor Guarth Hansen at his home in Urbana, Illinois and asked him to come to East Lansing to interview for an administrative position in Agricultural Chemistry. Hansen politely declined, however, stating that he had no interest in administration and besides he had been away from the family for three months and they were planning a vacation. Complicating the situation was the fact that Professor Hansen had just been awarded a Fullbright Fellowship to work with Luis LeLoir in Buenos Aires, Argentina, a well-known biochemist making great progress in a similar research field as his. Dean Cowden, however, not being one to give up on his endeavors, called again later that summer and suggested that if he had cause to be in Chicago he would like to meet him there and describe the job. As circumstances would have it, Hansen had a meeting in Chicago that Fall, so a meeting was arranged with Dean Cowden at the old LaSalle Hotel. Dean Cowden's manner and style appealed to Professor Hansen enough that he agreed to travel to East Lansing for an interview. After an offer was made, Michigan State University agreed to wait a year for his appointment, but Hansen decided it had to be one or the other- Argentina or Michigan State University, but not both (Hansen, 2001). As we know, he chose to come to Michigan State University.

During the interview at Michigan State University, Dean Cowden and Professor Hansen met with President John Hannah for about one hour. When the President

Figure 2.1: A view of the John Hannah Sculpture in front of the Hannah Administration Building, North Campus.

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learned of Professor Hansen's vision for a Department of Biochemistry, he was delighted since this would compliment his plan of creating a Medical School at Michigan State University. Hansen visualized a department in which the faculty would have full citizenship in the academic community, that is, they would teach and provide instruction for biochemistry majors, medical students, other biological science majors, and create a research program (Hansen, 2001). On November 1, 1957, Roger Guarth Hansen was appointed Chairman of the Department of Agricultural Chemistry in the Agricultural Experiment Station (Board of Trustee's minutes, October 18, 1957). He replaced E. J. Miller who had been Chairman of the Chemists and the Department from 1931 to 1956 (Directory, Michigan State College, 1931-1932; MSU Faculty Staff Directory, 1955-1956).

A year and half after Professor Hansen was appointed as Chairman of the Department of Agricultural Chemistry, the Board of Trustees adopted a resolution at their April 16, 1959 meeting to drop the word "research" from the academic titles of the staff of the Department so that these faculty had the same status as all other members of the university faculty, that is, they could teach and create their own research program. Then by the Fall Term 1960, the Department of Agricultural Chemistry offered the following courses jointly with the Department of Chemistry:

CEM 870: General Biochemistry
CEM 871: General Biochemistry
CEM 872: General Biochemistry
CEM 873: General Biochemistry Laboratory
CEM 874: General Biochemistry Laboratory
CEM 875: General Biochemistry Laboratory

The Department of Chemistry also offered the following courses:

CEM 261: Biochemistry
CEM 262: Biochemistry: Animal
CEM 263: Biochemistry: Blood and Urine Analysis
CEM 363: Biochemistry: Clinical
CEM 364: Biochemistry: Plant
CEM 365: Dairy Chemistry
CEM 470: Biochemistry

Other courses offered by the Department of Agricultural Chemistry included graduate student research, research methods, special problems of current interest, and a seminar. Nine graduate students were majoring in Agricultural Chemistry and three additional students were doing much of their research in the department as joint majors. There were also three postdoctoral trainees in the department.

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Figure 2.2: Food Science Building, originally called the Old Dairy Building, because it served as the college dairy when it was built in 1913. It provided laboratory space for Agricultural Chemistry from 1958 to 1964: it was demolished in 1987. Michigan State University Archives and Historical Collections (MSU buildings, Soils Science building folder).

In 1958, the Department of Agricultural Chemistry moved into the Food Science Laboratory, which had been extensively remodeled for Agricultural Chemistry and Dairy Technology (Cowden 1956). This building, built by September 1, 1913, was two stories high and had a basement (1912 College Catalog, p. 25): it was demolished in August 1987 (Robertson, et al., 1988). The agricultural chemists occupied the second floor and the basement but they also had laboratory space on the fourth floor of the agriculture building and in the horticulture

Agricultural Chemistry
209 Food Science Laboratory

Hansen, R. Guarth; Head

Professors
- Benne, Erwin J.
- Duncan, Clifford W.
- Evans, Robert J.
- Luecke, Richard W.
- Sell, Harold M.
- Wood, Willis A.

Associate Professors
- Bandemer, Selma L.
- Fox, Allen S.

Assistant Professor
- Salsbury, Robert L.

Instructor
- Bass, Samuel T.

Research Associates
- Anderson, Richard L,
- Burnett, Jean B.
- Kearney, Philip C.
- Meloche, Paul M.
- Miyamoto, Takao
- Okuhara, Eiji
- Singh, Indra Pal

Table 2.1: Listing of the Agricultural Chemistry Department staff in the 1960-61 Faculty and Staff Directory, Michigan State University Library.

Graduate Research Assistants
- Albornoz, Americo
- Baldwin, Ransom
- Bretthauer, Roger K.
- Carlson, Don M.
- Cole, Richard C.
- Correll, David
- Fuchs, Morton S.
- Kuczmak, Myron
- Mayes, Jary S.
- Mead, Charles G.
- Nordin, John H.
- Parzen, Sheldon D.
- Ritzert, Roger W.
- Ruckle, Homer A.
- Samli, Marcqueta H.
- Yoon, Sei Byung

Others
- Baltzer, Betty V.
- Bauer, Doris H.
- Beck, Doris J.
- Bretthauer, Donna R.
- DeNio, Diane M.
- Fowler, Ruth S.
- Genusa, Carol M. J.
- Hampton, Shirley A.
- Jacobs, Linda B.
- Kerr, Mary H.
- Linden, Elizabeth I.
- Titus, Carolyn K.
- Wacasey, Mary A.
- Wilcox, Leslie A.
- Wreede, Trudi B.

Emeritus
- Lightfoot, Ceylon C.
- Miller, Elroy J.

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Figure 2.3: The Biological Chemists in the Department of Chemistry in 1959. They are (l to r, back row) Hans Lillevik, James Fairley, Unknown, John Justice, Gordon Kilgour, Rashid Anwar, John Speck, James Summary, Unknown, Burt Lambert, Richard Byerrum, Carl Hoppert. (l to r, middle row) Victor Krampl, Thomas Griffith, Rene Evard, Clarence Broomfield, Unknown, Kenneth Hellman, Jagan Ahuja, John Riehm. (l to r, front row) Unknown, Unknown, Gail Brown Griffith, Jesse Boyd, Unknown, and Parvin Medhat. Photograph courtesy of John C. Speck. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

building. Three years after they moved into the Food Science Building, the Board of Trustees approved the establishment of a Department of Biochemistry responsible to the College of Agriculture and to the College of Science and Arts with Roger Gaurth Hansen designated as head of the department, effective April 1, 1961 (MSU Board of Trustee's minutes March 31, 1961). This new department was to replace the Department of Agricultural Chemistry and provide a home for the biological chemists in the Department of Chemistry. Table 2.1 provides a listing of the staff (total 49) of the Agricultural Chemistry Department in the Fall of 1960 and Figure 2.3 is a photograph of those in the Biological Chemistry Division of the Department of Chemistry in the Fall of 1959: the

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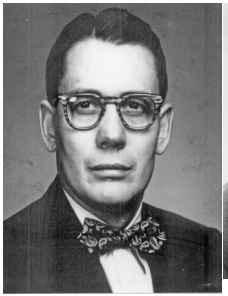


R. Guarth Hansen
Chairman

Allen Fox: Photograph courtesy of University of Wisconsin-Madison Archives.

faculty of the newly formed Department of Biochemistry is shown in Figure 2.4.

Shortly after the Department of Biochemistry was formed, the faculty and staff began a systematic design of its course offerings to reflect the needs of students with a major interest in biochemistry including medical

Erwin Benne

N. Edward Tolbert

Willis W. Wood

Hans Lillevik

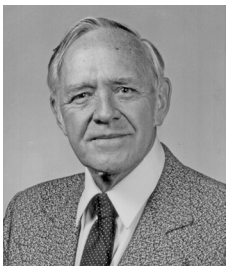
Carl Hoppert

Harold Sell

Robert Evans

Clifford Duncan

John Speck

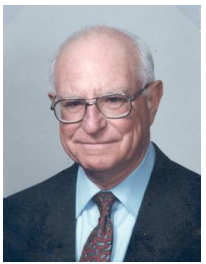


James Fairley

Selma Bandemer

Richard Luecke

Richard Anderson



Richard Byerrum

Gordon Kilgour

Figure 2.4: Faculty of the newly formed Department of Biochemistry on April 1, 1961. A photograph of Richard Salsbury was not available.

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students and those who required biochemistry in their major. Space and equipment limitations did not permit the department to revise laboratory courses as desired by the staff. Then in response to a demand from students and the perceived shortage of trained biochemists, an undergraduate program was initiated in 1962 (Hansen, 1962).

The new biochemistry group lacked coherence, however. They needed a common facility since faculty and staff members were spread among four buildings: Agriculture Hall, Horticulture Building, the Food Science Building, and the Kedzie Chemistry Building. Late in 1959, before the Department of Biochemistry was officially formed, R. G. Hansen sent a proposal to Provost Paul Miller stating that the future growth of biochemistry at MSU required that immediate attention be given to providing adequate housing for the current group of biochemists and the addition of new biochemists. The current research laboratories were widely scattered, extremely limited, and by all standards, inadequate in comparison with the biochemical facilities at major institutions throughout the United States. In Hansen's view, it was appropriate to formulate a proposal to the National Institutes of Health, an agency with funds to assist the development of this type of program on university campuses, even though the guidelines for a grant from NIH required a separate definition of teaching and research facilities and funds in support of construction of research facilities had to be matched by the University. Furthermore, funding would not be provided for classroom space in either a lecture or laboratory setting, but would support construction of research laboratories for use by graduate students of staff members. In short, Hansen proposed that plans be formulated for a biochemistry building, that consideration be given to requesting 50% of the cost from the National Institutes of Health, that other major research foundations and organizations be invited to participate, and that consideration be given to any other source of funds which the University deemed appropriate (Hansen, 1959).

Despite some negative comments by Laurence L. Quill, Head of Chemistry, who argued that the University must not lose sight of its teaching function (Quill, 1959), requests were made as early as 1960 for each staff member in the Department of Agricultural Chemistry to design a laboratory that would meet their needs. A number of research laboratories were also visited at other universities and industries (Hansen, 1963). Following that, a discussion group, primarily Guarth Hansen,

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Department Chairperson, Willis A. Wood, and Nathan Ed. Tolbert, all Professors of the Department of Agricultural Chemistry, held intensive discussions over several months prior to the selection of architects for the building. This group was determined to participate strongly in all affairs relating to the design and construction of the building. As faculty with extensive experience in biochemical research, they had strong opinions about the requirements for conducting cutting edge research as well as training graduate students. This focus on the building by the faculty noted above extended to virtually all aspects of the building design and construction. When specific dimensions and details were needed by the architects, mockups were made and evaluated for chemical resistance and retention of radioactive substances (Wood, 2010).

After the Department of Biochemistry was created and a new building designed, a proposal was submitted to the facilities division of the NIH for one-half of its estimated cost of $5.2 million; the other half was to be matched by the university. According to Hansen, this proposal for a new building was forwarded by the MSU Central Administration to NIH along with a proposal from the College of Veterinary Medicine for a new building to house the Department of Surgery and Medicine (Hansen, 2001). (A copy of these proposals has not been found.) Then on September 13, 1961, a memo was sent out by Richard U. Byerrum, Assistant Provost, stating that 5 individuals including the Chief of the Health Research Facilities Branch of NIH, the President of Upstate Medical Center, State University of New York, Vice President for Medical Affairs, University of Colorado, the President of Montana State College, and the Dean of the College of Veterinary Medicine, University of Minnesota were to visit the University on September 15, 1961 (Byerrum, 1961). Shortly after this site visit, Professor Hansen received a private phone call from NIH stating that their proposal for a new building had carried the day and the approved amount was for exactly what was requested. He also stated that their policies precluded interference with campus decisions. In any case, the University only committed one half of the grant request to biochemistry. According to Hansen, Philip J. May, Vice-President of Business and Finance, was of the opinion that the Biochemistry Department did not need such a large building (Hansen, 2001).

A couple of months later President John Hannah received a letter from the Chief of the Health Research Facilities Branch of the National Institutes of Health, dated

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November 21, 1961, advising him of the March 1, 1962, deadline for a proposal to be received in Bethesda, MD: carbon copies of this letter were addressed to Dr. (R. U.) Byerrum (Assistant Provost), Dr. (Willis) Armistead (Dean of the College of Veterinary Medicine), and Dr. (R. G.) Hansen (Schmehl, 1961). No doubt as a result of this letter, a proposal was submitted to the Department of Health, Education, and Welfare, Public Health Service of the National Institute of Health, dated March 1, 1962, for $3,267,283 entitled "Biochemistry and Biomedical Research Buildings." Richard U. Byerrum, Asst. Provost and Professor of Biochemistry was listed as the Principal Investigator. The funds requested were to cover the costs of construction of a Biochemistry Building and a Department of Medicine and Surgery building to house the basic medical science departments and an Institute of Biology and Medicine (Byerrum, 1962).

It is important to realize that President John Hannah was moving aggressively at this same time to establish a medical school. The committee he appointed to study the possibility of establishing a Medical School reported to the Board of Trustees in December 1960 with the following recommendations:
1. That a detailed planning study be undertaken immediately to develop and implement for Michigan State University a unique program in biology and medicine;
2. That a commonwealth grant of $167,000 be used to finance this study;
3. That Richard U. Byerrum, Assistant Provost, be designated as director of the study;
4. That outstanding educators from on and off campus be assembled to assist in the planning;
5. That the following persons serve as an advisory committee to the director of the study: Vice-President of Research and Development Milton E. Muelder, Dean of Agriculture Thomas Cowden, Dean of Science and Arts Lloyd C. Ferguson, Dean of Veterinary Medicine W. W. Armistead, and Provost Paul Miller, ex officio.
6. That regular reports be submitted to the provost, president and the Board of Trustees (MSU Board of Trustee's minutes, December 16, 1960).

As part of this process, an Institute of Biology and Medicine was established by the Board of Trustees at their November 17, 1961 meeting; R. U. Byerrum was named as acting director (MSU Board of Trustee's minutes, November 17, 1961). The aims of the Institute of Biology and Medicine were to:
1. Provide for an expanded advanced degree program

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in the basic biological sciences which would ultimately result in the preparation of more individuals to teach in medical schools or to do industrial research;

2. Strengthen, through the hiring of additional staff and through broadening of the curricula, the health-related professions now existing at the University (veterinary medicine, animal science, medical technology, and nursing education);

3. Provide a 2-year preclinical human medical program;

4. Develop an integrated curriculum, both at the undergraduate and graduate levels, which would emphasize the comparative approach to the biological sciences, and allow students to choose as late as possible in their training program among the health related professions or the various degree programs in the basic biological sciences;

5. Promote research in the basic biological sciences and the health related professions (Byerrum, 1961b). The Director of the Institute of Biology and Medicine was to work with the provost's office to identify, coordinate, and integrate resources which would contribute to and be strengthened by a medical school (Downs, 1967b)

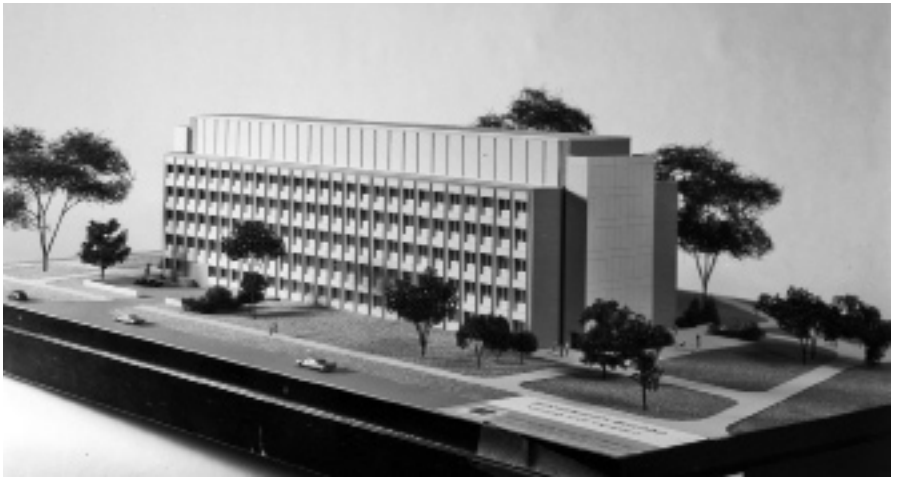

Figure 2.5: The proposed Biochemistry Building. Mark Haslam, Physical Plant Engineering and Planning. Photograph 63286-4. Michigan State University Archives and Historical Collections, East Lansing, MI.

(Suelter, 2007). Thus it seems reasonable to conclude that the Central Administration used the proposal for a new Biochemistry Building to support the construction of a Veterinary Clinic and thus promote the development of a stronger Medical School.

The proposal to NIH with R. U. Byerrum as the Principal Investigator was approved in December 1962 for $2 million of which $1.4 million was to support construction of a biochemistry building with the remainder being used

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for construction of a Veterinary Clinic (Weston, 1979). This meant that the Department of Biochemistry needed at least $1.2 million more, to be matched by the university, to build the desired building. As a result, Guarth Hansen submitted a proposal to the National Science Foundation which he signed on February 13, 1962 for matching funds for construction of facilities for graduate training and research in biochemistry: he requested $1,213,040 (Hansen, 1962b). Five weeks later Hansen received a letter from J. M. Leise, Program Director for the Life Sciences Facilities Office at the National Science Foundation informing him that a site visit was planned for April 30, 1962: site visitors included Louis Levin, Brandeis University, Vernon Cheldelin, Oregon State University, George Lefevre, Harvard University, and J. M. Leise, NSF (Leise, 1962). Then President Hannah received a letter dated November 2, 1962 informing him that the sum of $1,213,000 was granted to Michigan State University of Agriculture and Applied Science for the construction of new research facilities for the Department of Biochemistry (Robertson, 1962). Soon Guarth Hansen also received a letter from the National Science Foundation dated November 7, 1962 informing him of the grant for $1,213,000 of which $1,103,000 could be used for construction and no more than $110,000 for general purpose research equipment. Each of these two amounts had to be matched by non Federal Funds (Goff, 1962). This grant was accepted by the Board of Trustees at their meeting on November 16, 1962.

Initially, the university architects and physical plant officials wanted the new building placed south of the railroad tracks between Farm Lane and the Physical Plant Buildings. However, due to the intervention of Dean Thomas Cowden of the College of Agriculture, the building was built in its present location (Hansen, 1965a; Hansen, 2001; Wood, 2003).

The University Architect, with the help of the faculty discussion group noted earler, created a modular design since many of the features of each individual laboratory were common. This design was created to allow maximum flexibility so that only a minimum of changes were needed to meet the needs of shrinking and expanding research programs of individual faculty members and teaching programs. Furthermore, repetitive units had the advantage of minimizing construction and maintenance costs. The plan for the building included a basement and five floors. The basement was to house the service functions, the first floor was designed to accommodate

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all the teaching then conducted in two Quonset buildings, the third floor of Kedzie Hall and the basement of the Food Science Laboratory. The second, third, fourth and fifth floors were designed with maximum flexibility for approximately 22 research groups. Final detailed blueprints and specifications were prepared with Professor N. Edward Tolbert in charge with major assistance from Professor Willis A. Wood and other members of the staff (Hansen, 1963).

After the plans were circulated and bids requested, the low bids were submitted by Granger Construction Company of Lansing, general contractor, $1,837,000; John E. Green Plumbing and Heating of Detroit, mechanical, $1,414,000; Keawaunee Manufacturing Company, laboratory casework, $599,000; Hatzel and Buehler, Inc., electrical, $345,000; Westinghouse Electric Corporation, elevators, $61,498; and Detroit Sterling Hardware, finish hardware, $15,980. Fees, such as $220,000 for the architect, $71,000 for the site, $200,000 for utilities, $150,000 for parking, $50,000 for supervision and bonds, $200,000 for movable equipment and $16,122 for contingencies, brought the total to $5.2 million (Hansen, 1963) (Board of Trustees minutes, March 20, 1963). Construction of the building began on April 5, 1963, and was completed by December 1964. Our best accolades must go to Professor Tolbert who spent the better part of a year virtually living in the building so as to iron out construction problems and insure that the design concepts were followed (Wood, 2010). Occupancy of the building was begun in December 1964 and completed by the end of January 1965 (Hansen, 1963).

As part of the NSF grant, Guarth Hansen was required to submit a final report. This he did on August 12, 1965 as an attachment to a letter addressed to Dr. J. M. Leise, Head of the Science Facilities Section, NSF. He noted that the building was occupied on January 1, 1965 by 24 faculty, 13 postdoctoral fellows, 65 graduate students, 17 technicians, 6 office staff, one animal caretaker, and 35 others including students. He also noted that 32 personnel from the Plant Science Research Institute, now known as the MSU-DOE Plant Research Laboratory, and two from the Department of Entomology were in the building. The personnel from the Plant Research Laboratory were being housed temporarily while their own facility was being constructed and the Entomology Department was expanding and expected to occupy new space in the near future. He did not expect to house these personnel for more than two years because staff members for our three

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unfilled positions were to occupy these facilities when vacated (Hansen, 1965c).

The final report listed the research projects including the title and budget transferred to the new facility, new projects made possible and initiated or to be initiated by the move, graduate training programs being conducted, the new seminars by faculty and students made possible by the new facility, the disposition of old facilities, work done on grant support during the period of its support and a summary of all changes made in the construction and renovation plans. No construction or renovation difficulties were reported and other comments, suggestions, and photographs were provided. He also noted that the psychological effects upon the morale and effectiveness of the faculty, students, and research workers had been rather striking. It was now possible for faculty to become familiar with their counterparts and their programs which was previously impeded by the dispersion into four buildings (Hansen, 1965c). After J. M. Leise received the final report submitted by Hansen, he responded by noting that they approved of having the Plant Science Institute and the Department of Entomology occupy part of the space but that they would like to be informed when the space reverted back to its original planned usage by the Department of Biochemistry (Leise, 1965).

Records show that the Plant Research Laboratory occupied Rooms 301, 302B, 409, and 413 (Memorandum, 1965). According to Anton Lang, Director of the Plant Research Laboratory, the laboratory personnel were to be moved into their new building by June 10, 1966. He also recommended that representatives from the Biochemistry Department, the Plant Research Laboratory and the Physical Plant go over the space to determine if any repairs should be made. In addition, he requested permission to continue using some of the growth chambers in Room 5 and the Library in Room 202 (Lang, 1966) About a month later, Professor Hansen informed the National Science Foundation that the Plant Research Group had completed their move into new quarters and that the laboratories they occupied were being readied for occupancy by the new Biochemistry appointees (Hansen, 1966).

After the contracts for the new building were signed, the Biochemistry Faculty began to consider the dedication program for the new building. They discussed the time of the symposium, financial arrangements, local

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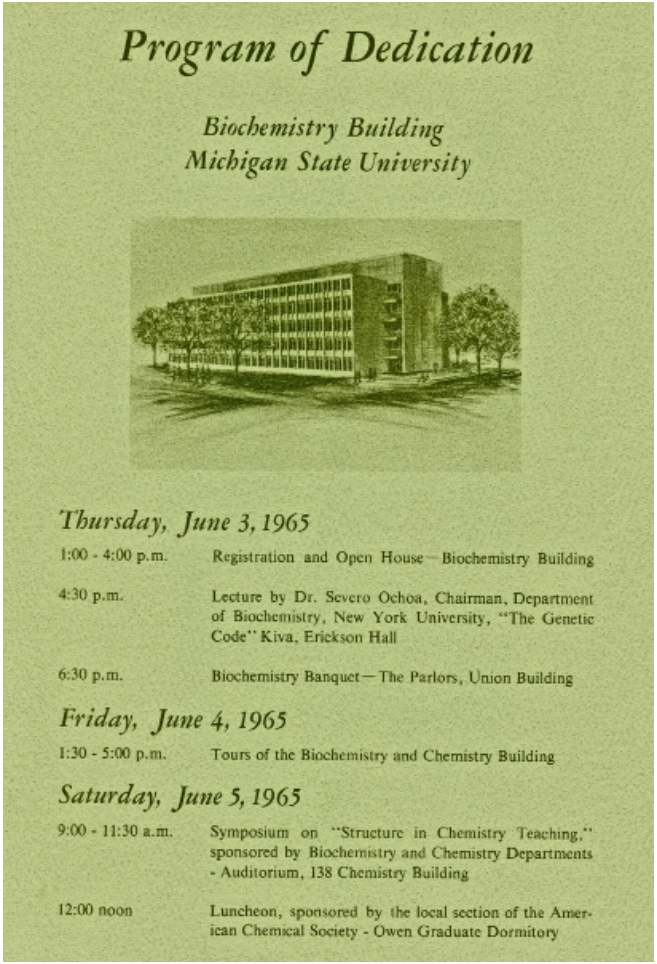
arrangements, audience, subject matter, publication policies, and its function and purpose (Hansen, 1963a). Then a meeting was held on March 19, 1965, in which it was reported that Thursday June 3, 1965, had been established for the Biochemistry's Dedication ceremonies and June 4, 1965 for the Chemistry's Dedication. The plans were being made for Dr. Severo Ochoa to present a lecture at 4:45 pm at the Kiva in Erickson Hall followed by a banquet at the Student Union at 6:30 pm that evening. It was also recommended that Professor Hansen serve as master of ceremonies at the banquet and that he give the background of the planning and realization of our new facility and how it is to serve. He was also asked to introduce people and recognize those who should receive special notice. Records show that 42 faculty from MSU, 21 from other Michigan Colleges, 28 biochemists from off campus, 6 former staff and students, 12 chemists from MSU, and 91 from the biochemistry department, making a total of 200, attended the dedication banquet in the Student Union (Minutes, 1965).

The local newspapers reported that Two Nobel Prize winners were to help dedicate new research and training



Program of Dedication

Biochemistry Building
Michigan State University

Thursday, June 3, 1965

1:00 - 4:00 p.m. — Registration and Open House — Biochemistry Building

4:30 p.m. — Lecture by Dr. Severo Ochoa, Chairman, Department of Biochemistry, New York University, "The Genetic Code" Kiva, Erickson Hall

6:30 p.m. — Biochemistry Banquet — The Parlors, Union Building

Friday, June 4, 1965

1:30 - 5:00 p.m. — Tours of the Biochemistry and Chemistry Building

Saturday, June 5, 1965

9:00 - 11:30 a.m. — Symposium on "Structure in Chemistry Teaching," sponsored by Biochemistry and Chemistry Departments - Auditorium, 138 Chemistry Building

12:00 noon — Luncheon, sponsored by the local section of the American Chemical Society - Owen Graduate Dormitory

Figure 2.6: Program of Dedication, Biochemistry Building, Michigan State University, Thursday, June 3, 1965. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI

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facilities at MSU during ceremonies June 3-5, 1965, for a $5.2 million biochemistry building and a $6.6 million chemistry building. The chemistry building was funded by an appropriation from the state Legislature. Dr. Severo Ochoa, 1959 Nobel Prize winner in medicine spoke June 3, on the "The Genetic Code." Dr. Willard F. Libby, 1960 winner in chemistry spoke June 5 on atomic chemistry (The State Journal, May 27, 1965; State News, May 27, 1965).

Figure 2.7 provides a view of the South Campus Science Complex in March 1963. Note the vacant field south of the Biochemistry Building.

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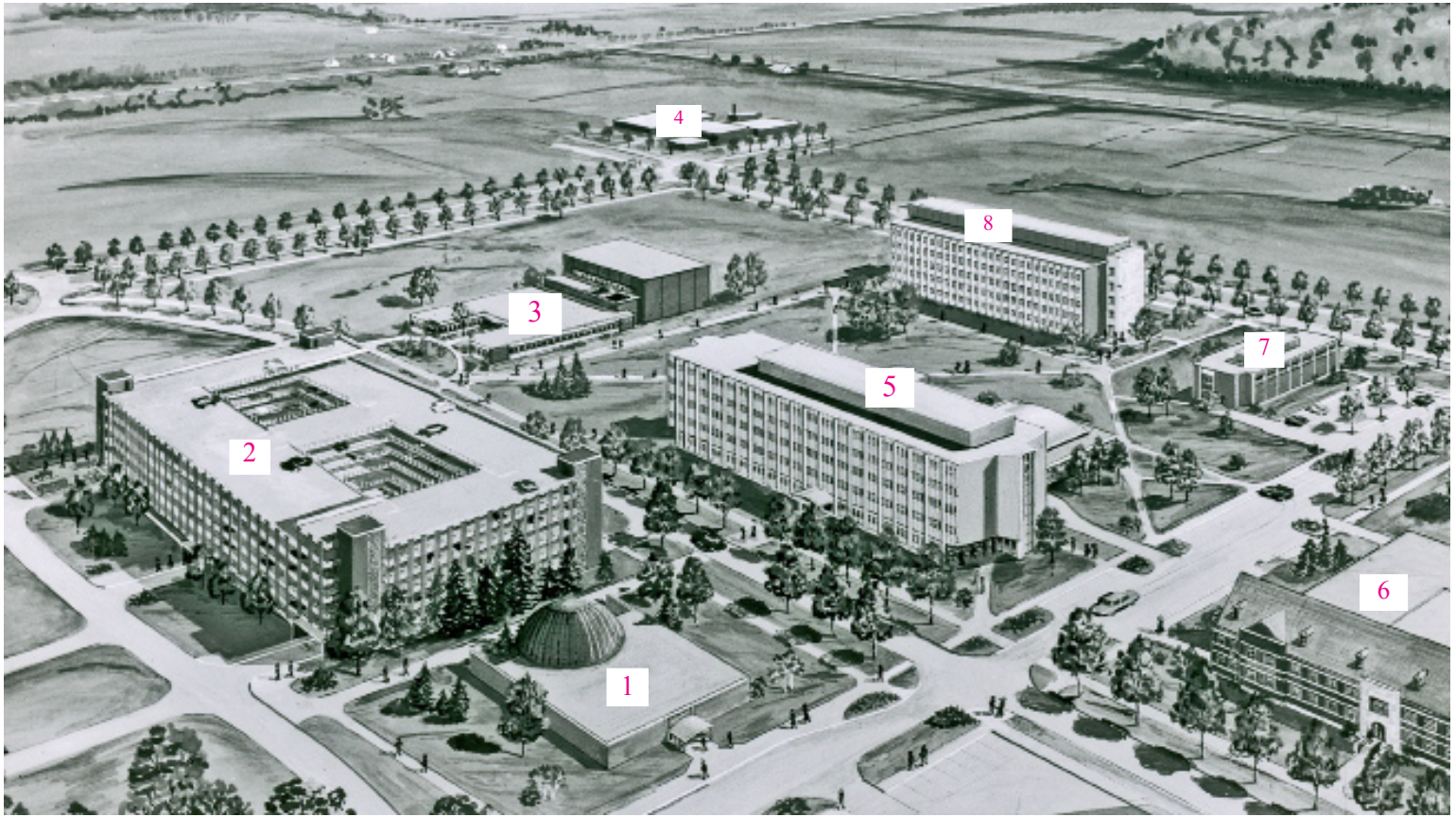

Figure 2.7: South Campus Science Complex, Michigan State University in March 1963. Included in the Complex are: (1) the Planetarium slated for operation in June 1963; (2) Parking Ramp; (3) Cyclotron built in 1964; (4) Veterinary Medicine built in 1965; (5) Chemistry built in 1965; (6) Agricultural Engineering built in 1948; (7) Biology Research Center built in 1960 and demolished in 2000;, and (8) Biochemistry. Illustration by the Division of Physical Plant Planning and Development. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI. (Science Complex, 1963).

Chapter Three

The Biochemistry Building

The five story Biochemistry Building built in 1963-64 was constructed of fire-resistant material throughout and contained 156,000 square feet of floor space. Much of the mechanical and electrical equipment necessary to operate the building was located in the penthouse. Exterior materials are limestone, brick and glass. Special dense concrete with a marble aggregate was used for the floors except for some offices where a tile covering was used. The interior walls were finished with hard, durable epoxy-based materials. Ceilings were made of acoustical material and were easily removable to provide access to all mechanical, electrical, and special services. The research laboratories were designed on a modular system with interconnections between areas, thus permitting laboratory rearrangements to meet the needs of changing research programs. The metal laboratory furniture in the teaching and research laboratories were finished in an attractive light green color. Bench and table tops were built of a special gray material, instead of the customary black, to reduce glare and visual fatigue.

Figure 3.1: A view of the Biochemistry Building under construction in the summer of 1963. The Cyclotron Building can be seen behind the steel structure. Courtesy of Theodore Jackanicz, Ph.D. 1965. UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI.

The basement was designed to house the building utilities including the electrical substation (Room 10), the building compressors (Room 8 and 10A), the telephone interchange (Room 10B), custodial services (Room 1, 1A, and

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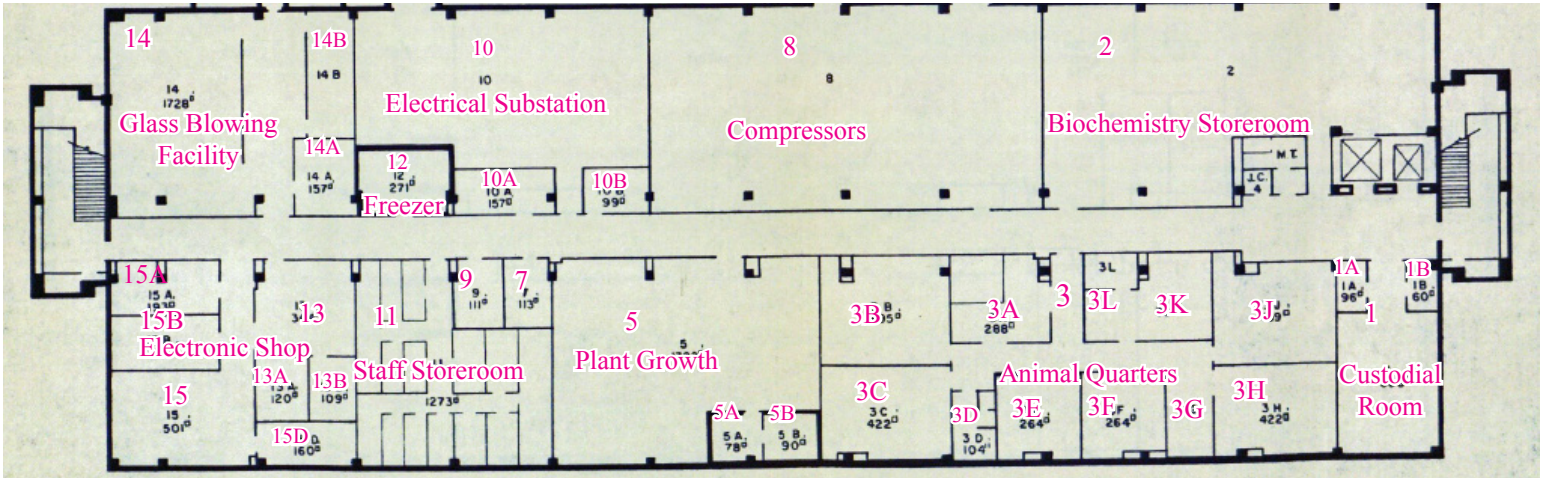

Figure 3.2: The design of the basement floor of the Biochemistry Building created by the Physical Plant Department of the Engineering Division of Michigan State University in October 1964.. The top of the design is the south side of the building. The assigned room numbers are in red. UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI

1B) and the Departmental services such as the biochemistry storeroom (Room 2), animal quarters (Room 3-3J), plant growth chambers (Room 5, 5A and 5B), staff storeroom (Room 11), electrical shop (Rooms 13, 13A, 13B, 15, 15A, and 15B), and the glass blowing facility (Room 14, 14A, and 14B).

The first point to be made is that the Glass Blowing Facility never materialized. On June 8, 1962, before the funds to build the biochemistry building were available, Guarth Hansen sent a letter to John Cantlon, Chairman of a subcommittee of the Graduate Council, relating comments made by the Biochemistry Staff at a recent meeting, namely that the University needed a Glass Blowing Shop, an Electronics Repair Shop, and a Machine Shop. He pointed out that these shops could be managed in more than one way but preferred that they service the whole University (Hansen, 1962c). About a year later at the meeting of the Graduate Council on May 6, 1963, it was reported that the Biochemistry Department was planning a modern glass blowing shop and that the Chairman of the Department, Dr. Hansen, had indicated a willingness to

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have the shop equipped to meet the university-wide role (Tucker, 1963). Later, Guarth Hansen sent another letter to Cantlon informing him that a competent, professional, master glassblower was asked to design a glass blowing shop to occupy about 2,000 sq. ft. of space in the basement of the new biochemistry building. Furthermore, he first understood that the the new chemistry facility was designed primarily to meet the needs of the Chemistry Department but that it now appears that they were desirous to meet the needs of the entire campus. However, he went on to say that the Biochemistry Staff felt that such a solution could only be temporary and that in the very near future the demands would far exceed the capacity of the chemistry facility. Thus, he argued that this situation should be carefully reviewed to insure a facility that met the needs of the entire campus (Hansen, 1963).

On March 15, 1963, a revised budget for the biochemistry building and its components was developed that allowed $30,000 to $40,000 for glass blowing equipment. No record has been found of actual purchases, but colleagues do remember a lathe and furnace in Room 14. Next a report issued by a Subcommittee on "Repair and Maintenance" of the Graduate Council dated October 16, 1963, entitled "An All-University Glassblowing Facility" recommended that a university-wide glassblowing facility be initiated immediately and established in the space provided in the new chemistry building. They went on to state that the projected needs for glass blowing on this campus could become inadequate in the next few years and that the shop incorporated in the new biochemistry building could be activated so as to absorb the necessary expansion (Cantlon et al., 1963). Now we know that sometime in late 1966, Professor Matt Zabik, Department of Entomology, moved into Room 14 and occupied the space until 1968 when he moved into the new Pesticide Research Center (Zabik, 2010). It is believed that the glass blowing equipment in Room 14 was then moved over to the Chemistry Glass Blowing Shop in Room 39, Chemistry Building. Again, no record of this move can be located. As a result, the space in the biochemistry building originally planned for a glass blowing shop (Rooms 14, 14A, and 14B) now serves as a Machine Shop for the repair and maintenance of scientific equipment such as centrifuges, refrigerators, vacuum systems, CO_2 incubators, mechanical, and custom machine shop equipment.

Room 11 was officially called the Staff Storeroom; unofficially, it was called the morgue (Snook, 2010). Faculty and staff stored a variety of items in this room. Room

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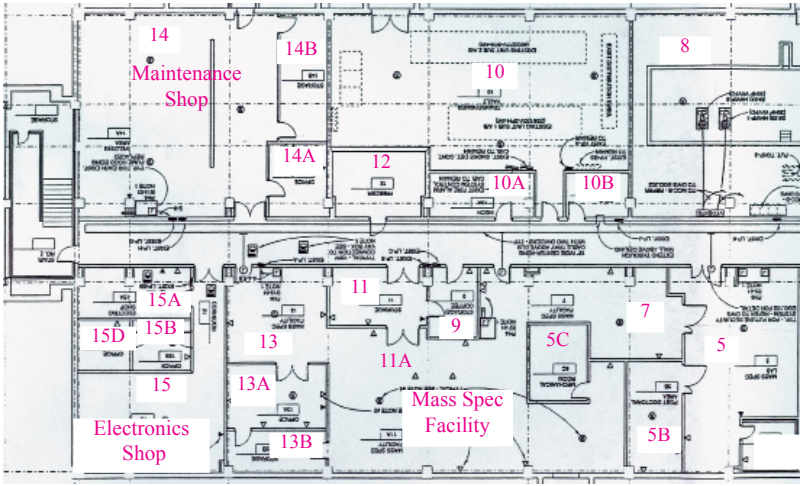

Figure 3.3: A schematic view of the East end of the basement of the Biochemistry Building in 2010. Rooms 1 - 8 are not shown. The top of the schematic is the South side of the building. UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI.

12 is a walkin freezer and was being used as such until 2010. The plant growth chambers as seen in Figure 3.4 were originally placed in Room 5: they were removed in 1985 to provide space for the Macromolecular Structure Facility. Rooms 7, 11, 11A, 13, 13A, 13B, and 15D were remodeled in 1979 to make room for the Mass Spectrometry Facility. As comparison of Figures 3.2 and 3.3 shows, Room 13B was originally 15D. The Electronics Shop then utilized Rooms 15, 15A, and 15B until late 2009 when the Electronics Shop was closed. These rooms have now been remodeled for the Proteomic Core Facility, which is part of the Research Technology Support Facility that has been in Room 3B since 2001. Rooms 14, 14A, and 14B continue to be used

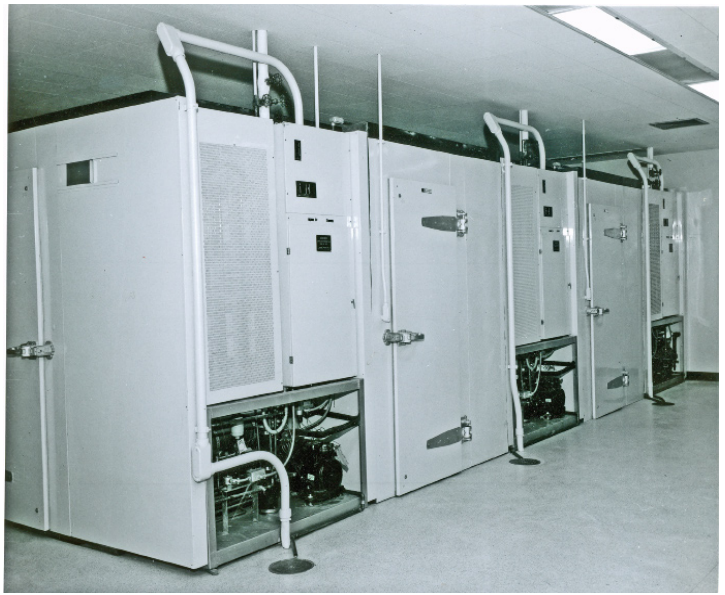

Figure 3.4: A view of the plant growth chambers installed in Room 5 of the Biochemistry Building in 1965. They were removed in 1985 to provide space for the Macromolecular Structure Facility. UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI.

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as the Instrument Repair Shop. Plans are also in progress to return Room 3B back to the Animal Quarters now that the Proteomics Facility has moved into the Electronic Shop, Rooms 15, 15A, 15B, 15D. The Animal Quarters

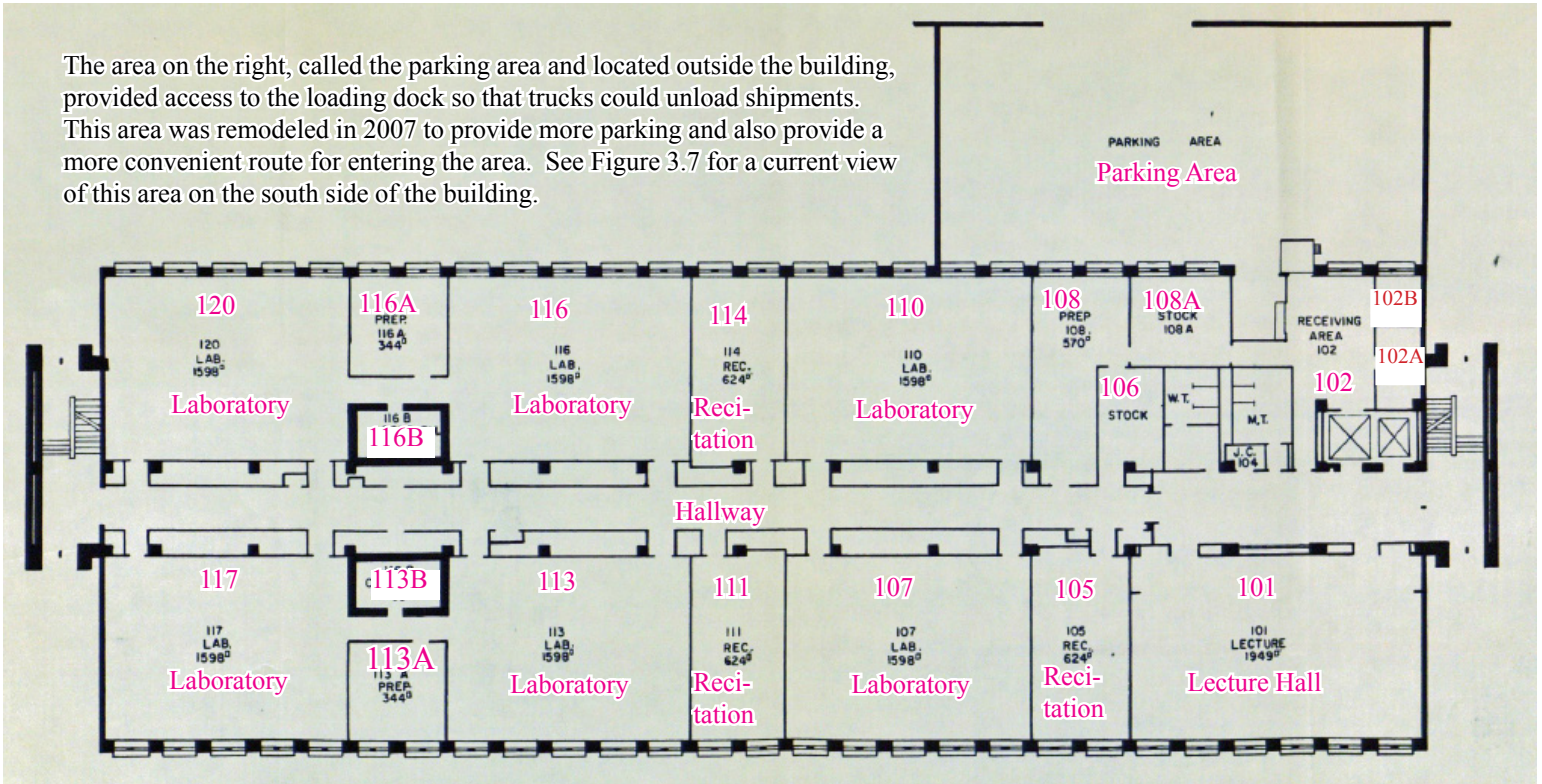

Figure 3.5: The design of the first floor of the Biochemistry Building created by the Physical Plant Department of the Engineering Division of Michigan State University in October 1964. The assigned room numbers are in red. The top of the design is the south side of the building. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

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have been in Rooms 3-3K, except for Room 3B, since the building was constructed. The Biochemistry Storeroom, or sometimes called the Biochemistry Stockroom and now called the BMB Research Store, occupied Room 2 beginning in 1965 and remained in this room until 2008 when it was moved into Rooms 108, 110, and 114. Room 2 was then remodeled for a new Plant Growth Chamber Facility.

The first floor was designed for graduate and undergraduate lecture, recitation, and laboratory instruction. As can be seen in Figure 3.5, there were 6 laboratories used for laboratory instruction in 1965; Rooms 107, 110, 113, 116, 117, and 120. Undergraduate laboratory instruction is conducted in Rooms 113 and 117 in 2010. Rooms 107, 116 and 120 are being used as research laboratories. The BMB Research Store has occupied Rooms 110 and 114 and the newly created Room 110A since 2008. Rooms 108, 115A, and 116A were originally reserved for storage and preparation of teaching laboratory reagents: today only Room 115A is used for a laboratory stockroom and for the preparation of reagents.

Figure 3.6 presents a view of the west end of the first floor in 2010. First, it shows that Rooms 108 and 108A

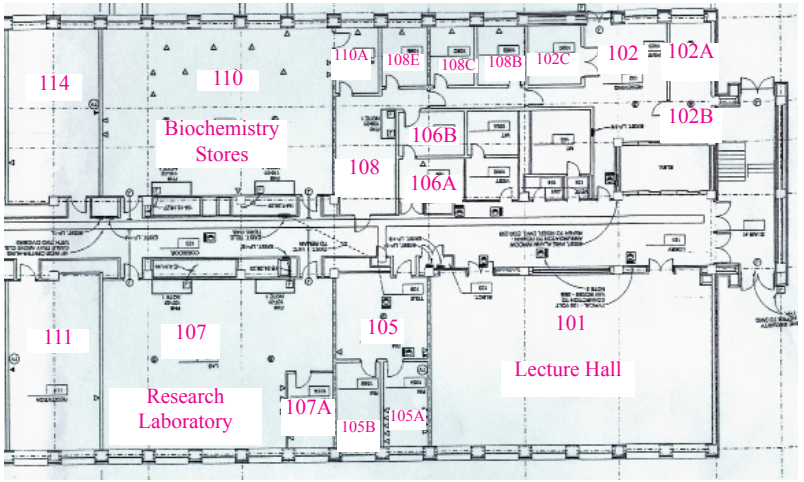

Figure 3.6: A schematic view of the west end of the first floor of the Biochemistry Building in 2010. Room numbers are in red. Rooms 113 and 116-120 are not shown. The top of the view is the south side of the building. UA16.18, Michigan State University Archives and Historical Collections, East Lansing, MI.

have been divided into smaller rooms (Rooms 108, 108B, 108C, and 108E). Room 106 was originally designed as a stock room for the teaching laboratories but today it is divided into two rooms (Rooms 106 and 106B) and along with Rooms 108B, 108C, and 108E are used for faculty offices. Currently, Room 108 houses a few plant growth chambers.

The loading dock is located outside of Room 102 so this room is used for receipt of shipments of supplies; Rooms

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Figure 3.7: View of the redesigned parking area on the south side of the Biochemistry Building in 2007. The view, looking east along Wilson Road, first shows (1) a bicycle parking area, (2) the loading dock and (3) the entrance to the area . UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI.

102A and 102B provide storage space for hazardous chemicals and 102C houses a garbage dumpster. Since Room 102 is the receiving room, it has an outside door to the loading dock and the parking area as noted on the upper portion of the first floor schematic in Figure 3.5.

In 2007, this parking area was extensively renovated as shown in Figure 3.7. The loading dock remains at the same position but the area is now entered at the point noted by the number 3. The garbage dumpster was moved outside during the 2007 renovation so Room 102C is now used for storage of disposable equipment. The renovation also makes it much easier for delivery trucks to enter and deliver materials and also provides for more parking space.

In 1965, Rooms 105, 111, and 114 were designed to be used as classrooms. The minutes of the Faculty Advisory Committee meeting held on December 21, 1977 show that Chairperson Barker was granted approval to proceed with plans to renovate Room 105 to provide faculty offices and secretarial space (Minutes, 1978). Staff Directories show that the undergraduate office was in place by the Fall of 1980: in 2010, Rooms 105A and 105B serve as the Undergraduate and Graduate Programs Offices (Figure 3.6). Room 105 now provides space for undergraduate students to meet and/or use computers provided by the Department. Of the three rooms on the first floor originally designed as classrooms, only Room 111 is used as such in 2010; Room 114 is being used as office space for stockroom personnel.

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Figure 3.8: A view looking east in Room 101, Biochemistry Building, in 1965. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI

Figure 3.9: The same view of Room 101 as that shown in Figure 3.8 except this one was photographed in 2010. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI

Room 101 was designed to be used as a lecture room in 1965 and continues to be used as such in 2010. It was remodeled, as comparison of Figures 3.8 and 3.9 will show, by removing the continous table top being used as a student desk top and replacing it and the original chairs with chairs with side arms. Not apparent are the changes in the slide projection technology, that is, the slide projector and cabinet in the rear of the lecture hall were removed and replaced with the computerized projection system common to many lecture halls today as seen on the ceiling in Figure 3.9.

The second floor (Figure 3.10) was designed to provide space for research laboratories, departmental offices, the library, and a small conference room adjacent to the central office (Figure 3.11). The library (Room 202) was closed in 2006, however, when the Biomedical Physical Science Library opened in the building just to the west of the Biochemistry Building. Room 202 is now used for the Computer Facility as discussed in more detail in Chapter 4. Figure 3.10 shows that all the space on the north side of the second floor hallway plus Rooms 220, 220A, 224, 224A, and 218 on the south side were designed for use as research laboratories. The unique feature of the design is that the research space assigned to a faculty person can expand or collapse depending on their need. Examining the location of Rooms 201B, 209B, 214A, 215B and 220A in Figure 3.11 shows that they are located between Rooms 201 and 209, 215 and 223, 220 and 224, 214 and 218. These spaces, that is Rooms 201B, 209B, 214A, 215B, and 220A , were often assigned to postdoctoral fellows and thus were usually called postdoc-

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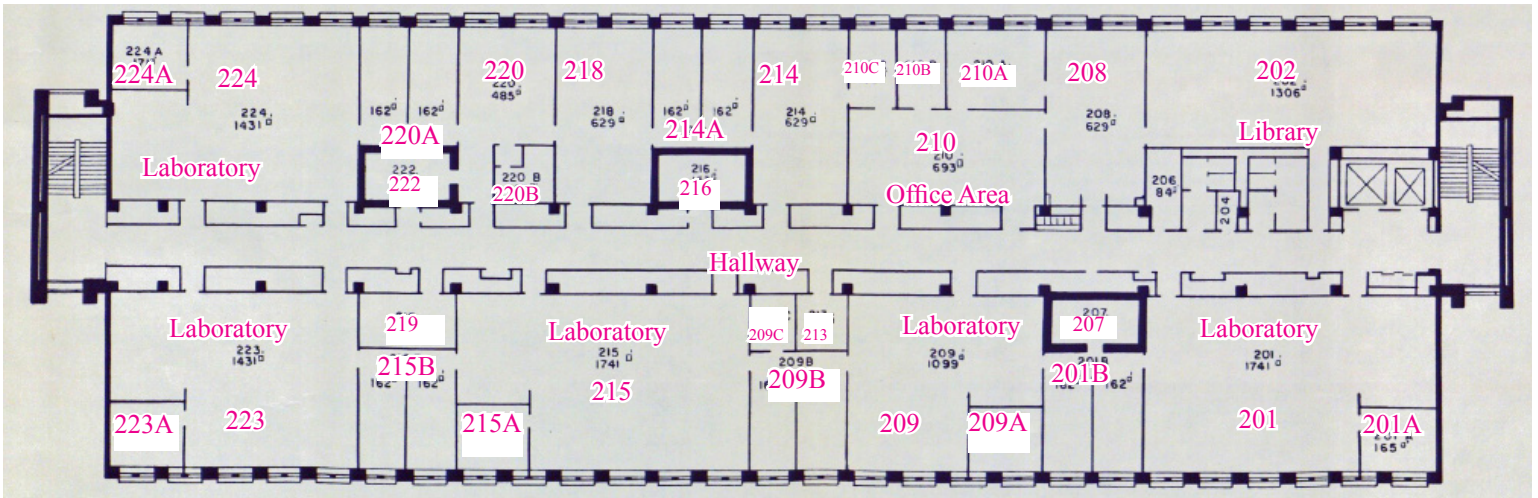

Figure 3.10: The design of the second floor of the Biochemistry Building created by the Physical Plant Department of the Engineering Division of Michigan State University in October 1964. The numbers assigned to each room are given in red. The top of the Figure represents the south side of the building. UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI

toral laboratories. It is important to realize, however, that graduate students or visiting faculty were also assigned to this space. Today, these spaces serve a variety of other uses, as well.

The remaining rooms on the second floor, except for the three walk-in cold rooms (Rooms 207, 216 and 222), are used for the Central Office: Room 208, now called the Jacob A. and Matre S. Graham Room (Figure 3.11), is used

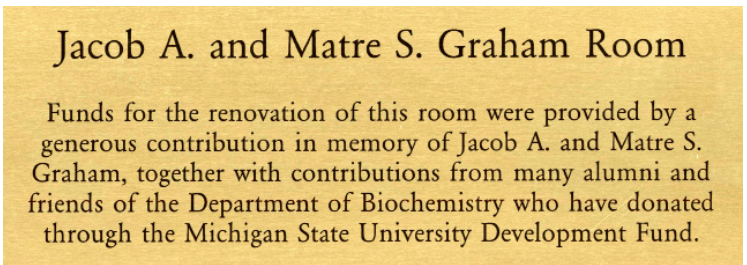

Figure 3.11: Photograph of a plaque on the wall in Room 208, Biochemistry Building. Most of the funds for the renovation were donated by William L. Smith, Chairperson of the Department from 1994-2003, in honor of his favorite Uncle and Aunt.

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for faculty meetings, small group discussions, presentation of PhD thesis, and receptions.

The central office complex has undergone an extensive growth and reconfiguration since it was first occupied. Figure 3.12 shows a view of the Central Office in 1965. According to the MSU Faculty Staff Directory, the Department had six office personnel in 1965-66 (Lena Flory, Senior Department Secretary; Patricia Glossenger Jagger, Bookeeper; Nancy Lewis, Clerk Typist; Darby St. Jacques, Clerk Typist; Mary Burch, Clerk Typist; and Patricia Vignola Prokopp, Stenographer) supporting 58 employees excluding graduate assistants.

Figure 3.12: Photograph of the Biochemistry Departmental Office, Room 210, shortly after the Building was occupied in late 1964. The counter in front of the picture is located at the western end of the Room, so the view is looking east; the door on the back left of the picture opens to the building hallway. UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI

An examination of Figure 3.13 shows that the original Room 210 has been divided into two rooms, Room 210 and 212. According to the MSU Faculty Staff Directory this division was made in 1974. Room 210 now provides space for the Office Supervisor responsible to the Department Chairperson, whose office is now also called Room 210 instead of 210A. In 1965, Room 214 housed special laboratory equipment available to anyone involved in research. By 2000, Room 214 was divided into two rooms, one part near the hallway provided space for the Departmental Accountant while the remaining space was allotted for Office work and for a break room (the south portion). Room 214A, which was originally used as a postdoctoral laboratory, now serves as a storage room for office records. Rooms 218 and 218B provide space for laboratory research and a faculty office, respectively while Room 218A houses computer servers that will be discussed more fully in Chapter 4.

The 3rd, 4th, and 5th floors are essentially all devoted to laboratory research. Because the fourth and fifth floor has

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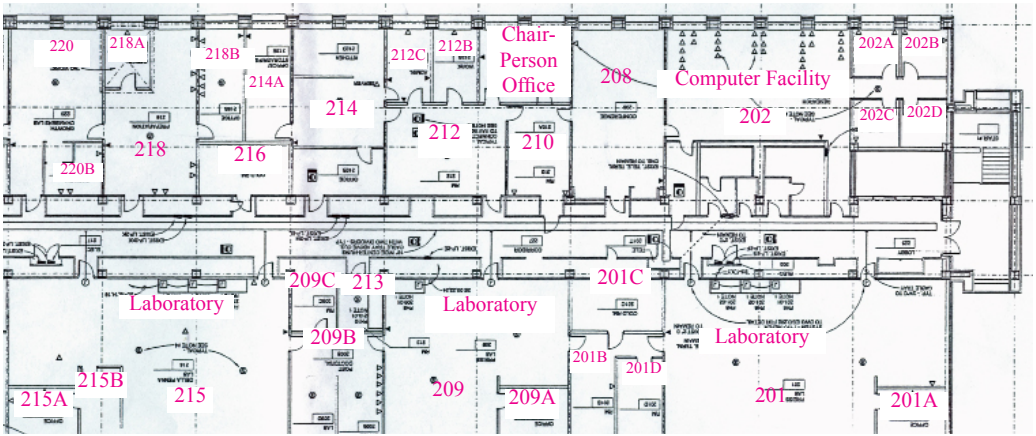

Figure 3.13: A schematic view of the West end of the second floor of the Biochemistry Building in 2010. The top of the figure represents the south side of the building. Room numbers are shown in red. UA16.18, Michigan State University Archives and Historical Collections, East Lansing, MI.

undergone some reconfiguration, a schematic diagram of the fourth and fifth floor is given in Figure 3.15 and 3.16. The first point to be made is that Room 402A is used as a meeting room for students, staff, and faculty. Rooms 302A and 502A are located in the same relative position on the 3rd and 5th floor, respectively, and have similar uses. Room 302A was modified in 1987 to serve as a student lounge as will be described in Chapter 5. In the early days Rooms 302B, 402B, and 502B were used by clerk typists assigned to serve faculty on that floor primarily by typing letters, grant proposals, and research papers. The availability and use of the personal computer has dramatically changed these functions as will be discussed later in Chapter 7.

Other features noted on the fourth floor are that Room 411 houses a dark room (Figure 3.14) and 417, a flow cytometer as will be described in Chapter 4. Rooms 408, 414, and 420 are walk in cold rooms, all accessible on the south side of the hallway. The cold rooms on the fifth floor are located in the same relative position. Comparing the second floor, Figure 3.10, with the fourth floor, Figure 3.15, shows the same layout for the research laboratories except for the Office Complex, Library, and Conference Room on the second floor. Again it is important to note that the layout of

Figure 3.14: A view of the entrance to Room 411, the dark room in the Biochemistry Building.

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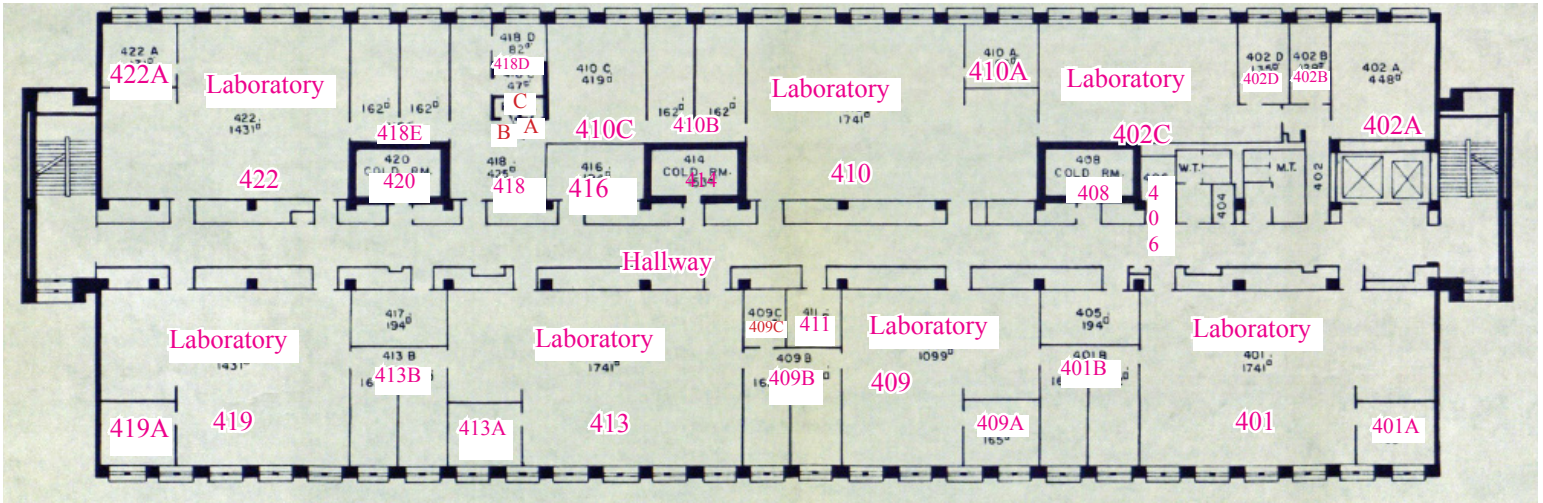

Figure 3.15: The design of the fourth floor of the Biochemistry Building created by the Physical Plant Department of the Engineering Division of Michigan State University in October 1964. The numbers assigned to each room are given in red. The top of the Figure represents the south side of the building. UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI

the postdoctoral laboratories, between each of the research laboratories, and the faculty offices are the same. Rooms 405, 406, 409C, 411, and 417A house a variety of instruments in 2010.

Two other points need to be made. First, Rooms 502C and 502D originally housed the Biochemistry Analytical Laboratory as described in Chapter 4. This laboratory was managed by Professor Erwin Benne from 1965 to 1970.

After he retired, Elizabeth Linden managed the laboratory until she retired in December 1977. The space was then utilized for laboratory research. The second point is that the MSU Board of Trustees, at their meeting on April 27-28, 1978, awarded a contract to create space in the basement to house the Mass Spectrometry Facility which up to then, was located on the fifth floor in Room 518. The space vacated by the facility on the fifth floor plus Rooms 516A, B, and C were then converted to containment

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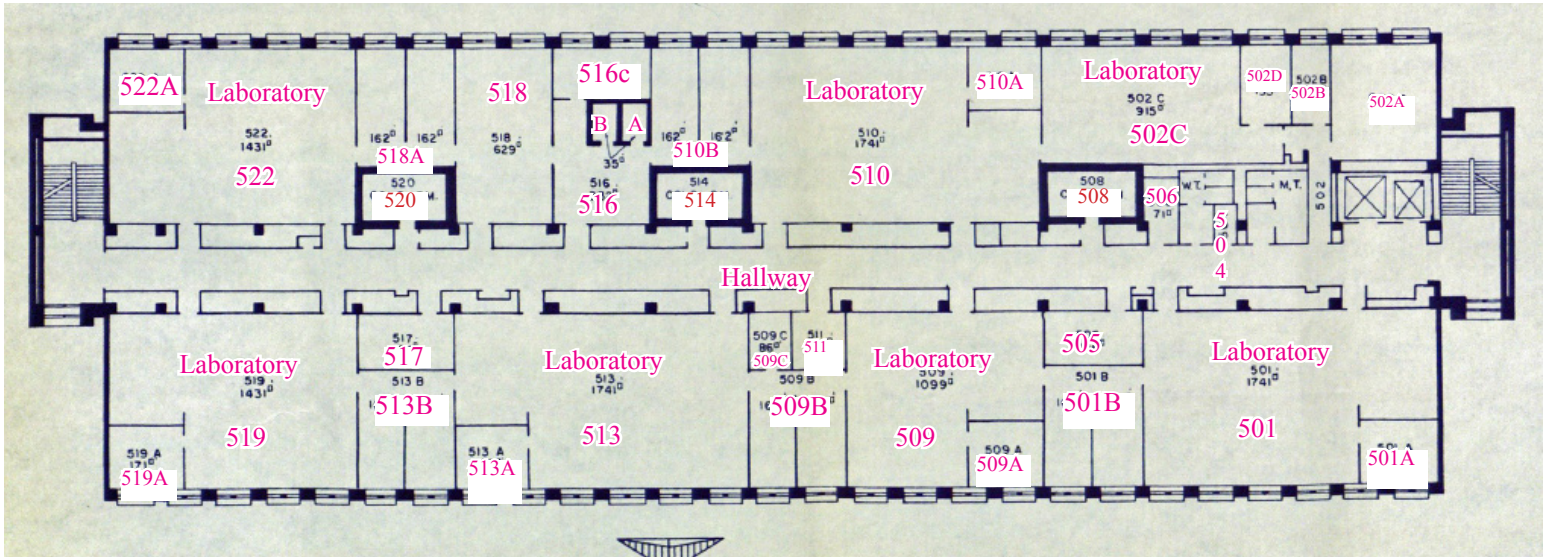

Figure 3.16: The design of the fifth floor of the Biochemistry Building created by the Physical Plant Department of the Engineering Division of Michigan State University in October 1964. The numbers assigned to each room are given in red. The top of the Figure represents the south side of the building. UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI

laboratories for research in bacterial genetics, virology, and recombinant DNA (MSU Board of Trustee's minutes, October 25-26, 1979). These containment facilities were required by the NIH as a pre-requisite for the award of research grants for work in these areas. A little over a year later, the Board agreed to alter rooms 518 and 518A to function as a carcinogenic materials handling laboratory (MSU Board of Trustee's minutes, November 1, 1980) (see Chapter Four for details regarding the fifth floor renovation to provide space for the containment facilities).

While the faculty involved in the design of the Biochemistry Building could not predict or imagine how Biochemistry as a discipline would change over the years, it is important to re-emphasize that several principles and unique concepts were successfully translated into the Building

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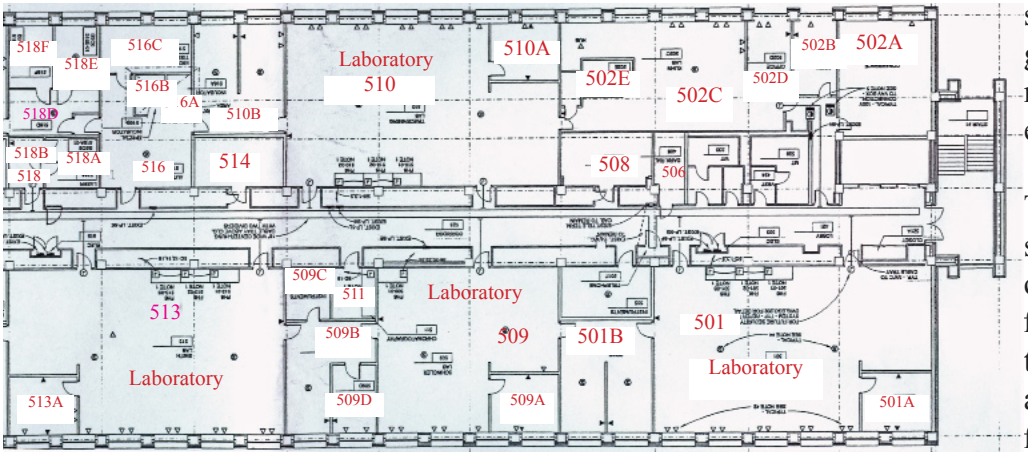

Figure 3.17: Schematic view of the West end of the fifth floor of the Biochemistry Building in 2010. The top of the figure represents the south side of the building. Room numbers are shown in red except Rooms 513B, 517, 519, 519A, 522, 522A, and 522B are not shown. UA16.18, Michigan State University Archives and Historical Collections, East Lansing, MI.

in 1964. The major unique concept that was adopted was the modular design, that is, a standardized laboratory thoughout the building so that the 2nd, 3rd, 4th, and 5th floor would be practically identical. In addition each floor would have specialized rooms such as walk in cold rooms and specialized equipment rooms required for biochemical research. Furthermore all laboratories throughout the building had the same design, that is, the same laboratory benches, cabinetry, student working desks, and utilities. Each laboratory would also have the same infrastructure support services, such as, fume hoods, glassware washing and drying equipment, chemical and glassware storage etc.

To accomodate a wide variety of research activities from distillations and column chromatography work to fruit fly colonies, the design of the laboratory would have to be adaptable. Thus, a unique structure was developed using floor to ceiling Unistrut frames outfitted with utility services, one unit of which was sitting in a floor level sink. In addition, movable laboratory benches were provided to allow creation of a unique working space utilizing the Unistrut arrangement as shown in Figure 3.18. Another adaptable feature built into the design is the provision for research laboratories with 2, 3, and 4 laboratory benches but with an identical infrastructure. This feature made it possible for research programs to shrink or expand depending on the availability of research funds, student activity, postdoctoral fellows or visiting faculty. This expansion or shrinkage was also made easier by the addition of what have come to be

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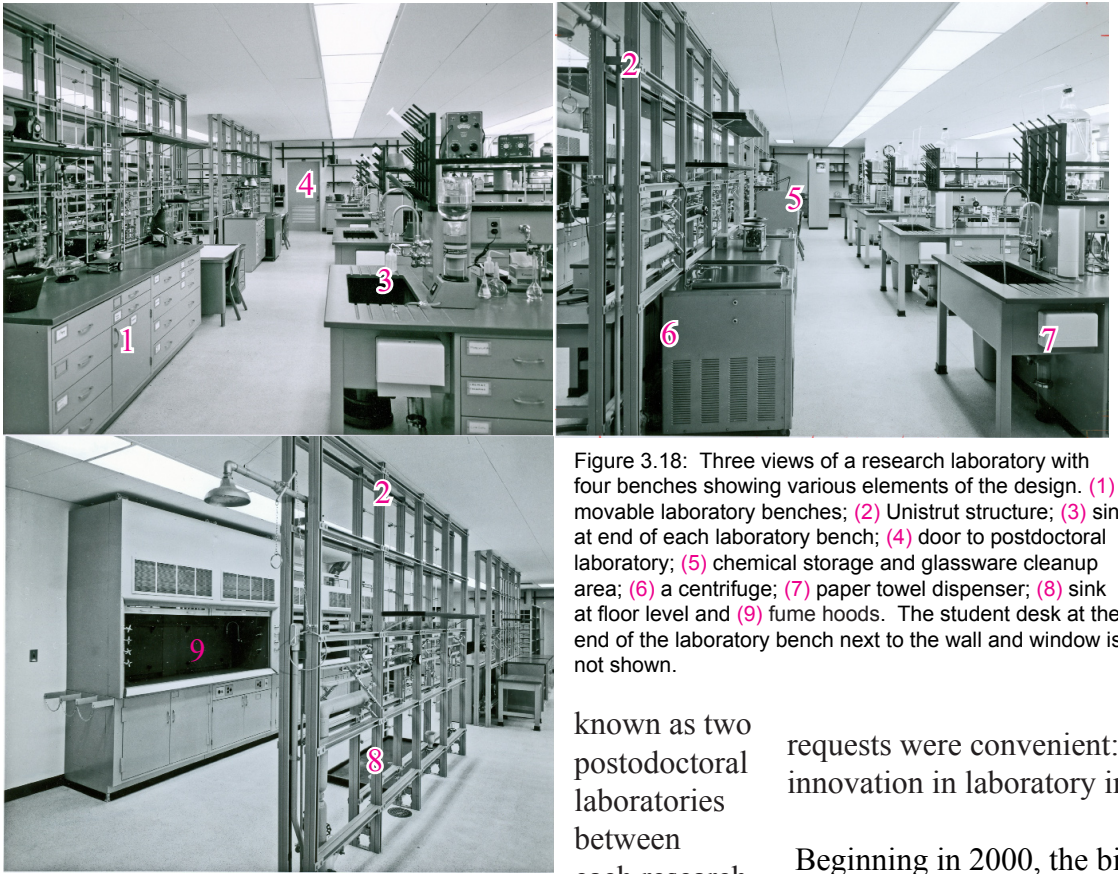

Figure 3.18: Three views of a research laboratory with four benches showing various elements of the design. (1) movable laboratory benches; (2) Unistrut structure; (3) sink at end of each laboratory bench; (4) door to postdoctoral laboratory; (5) chemical storage and glassware cleanup area; (6) a centrifuge; (7) paper towel dispenser; (8) sink at floor level and (9) fume hoods. The student desk at the end of the laboratory bench next to the wall and window is not shown.

known as two postodoctoral laboratories between each research laboratory (Figure 3.16 and 3.19). Each laboratory was also equipped with an ample supply of a reasonable grade distilled water which was produced in the penthouse (Figure 3.20) and delivered to each laboratory by glass pipe.

Since the group that created the basic design had the belief that each faculty person should also do experiments and thus essentially live in his or her laboratory, faculty offices were placed toward the back of each laboratory with their office door opening into the laboratory and not into the hallway. The electronic and mechanical shops were placed in the basement so that responses to service requests were convenient: they also hoped to encourage innovation in laboratory instrumentation (Wood, 2010).

Beginning in 2000, the biochemistry building underwent an extensive renovation. All laboratory benches were repainted in 2000 by the Elite Electo Coaters, Inc, Lan-

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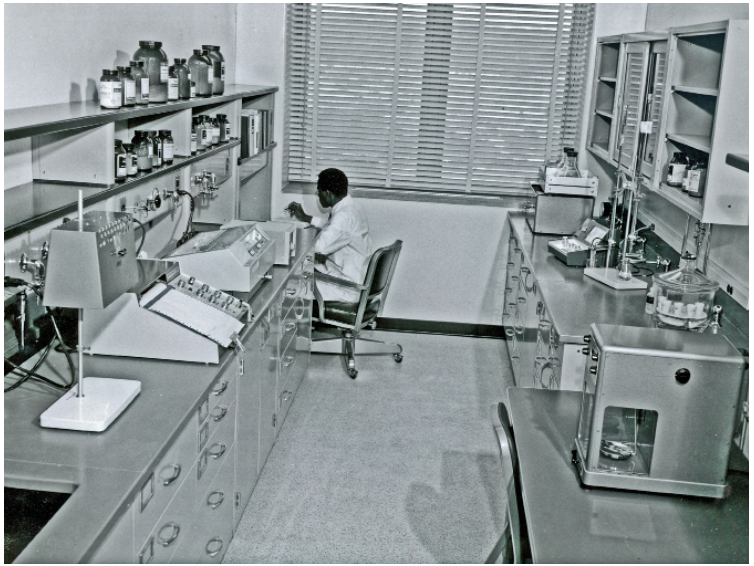

Figure 3.19: The design of typical postdoctoral laboratory in the Biochemistry Building created by the Physical Plant Department of the Engineering Division of Michigan State University in October 1964. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI

Figure 3.20: A view of the distilled water production facility in the penthouse in 2010.

sing, MI: cost $80,000. Then, beginning in the Spring of 2002, all major air handling equipment, both supply and exhaust, and room level air distribution systems and controls were replaced. Other improvements included new fume hoods and a new heating hot water system, including pumps, variable frequencey drive fans, steam-to-water heat exchangers, new light fixtures, and new hanging ceilings. The new equipment was designed to improve the airflow within the building as well as to provide capacity for additional fume hoods in the future. There are two separate exhaust fan systems serving the building, each with three exhaust fans. Under normal operation, only two fans are required with the third fan serving as a standby fan. The cost of these renovations exceeded $15 mil-

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lion (Robinson, 2010). The Department is grateful to the Biochemistry Stockroom supervisor and jack-of-all-trades Joyce Robison for handling the logistics of the moves and making arrangements for moving heavy items or instruments. Professor Emeritus Loran Bieber returned to duty on a part time basis to assist Joyce: Ron Norris, the departmental mechanic, played a vital role in the process since he seemed to be the only one who actually knew the location of most of the telephone lines, ethernet cables, new valves, and switches. He also proved to be an invaluable information source for the construction crews as they dismantled the infrastructure in the course of the renovation (Biochemistry, 2003, pp 20-21). In 2006, at the direction of the University President, the Department of Public Safety replaced the keys in the outside doors as well as several laboratories in the building with electronic access primarily for security reasons (Creamer, 2010).

Figure 3.21: Joyce Robinson has kept her good humor as she managed the building renovation. (Biochemistry 2003, p. 21)

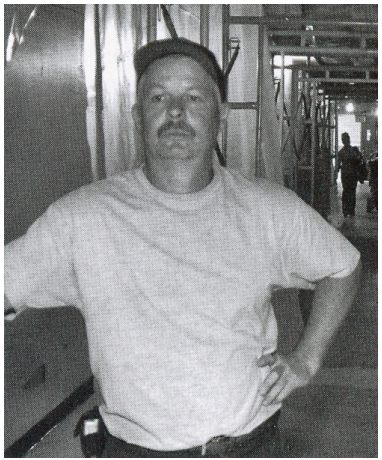

Figure 3.22: Ron Norris playing a vital part in the renovation of the Biochemistry Building (Biochemistry 2003, p. 21)

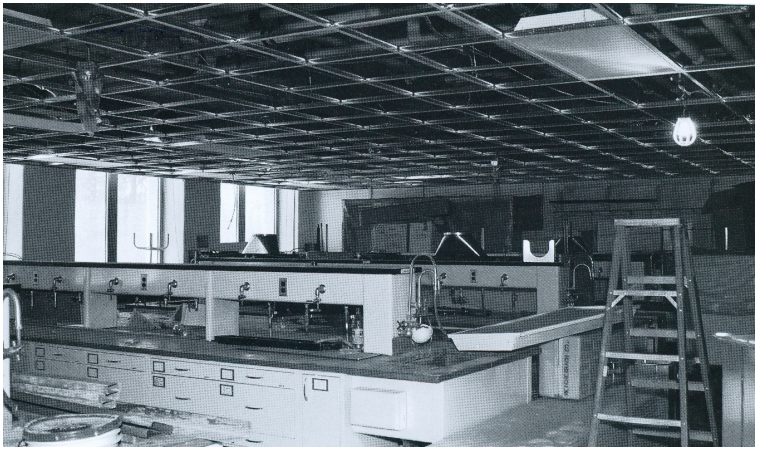

Figure 3.23: A typical view of a laboratory under renovation showing removal of the original ceiling and ventilation ductwork. (Biochemistry 2003, p. 21)

Figure 3.24 provides a view of the biochemistry building looking southeast shortly after it was occupied in May of 1965. This view is to be compared with a photograph of

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the building looking directly South across the courtyard as shown in Figure 3.25. First note the six towers on the top of the building in 2010. These are the exhaust fans, installed during the 2002-2006 renovation, that are connected to the two separate exhaust systems each with three fans serving the building. Next note that the parking lot directly west of the building and the parking along the street in 1965 as shown in Figure 3.24 no longer exists. This space is now occupied by the Biomedical Physical Science (BPS) building constructed in 2002. Figure 3.25 shows part of the BPS building on the right. The open space on the North side of the biochemistry building shown in Figure 3.25 is now called the Biochemistry Courtyard.

Figure 3.24: A view of the Biochemistry Building in May 1965 looking Southeast. UA 16.18, Michigan State University Archives and Historical Collections, East Lansing, MI.

An aerial view of the South Campus Science Complex in 2005 is shown in Figure 3.26. When compared to Figure 2.7, it is clear that the area south of the Biochemistry Building has been extensively developed since it was constructed. The great majority of this development supports the plant sciences.

Figure 3.25: A view looking south towards the Biochemistry Building in 2010. The Biomedical Physical Science (BPS) building is on the right. Note the cross walk connecting the Biochemistry Fifth floor to the Fourth floor of the BPS building: an underground linkage to the BPS building was also added. The Biochemistry Courtyard shown in this view occupies the space between the Biochemistry Building on the South, the Chemistry Building on the North, the Biomedical Physical Science Building on the West and the Cyclotron on the East. Photograph courtesy of Neil Bowlby.

A close up view of the sculpture in the photograph above.

Sculptural Improvisation II by

Richard Hunt 2008

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Figure 3.26: Photograph of the MSU south campus science complex taken from a helicopter in May 2005. (1) Biomedical Physical Sciences; (2) Chemistry; (3) Biochemistry; (4) Cyclotron; (5) Plant Biology; (6) Herbarium wing of Plant Biology; (7) Horticultural Gardens; (8) Center for Integrated Plant Systems; (9) National Food Safety and Toxicology Center and (10) Plant and Soil Sciences. Courtesy of Kurt Stepnitz, MSU University Relations.

Chapter Four

Research Facilities

Analytical Laboratory: As noted earlier in this history, when the Biochemistry Department was formed on April 1, 1961, it included the group of Agricultural Chemists in the Agriculture Building. Included in this group were the members of the Analytical Laboratory located on the North end of the third floor of the building. Members of the Agricultural Chemistry Department worked with faculty from many of the departments of the Agricultural Experiment Station and the staff of the Analytical Laboratory to analyze a diverse assortment of materials for a variety of constituents of importance in agricultural research.

After the Biochemistry Analytical Laboratory was moved to the new Biochemistry Building, it occupied Rooms 502C, 505, 507, 509, and 511 (Benne, 1970, 1970a).

By 1970, its workload decreased somewhat so there were only two full-time employees and only one of them was in a salaried position. During 1969, they completed 131 determinations for Agricultural Engineering, 558 determinations for Crop and Soil Science, 5,568 determinations for Dairy, 235 determinations for the Upper Peninsula Experi-

Figure 4.1: View of the Analytical Laboratory in the Agricultural Building in March 1959. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

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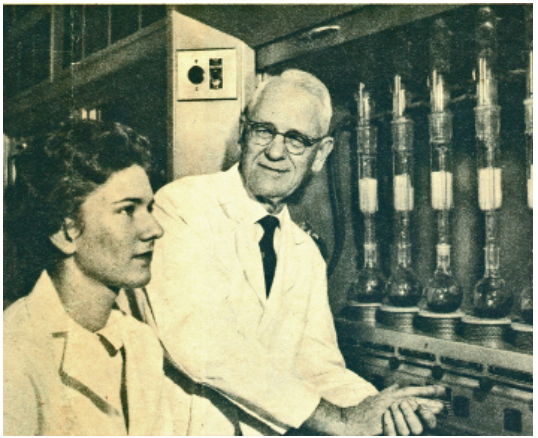

Figure 4.2: Professor Clifford Duncan instructing Phillenore A. Drummond Howard as she worked in the Analytical Laboratory in the Agriculture Building analyzing hay samples for fat solubles using various organic solvents. (Detroit News Pictorial Magaazine Page 18, March 12, 1961). Phillenore was the first undergraduate student in the Department of Biochemistry to complete the requirements for and receive a BS degree (Commencement, 1963). UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

ment Station, 11 determinations for Foods and Nutrition, 1375 determinations for Poultry, 606 determinations for the USDA Poultry Laboratory, and 295 determinations for the Veterinary Clinic making a total of 8779 determinations. They analyzed for Kjeldahl Nitrogen, crude fiber, crude fat, ash, moisture, Nitrogen free extract, Calcium, and Phosphorus. The laboratory had two analytical balances, Kjeldahl equipment (one macro apparatus and one micro apparatus), crude fiber equipment (two 6-unit digestion racks), Bailey-Walker extraction equipment for determining crude fat, photometric equipment (one Perkin-Elmer flame photometer and one Cenco-Sheard-Safford photoelectric colorimeter), drying and ashing equipment, and grinding and cutting mills including a large Wiley mill on castors and a modified Wiley mill for grinding large samples of forage plus miscellaneous laboratory equipment (Benne, 1970a).

Figure 4.3: Vaughn Snook using a grinder built by Lester Hoag to grind corn stalk in the plant growth chambers in the basement of the Biochemistry Building in 1965. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

After Professor Benne retired from the Biochemistry Department in 1970, Professor W. A. Wood was placed in charge of the Analytical Laboratory: Elizabeth Linden managed its day to day operation. In 1975, they analyzed

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for ash (924 determinations), crude fiber (508 determinations), ether extract (506 determinations), water (1613 determinations), nitrogen or protein (2098 determinations), N-free extract (166 determinations), calcium (437 determinations), phosphorus (444 determinations), ammoniacal nitrogen (155 determinations), and non-protein nitrogen (184 determinations) making a total of 7035 determinations (Linden, 1976). Then on October 29, 1976, Professor Robert Barker, Chairman of the Department of Biochemistry, informed all department chairs of the College of Agriculture and Natural Resources that Elizabeth Linden had resigned her position as Senior Research Assistant in charge of the Biochemistry Analytical Laboratory effective January 31, 1977. In his view, her resignation would create a hiatus in the provision of analytical services. It was also noted that an Ad Hoc Committee was evaluating the need to continue these services and that Dr. Robert Leader, of the Department of Pathology, chaired this committee (Barker, 1976).

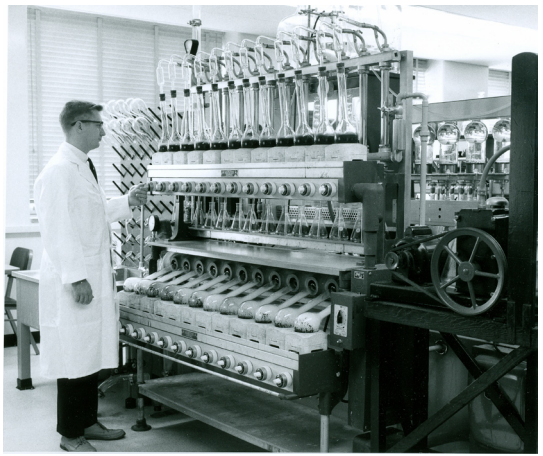

Figure 4.4: John Grier using the Kjeldahl Apparatus in the Analytical Laboratory on the Fifth floor of the new Biochemistry Building. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

Figure 4.5: Elizabeth Linden using an analytical balance to prepare samples for analysis in the Analytical Laboratory. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

The final disposition of the Biochemistry Analytical Laboratory is not exactly clear. According to a memorandum sent to Professor Sylvan Wittwer, Director of the Agricultural Experiment Station, from an Ad Hoc Committee for Review of Analytical

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Chemical Services dated November 9, 1976, the committee had met five times to ascertain the need for these services. This committee recommended that the operation of the laboratory should be maintained at its present level, that the Director of the Laboratory, Robert Barker, should consult with Professor Harold Hafs, Chairman of Dairy Science, to work out the details of transferring the Analytical Laboratory from Biochemistry to Anthony Hall and that the supervision of the laboratory should be given to the Department of Dairy Science (Leader et al. 1976). However, according to Professor Hafs, the laboratory was never setup in the Department of Dairy Science because many of the research laboratories in the College of Agriculture had the capability to perform their own biochemical analysis and thus the need for the services of the Analytical Laboratory had decreased to the point that it was no longer needed (Hafs, 2010). Thus, the equipment in the Biochemistry Analytical Laboratory was moved into the storage room, Room 11, in early 1977 (Holland, 2010; Maine, 2010). As far as can be determined, it was then sent to salvage so Room 11 could be renovated for the Mass Spectrometer Facility as approved by the Board of Trustees (MSU Board of Trustee's minutes April 27, 28, 1978).

Biochemistry Animal Facility: When the Biochemistry Building was designed, Rooms 3-3K were allotted for the animal quarters. Leo Klever, who was the caretaker of the Department of Chemistry Animal Facility, was asked to serve as the Caretaker for the biochemistry facility. Two years after the building was occupied, the Board of Trustees established the Center for Laboratory Animal

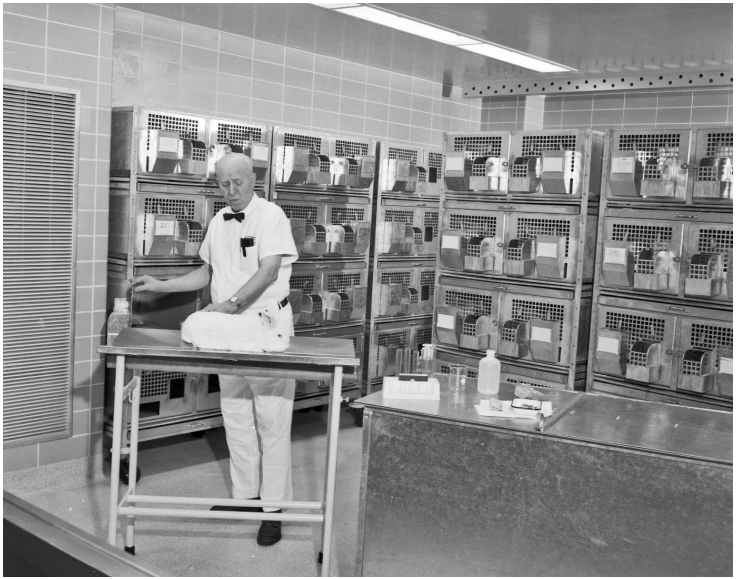

Figure 4.6: A view of the Animal Facility and Leo Klever in the basement of the Biochemistry Building on March 17, 1965. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

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Resources (CLAR) in the College of Veterinary Medicine, and accepted a grant from the National Institutes of Health to fund its first year of operation. Its policies were to be determined by a board consisting of the director of the center, the director of the Institute of Biology and Medicine, and the deans of the Colleges of Agriculture, Human Medicine, Natural Science, and Veterinary Medicine. The facility was established to develop programs for training animal caretakers, instructing graduate students who would use animals in their research, and conducting research in laboratory animal science to gain basic information about animals traditionally used for laboratory research (Downs, 1967a) (MSU Board of Trustee's minutes May 18, 1967).

On July 1, 1975, CLAR was discontinued and the instructional and research responsibilities were transferred to other units in the College of Veterinary Medicine. The Laboratory Animal Care Service (LACS) was then established to discharge the service responsibilities, that is, animal procurement, acquiring feed and supplies, animal care by contract, consultation and diagnostic services, surgical facilities, necropsy, examination, disposal of animals, and assistance with inspections. Researchers were asked to use the smallest animals possible and to include a budget in all appropriate grants for high quality animal care (King, 1975). LACS became the University Laboratory Animal Resources (ULAR) in July 1988.

Today ULAR operates as a campus-wide organization providing support for research and instructional programs and is responsible for the care of a wide variety of animals — from fish to frogs and goats to guinea pigs (Crosslan, 2005). The following individuals served as Caretakers for the Biochemistry Animal Facility: Leo Klever (1961-1968); Keith Crosslan (1969-1970); Elizabeth Smith (1972-1980); Heidi Brown (1981-1982); Randall Shoemaker (1982-1992). After 1992, the Biochemistry Telephone Directory does not list a Caretaker for the Animal Room.

Biohazard Containment Facility: Sometime late in 1976 or early 1977 the Department of Biochemistry made a decision to alter Room 518 to be used as a P-3 or Recombinant DNA Facility according to Federal Guidelines. As a consequence of this decision, they sought estimations of the renovation costs which they received from Engineering Services dated June 9, 1977, showing an estimation of $50,000 (Cross, 1977). Following receipt of this estimation, the Faculty Advisory Committee at

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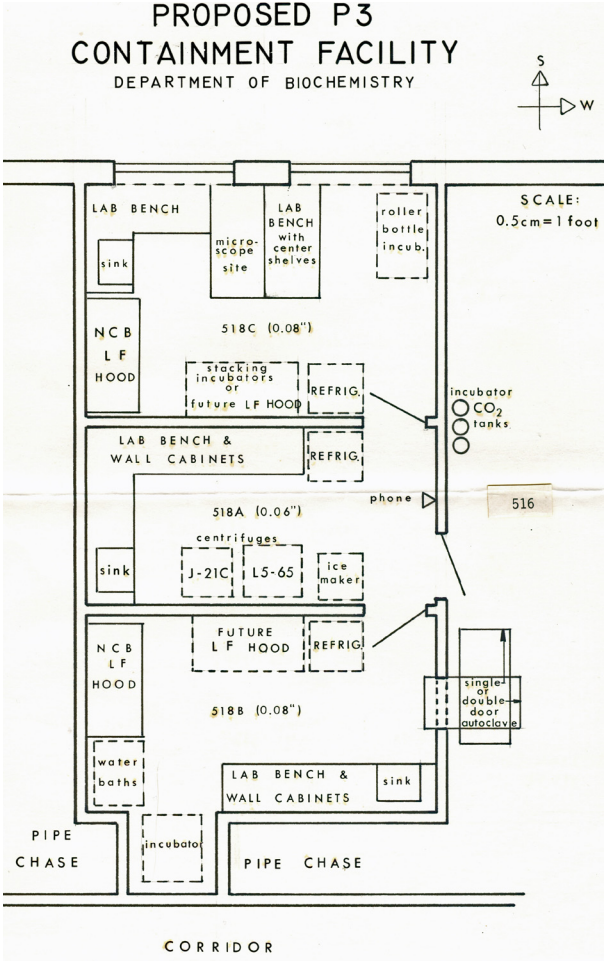
their meeting on September 14, 1977, recommended that an ad hoc committee be setup to expedite planning for a P-3 facility in the Biochemistry Building (Minutes, 1977). Shortly after that, on October 3, 1977, Robert Tanis, Administrative Assistant, contacted David Jackson, Department of Microbiology, The Medical School, University of Michigan, Ann Arbor by phone to consult with him about building a P-3 DNA Containment Facility (Tanis, 1977). It turns out that the Department of Microbiology at the University of Michigan had let contracts to build a P-3 Containment Facility in the Fall of 1976 (Jackson, 1977).

After consideration of various plans including several suggestions made by Dr. David Jackson, a request for $70,500 for the



establishment of a P-3 Containment Facility was submitted to the National Science Foundation with Fritz Rottman as the Principal Investigator: closing date March 1, 1978. The design (Figure 4.7) required that the only entry to the facility be via the connecting door between Rooms 516 and 518. This entrance provided direct access to 518A, which would be utilized as a biochemistry support laboratory; Room 518B was designated for recombinant DNA research, and Room 518C for virology projects. The adjacent Room 516, contained shared research equipment as well as a convenient staging area, so that materials and supplies would not be dealt with in the corridor (Rottman, 1978).

Figure 4.7: Design for the renovation of Room 518 to be used as a P-3 Recombinant DNA Facility created in 1978. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

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Sometime later, Fritz Rottman, Principal Investigator, signed a memorandum of understanding and agreement for studies involving recombinant DNA molecules on May 31, 1978. He stated that he was familiar with current NIH Guidelines concerning recombinant DNA research as described in the Federal Register, Part 3, Tuesday September 27, 1977 and that he agreed to abide by the provisions contained within this document (Rottman, 1978a).

On June 20, 1978, Fritz Rottman received a phone call from Dr. Mary Clutter at NSF concerning the P-3 Recombinant DNA Facility proposal informing him that they had several questions regarding the proposal and that a completely revised set of guidelines for recombinant DNA research were created and were in the process of being approved. Professor Rottman then informed his colleagues, who were interested in the proposal, that the NSF review panel made the decision to provide no funds for renovation as per their request or apparently any other request (Rottman, 1978b). The new revised NIH Guidelines regarding research on recombinant DNA became effective on January 2, 1979 (Guidelines, 1979).

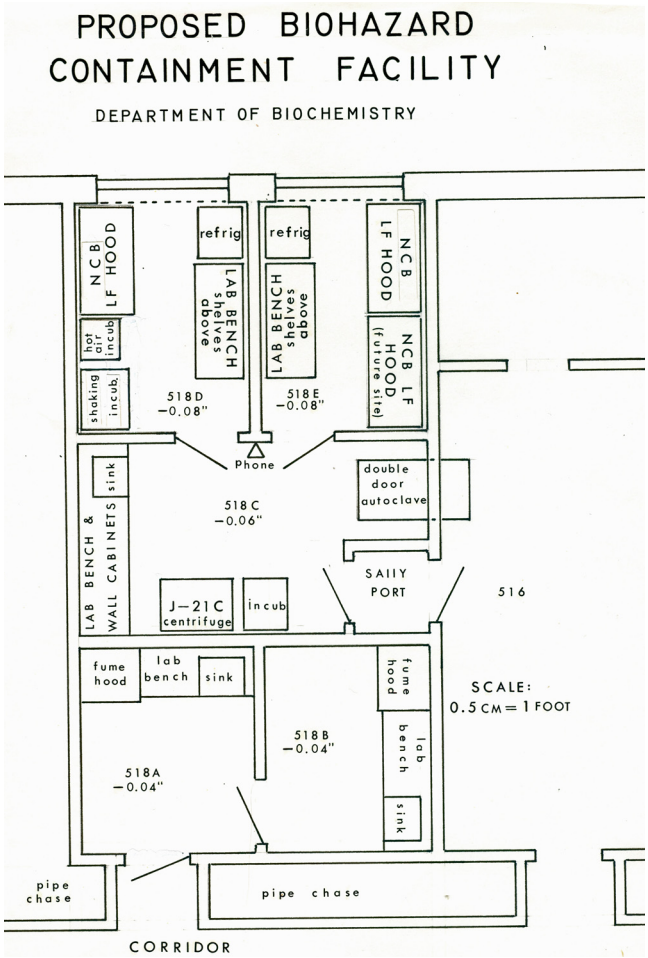

Figure 4.8: Updated design, dated Mardc 9, 1979, for renovation of Room 518 to be used as a Biohazard Containment Facility. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

Sometime before March 9, 1979, Fritz Rottman was notified that the proposal for a biohazard containment facility at Michigan State University had been recommended for funding and that new

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guidelines lowered the P-3 experiments to the P-2 level. These points were noted in a letter sent to Dr. Mary Clutter, Program Director at NSF, dated March 9, 1979, that included a revised budget request of $50,000 for equipment and an exhaust ventilation and filter system: funds for renovating Room 518 were not requested. A modified diagram for the renovation of Room 518 was also attached to the referenced letter (Figure 4.8). It was noted that Rooms 518A and 518B were not part of the biohazard containment facility to be funded by the NSF grant. These areas were designated for future possible use with highly toxic or carcinogenic materials and funds for renovating and equipping these rooms would be requested from other sources. The vents and filters for Rooms 518A and 518B would be independent of the P-3 area comprising 518C, 518D, and 518E. Bacteriological work would be done in 518D and virology in 518E with a common biochemical support laboratory in 518C. Furthermore, a dedicated sally port had been added as per the recommendation of Dr. Emmett Barkley of NIH (Rottman, 1979). Then Rottman received a letter from Mary Clutter, Program Director of NSF, dated May 15, 1979, that his proposal for equipment was approved for funding (Clutter, 1979).

Finally bids were received on October 10, 1979 to alter Room 518 for use as a P2 level recombinant DNA facility. This project involved the division of existing space into five smaller spaces by the erection of masonry block and plaster partitions. The alterations included the installation of epoxy flooring, new plaster ceilings, and laboratory furniture. Necessary mechanical and electrical alterations were also incorporated. These alterations provided three Biological Containment Laboratories (518 C, D, and E) and two Chemical Containment Laboratories (518 A and B). The three Biological Containment Laboratories were used for research in bacterial genetics, virology, and recombinant DNA (Board of Trustee's minutes, October 25-26, 1979).

Figure 4.9: View of Level 2 Biological Safety Cabinet in Rooms 516A, 516B, 516E, and 516F.

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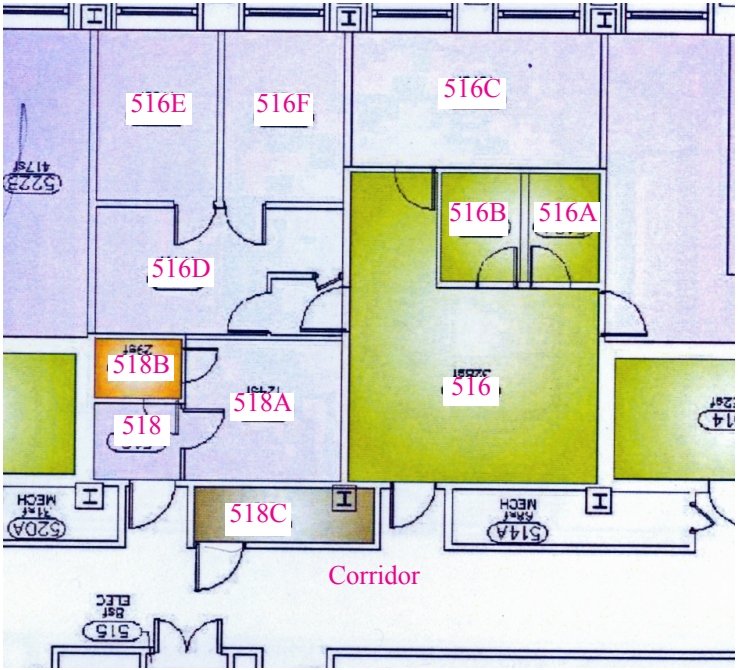

Figure 4.10: View of the layout of Rooms 516 and 518 in 2006. Courtesy of Joyce Robinson

As implied earlier, the first work on gene cloning was carried out under very strict confinement conditions in only 2 or 3 laboratories in the USA. As work progressed, however, restrictions were gradually relaxed and gene cloning could be carried out in open laboratories. Thus, after this containment facility was built, it was no longer needed for cloning experiments (Rottman, 2010). Now the space called the Biohazard Containment Facility is in Room 516 (Figure 4.10). Room 516 is composed of seven rooms, 516-516F: the components and use of each room changed through the years so a description of each room will not be given.

One year after the Board of Trustees accepted the bids to alter Room 518 for DNA cloning experiment, bids were received to construct a carcinogenic materials handling laboratory by altering Rooms 518A and 518B (Figure 4.8). This project included new walls, new plastered ceiling, epoxy floor, aluminum doors, and related plumbing and ventilation work. The contract in the amount of $31,740 was awarded to the Haussman Construction Company, Lansing, MI (Board of Trustee's minutes, November 1, 1980). Room 518, now called the Chemical Conatinment Facility, is composed of four rooms, 518-518C (Figure 4.10): Except for Room 518C, the other three rooms are used by researchers working with hazardous chemicals; Room 518 B is designed to be used as a shower.

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BMB Research Store: As noted in Chapter Three, plans for a Departmental Stockroom were incorporated into the design of the basement of the newly projected Biochemistry building in 1964. Professor Richard Anderson was responsible for setting up the storeroom. His first act was to recruit Vaughn Snook to manage its day to day operation. Vaughn was hired on July 1, 1964, to devise a plan for the stockroom even before the Biochemistry Building was built. In this regard, it is of interest to note that on December 7, 1964, a memorandum from the MSU Purchasing Department was sent to the Biochemistry Staff informing them of their plan to start a Scientific Stores on the MSU campus. Its purpose was to have available on campus many supplies and materials needed by scientific laboratories and to purchase them in quantity at a saving to all who used them and also to relieve the departmental stores, such as chemistry Stores, of providing service to other consuming departments (Kirk, 1964). It is not clear whether this memo was intended to have the proposed stores replace the planned Biochemistry Storeroom or not. In any case, Chairperson Hansen covered the expenses for Vaughn Snook to go to the University of Minnesota to gain an insight on how to set up a Biochemistry Storeroom from Professor LaVell Henderson, who had just been involved with the design of a new Biochemistry facility (Snook, 2010). As soon as the Biochemistry Building was built, Vaughn set up the new stockroom that he managed for 10 years. After Vaughn left the Stockroom, Diana Wieczorek managed the stockroom for four years (1974-1977). She was replaced by Don Chrusciel, who directed the operation for five years (1978-1982). Then during the summer of 1980, he hired Joyce Robinson as a student employee and after Don Chrusciel left the Department in 1982, Joyce was hired to manage the stockroom and has continued to do so since that time.

Figure 4.11: Sign over the door of Room 110 of the Biochemistry Building in 2010.

Before we delve further into the history of the Storeroom, it is important to note that the name of the facility has changed over the years. It was first called the Biochemistry Storeroom, the Biochemistry Stores, or the Biochemistry Stockroom. Today, it is officially known as the BMB Research Store. However, it is important to note that many on the MSU campus simply call it the Biochemistry Stores or the Biochemistry Storeroom.

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After the stockroom was capitalized at $20,000 (Mathews, 1970), Vaughn Snook started to create the facility by asking each member of the Biochemistry faculty to provide a list of the chemicals and supplies that they used in their laboratory. After com piling this list, he worked with the University Purchasing Department to submit requests for bids to various companies. After the bids were accepted, orders placed, supplies arrived and stocked on the shelving that he also purchased, he was ready to sell supplies but was not allowed to charge customers any more than the items cost (Snook, 2010). Then account procedures were released on June 1, 1965, stating that a mark-up of 5% would be allowed. Apparently, the Department decided instead to charge Biochemistry Faculty 5% and faculty from outside the building an extra 10%. After an audit was conducted at the end of 1967, the auditors recommended that all departments be charged the same overhead (Hildinger and Wenner, 1968). An auditors report two years later brought up the same markup issues (Hildinger and Wenner, 1970). In reply to this report, the Chairman of the department and his Administrative Assistant argued that since the department provided part of the cost of the services provided by the Storeroom, that is, the manager's salary, they felt that the present markup system enabled them to provide a significant service to other departments of the University and was basically fair (Mathews and Wood, 1970). The differential markups were eventually approved by the University (Lockhart, 1971).

Vaughn Snook
1961-1973

Diana Wieczorek
1974-1977

Don Chrusciel
1977-1983

Joyce Robinson
1983-

Figure 4.12: Biochemistry Storeroom Managers 1961-2011

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By 1980, the markup of 5 and 10 percent that was allowed in 1970 was reduced to 3 and 6 percent. Being a non profit organization, they were expected to maintain inventory levels, staff, and equipment with mark-up from their services. However, after an audit in the early 1980s, they were told to charge an equal amount of markup to both inside the building accounts and outside accounts of 6 percent because of Federal grant guidelines. In 2010, the BMB Stockroom places a 10% markup on all orders. Thus contrary to the opinion of many, the Storeroom is not allowed to set their own rates, but is subject to outside auditor review. Furthermore, unlike University Stores and Purchasing, the BMB Research Store does not receive funds from indirect cost charges to grants. All costs of running the BMB Research Store are paid from the markup (Robinson, 2010).

Figure 4.13: Electric cork borer available for use in the BMB Research Store. The first borer was purchased by Vaughn Snook in 1964 but fell apart and was sent to salvage (Snook, 2010; Robinson, 2010). This borer was purchased by the Department of Microbilogy and Public Health in October 1956 for $150. It was moved to the Storeroom in the Biochemistry Building in 2002. Courtesy of Robert Keck, MSU Services.

The Biochemistry Department does pay a portion of the manager's salary beause of additional duties related to building maintenance and safety.

For the first ten years of operation, all record sales and inventory were kept by hand; computers were not available (Snook, 2010). Shortly after Diana Wieczorek was appointed as manager, a computer in the Mass Spectrometry Facility on the fifth floor was used to record sales and inventory of the Storeroom so that by August 23, 1976, the billing of the storeroom sales was kept on their computer. Then Curt Ashendal, an Undergraduate Senior in Biochemistry with considerable computer programming experience, was hired for the 1976 Fall term, to rewrite the Biochemistry Storeroom program. The new program was to be fully documented so that if improvements were necessary, they could easily be implemented

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(Wieczorek, 1976; Tanis, 1976). After the Mass Spectrometer Facility was moved to the basement of the Biochemistry Building, the dummy computer in the Biochemistry Storeroom was hard wired into their computer. After data were entered into the computer, back up tape reels had to be run every night (Robinson, 2010). Today, the storeroom has its own real time computers for billings and inventory as well as a website (www.bmb.msu.edu).

By 1980, the Storeroom carried about 1800 items, mostly large bottles (4 L) of solvents and reagents, glass and plastic ware, tubing and fittings, medical supplies, and personal protective equipment. At that time, the storeroom had a Drug Enforcement Agency and a State of Michigan license for a small amount of controlled substances. They had these licenses until 11 September 2001, when broad licenses were cancelled. After that they had to submit a requisition for each item that was Class II or lower. The Storeroom never had a Class I license. In the beginning, all chemical and radioactive wastes were collected in the store until Friday when the store manager had to call the Office of Radiation, Chemical , and Biological Safety (ORCBS) to pick up the wastes. Today, ORCBS comes directly to the laboratories. The Storeroom also had an electric cork borer, a water-cooled glass cutter, and asbestos sheets they would cut to your specifications. The electric cork borer is still in the stockroom (Figure 4.13): the water-cooled glass cutter has been moved to Professor Jon Kaguni's laboratory (Figure 4.14). By mid 1980, they started selling micro-centrifuge tubes, pipette tips, and frozen enzymes. To stock perishable materials required that they purchase freezers and refrigerators and today have several in the storeroom (Robinson, 2010).

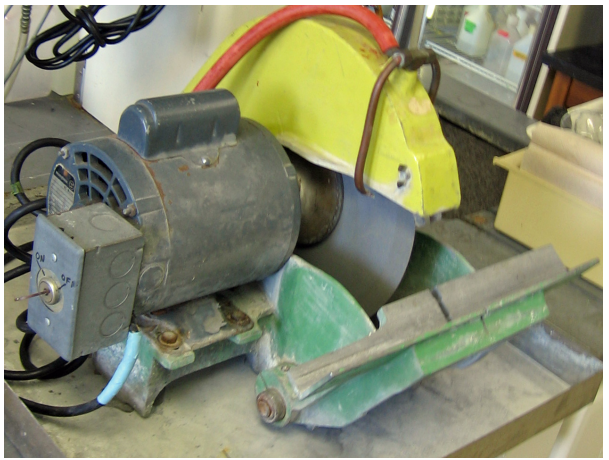

Figure 4.14: A view of the water cooled glass cutter that was moved from the BMB Research Store to the research laboratory in Room 322. The glass cutter was purchased by the Department of Biochemistry in February 1967 for $170. Courtesy of Robert Keck, MSU Services.

Early in 1986, James Wood, then the Administrative Associate in the Department of Microbiology and Public Health, met with Joyce

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Robinson to develop a storeroom in Giltner Hall, which they called Giltner Stores. At that time the faculty in the Department of Microbiology and Public Health were heavy users of the Biochemistry Stores and thus Wood and Robinson discussed the possibility of offering similar services in Giltner Hall. Then in April 1987, Joyce Robinson sent Susan Martin, a part-time employee in the Biochemistry Stores, over to Giltner Hall to supervise Giltner Stores (Wood, 1989).

At this point, it should be noted that beginning September 2, 1986, Biochemistry Stores became part of University Services and the manager, Joyce Robinson, moved to an office in the General Stores building on Harrison Road: after the Angell University Building was finished on Service Road in 1988, her office was moved to that building. This merger was made on the assumption that it would benefit the Storeroom operation by allowing for an increase in the number of companies providing open orders from 16 to over one hundred. In addition, it allowed the usage of General Stores' contract pricing for stock and provided for future computer hookups to warehouses and other heavily used companies. All other services that were provided by the Biochemistry Stores were to continue and Joyce Robinson would continue to supervise its operation along with some new duties (Preiss, 1986).

Figure 4.15: A view of the BMB Research Stockroom when they were located in Room 2 in the basement of the Biochemistry Building.

Two years later, Chairperson Jack Preiss proposed a new guideline for the joint operation between the Biochemistry Department and University Services that he sent to Provost David Scott and Vice President John Cantlon. According to this document, John Lewis, Director of University Services, had officially requested that Biochemistry Stores merge with University Services in September 1986. However, Preiss argued that the integration of the Biochemistry Stores operation with

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University Services had not accomplished its mission, in fact, service had become dramatically degraded. The new proposed guideline was necessary to prevent this merger from collapsing. The new guideline would assign Joyce Robinson, the current Storeroom Supervisor to University services at not less than 25% to supervise the satellite stores operations: Berkey Stores, Clinical Center Stores, and Giltner Stores as well as supervise the Biochemistry stores' operation and employees. In addition, the Biochemistry account number that was temporarily transferred to University Services for the convenience of the Biochemistry Stores Supervisor, while she was working at General Stores, was to be restored to the Department (Preiss, 1988a). No doubt, as a consequence of this new proposed guideline, the agreement between Biochemistry and University Services was terminated on February 1, 1989 and Joyce Robinson resumed her position as Supervisor of the Biochemistry Stores and Giltner Stores (Terry, 1989).

After the Biochemistry Stores entered into an agreement with University Stores, the Giltner Stores became a satellite of General Stores. However, when the agreement between Biochemistry and General Services proved unsatisfactory, a request was made to close Giltner Stores (Caskey, 1989). Shortly after this request was made, a meeting of Jack Preiss, Chairman of Biochemistry, John Breznak, Chairman of Microbiology and Public Health, Steve Rayburn, Administrative Assistant, Biochemistry, Bill Caskey, Administrative Associate, Microbiology and Public Health, John Lewis, General Services, Margaret Schlonsky, General Services, and Joyce Robinson was held on May 2, 1989, to discuss closing Giltner Stores. It was agreed that Giltner Stores was to be transferred to the Biochemistry Storeroom effective April 28, 1989 and that General Stores would return all inventory removed from Giltner Stores on April 25 at the earliest possible time (Terry, 1989). Giltner Stores continued to operate in Giltner Hall under Joyce Robinson's supervision until the Department of Microbiology and Public Health moved into the new Biomedical Physical Science building in 2002 (Robinson, 2010).

An audit of the Biochemistry Storeroom physical inventory conducted after the first year of operation showed that some shortages existed in the stock when compared to the inventory records. Inasmuch as faculty had keys to the stockroom, it was not possible to place the responsibility for the missing items on any one person. Consequently it was recommended that keys should

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Figure 4.16: A view of the shelves of the BMB Research Store after they relocated to Room 110 Biochemistry Building in 2008.

only be issued to stockroom personnel, except for a key kept by the department chairman (Love, 1966). Yet the Department allowed everyone with a sub-master key to have access to the Storeroom. This decision held until 1987 when the keys were placed in Steve Rayburn's office and audits of the inventory over the last five years showed an average loss of inventory between $15,000 and $20,000. Furthermore, there had been a loss of cash that was supposed to go to the key fund collected by the Storeroom. So a decision was made to rekey the Biochemistry Storeroom. This key was made available to those professors who sought unlimited access. However, they would be held responsible for any inventory losses uncovered (Preiss, 1987b).

Overall, the BMB Research Store, as it is known today, has been very successful. This we can see by examining its inventory and revenue. By July 1, 1970 inventory was $82,900 (Mathews, 1970), by 1978, $91,502, and $230,000 +/- 15% for the last 30 years. The annual revenue received from sales was: 1966, $23,904; 1970, $89,723; 1985, $344,295; 1991, $2,880,000; and by 2010, $3,702,480 (Robinson, 2010). At first the storeroom manager was the only employee of the storeroom, so it was not always open since she/he was often called to help others in the building. Today, the store has a manager, an

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accountant, a software supervisor; ordering and billing administrators and 6 student employees (Robinson, 2010).

Finally it should be noted that the BMB Research Store was relocated in 2008 from the basement (Room 2) to the first floor (Room 110). The growth chambers, that were placed in Room 2, do not mind the dark basement and the store employees love their windows (Robinson, 2010).

The responsibilities of the Supervisor or Manager of the Biochemistry Storeroom have changed somewhat over the years. In 1976, the Supervisor had the following responsibilities:

Order stock: learn sources, quantities, and purities of chemicals.
Sell stock
Prepare bills for various accounts
Interview salesman
Review bids
Receive stock
Stock materials
Search for sources of items requested by faculty
Keep a file on all pertinent products
Supervise employees
Take inventory every year
Sort clean laundry and file in storage cabinets; place dirty laundry by back dock every Wednesday morning
Keep records of keys obtained from key shop
Keep records of keys assigned to building occupants
Keep records of stock up to date
Dispense liquid nitrogen in safe manner
Keep record of rate of usage of nitrogen
Dispose of waste solvents, acids, and bases. Recycle mercury and batteries.
Cut glass tubing for customers
Make copies for Biochemistry personnel
Bill open orders and deliver to correct laboratory
Make calls to physical plant concerning electrical, mechanical and plumbing malfunctions in Biochemistry building
Maintain Stockroom
Open locked doors for authorized people
Unpack miscellaneous items for department
Supervise recycling of newspaper, glass, and cardboard
Help secretarial group as requested
Make vending machine money returns
Notify users of freezers of shut down and start up
Move items out of freezer and find temporary freezer storage

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In addition, to the above list of the Manager's responsibilities noted for 1976, the Manager's position in 2010 is now also responsible for:

Supply chain management for campus research supplies
Keep billing and inventory of hardware and software
Building infrastructure and structural changes, including safety upgrades like the $18 million HVAC project
Central contact person for all ORCBS/laboratory related issues for the Department of Biochemistry and Molecular Biology and the Department of Microbiology and Molecular Genetics
Building manager for day-to-day operations and long term objectives
Central contact person for Physical Plant work orders, emergency actions, planned utility shutdowns and maintenance
Hazardous materials technician for MSU
Instructor for the Community Emergency Response Team
Member of MSU's Chemical Hygiene Subcommittee which reviews local, state, federal and the Department of Homeland Security rules and guidelines.

The manager no longer has the following responsibilities:
Keep records of keys obtained from key shop
Keep records of keys assigned to building occupants
Sort clean laundry and file in storage cabinets; place dirty laundry by back dock every Wednesday morning
Cut glass tubing for customers
Make copies for Biochemistry personnel
Help secretarial group as requested
Make vending machine money returns

Flow Cytometry Facility, in Room 419 Biochemistry, had its origin in 1983 when Professors Harold Miller and Walter Esselman, Department of Microbilogy and Molecular Genetics purchased an Ortho Flow Cytometer from the Becton Dickinson Company (BD Company). This instrument was sent to salvage after it was replaced by the purchase of a BD Vantage SE TurboSortTM by the University in 1992, and a BD LSR II in 2007. The Vantage SE TurboSortTM is used for cell sorting or analysis and the LSRII for cell analysis only.

A large variety of methods for the study of plant and animal cells may be executed on these machines. Apoptotic cell death, cell proliferation, cell activation and signaling, cell integrity, cell and organelle function, and presence or absence of plasma membrane, cytoplasmic or nuclear markers: up to 9 markers can be done simultaneously.

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Figure 4.17: View of the Becton-Dickinson Vantage SE TurboSort flow cytometer currently in the Flow Cytometry Facility. The basic instrument was acquired in 1992 and upgraded to digital in 2002. Courtesy of Louis King,

Figure 4.18: Louis King, Operator of the Flow Cytometry Facility.

Studies of cellular DNA can be done to determine DNA content and the presence or absence of aneuploidy and polyploidy. Both instruments are capable of analyzing 8 to 10 parameters, including detection of five different fluorochromes in combination with forward and side scatter, and also able to sort cells at rates up to 25,000 cells/sec and, using an automated cell deposition unit, can place selected cells into 96 well tissue culture plates. A separate computer workstation handles data analysis. Professor Pamela Fraker assumed management of the Cytometer Facility in 1990: Louis King has managed operation of the instruments from 1986 until 2011 (King, 2010). The Research Technology Support Facility assumed management of the Cytometry Facility on October 1, 2005 (Fraker, 2005; Esselman, 2010).

Instrument Shop: As noted in Chapter Three, an instrument shop was planned from the very beginning for the basement of the new biochemistry building. In anticipation of getting the shop organized, the Department appointed Jack Holland as an instructor in 1964 to identify and purchase equipment needed for the Shop and to hire and train the personnel. Originally the shop was to be located in Room 13, 13A, 13B, 15, 15A, and 15B in the basement. After the Glass Blowing Shop, which was to be housed in Room 14, 14A, and 14B, was instead housed

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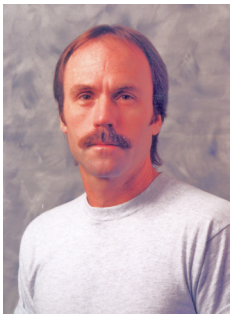
in the Chemistry Building, the Shop also occupied these three rooms. The Electronics portion of the Shop occupied Rooms 13 and 15: Rooms 14, 14A and 14B was used to house the machine shop. Then in 1979, Rooms 13, 13A, 13B, and 15D were remodeled and used by the Mass Spectrometry Facility. The Electronics Shop then utilized Rooms 15, 15A, and 15B until late 2009, when the Electronics portion of the Shop was closed to be used for the Proteomics Core Facility In 2010, the Machine Shop occupied Room 14, 14A, and 14B.

Jack Holland
(1964-1972)

James Maine
(1972-1993)

Huong Lee Tran
(2005-2009)



Jeffrey Lounds
(2005-2010)

Figure 4.19: Managers of the Electronic and Machine Shop and dates served. A photograph of Tony Sills (1993-2002) was not available.

The shop was managed or cooridinated by Jack Holland (1964-1972), Jim Maine (1973-1993), Tony Sills (1993-2002). Beginning in 2005, Huong Lee Tran managed the Electronic Shop until he retired in 2009 and Jeffrey Lounds managed the Machine Shop until 2010.

Electronics and Machine Shop Personnel		
Benson, Dawn	Trades Helper	1982-1983
Ellard, Terence	Machinist	1967-1970
Engstrand, Jean	Trades helper	1983-1984
Engstrand, Jean	Electronics Mechanic	1984-1992
Grossman, Dave	Electronics Technician	1982-1983
Holland, John	Instructor	1964-1972
Lounds, Jeffrey	Trades Helper	1984-1985
Lounds, Jeffrey	Electronics Mechanic	1985-1993
Lounds, Jeffrey	Instrument Maker	1993-2005
Lounds, Jeffrey	Research Shop Coordinator	2005-
Maine, James W.	Engineering Technician	1968-1976
Maine, James W.	Supervisor Tech Services	1976-1982
Maine, James W.	Coordinator Tech Services	1982-1988
Maine, James W.	Sci Instr Facility Supervisor	1988-1993

Table 4.1: Employees of the Department serving in the Electric and Machine Shop and the years they served. The table continues on the next page.

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Electronics and Machine Shop Personnel		
McPharlin, Tim	Labor Aide	2000-2001
Norris, Ron	Trades Helper	1987-1996
Norris, Ron	Mechanical Maintenance	1996-
Riddle, Nathan	Instrument Maker	1996-2003
Riegel, Taylor	Electronics Technician	1972-1985
Sills, Tony	Instru Facility Coordinator	1993-2002
Smydra, Stanley	Mechanical Technician	1978-1980
Tran, Huong Lee	Trades Helper	1984-1988
Tran, Huong Lee	Electronics Mechanic	1988-1993
Tran, Huong Lee	Instrument Maker	1993-2005
Tran, Huong Lee	Research Shop Coordinator	2005-2009

Table 4.1 Cont'd: Employees of the Department serving in the Electronic and Machine Shop and years served.

The Electronics and Machine Shop provided extremely important service to the Department of Biochemistry and many other departments on and off campus through the years of its operation. They responded quickly to requests for service when research equipment failed, even if it only meant replacing a fuse. They repaired many types of equipment from the basic magnetic stirrers to optical IR and UV spectrophotometer, ultra centrifuges, liquid scintillation counters, and gas chromatographs. They repaired refrigerated cold rooms and ultra cold freezers. They designed and fabricated special electronics research equipment, and machined one of a kind or replacement parts. At the same time, each job had to billed out separately to offset the cost of the shop operation. All of the shop personal were skilled but had to self-train to keep their knowledge current. What is not clear now is how the students and faculty will deal with instrument failures now that the Electronics Shop is closed.

Library: The Library or as it was often called, the Biochemistry Reading Room, was located in Room 202. In 1978, the Department received $941 from the Carl Hoppert estate to be used by Robert Tanis for support of the Library (Board of Trustees Minutes, February 23-24, 1978). By 1986, it housed approximately 3,900 volumes of the serials most often used in Biochemistry, about 1,920 textbooks and references and numerous pamphlets, brochures, and miscellaneous volumes. It was also used to store the Master's and PhD theses of students completing their work in the Department (Biochemistry, 1986).

When computers came upon the scene, as described more fully in the section on the Macromolecular Computer Facility, the Reading Room housed IBM PC and Macintosh

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computers equipped with the latest software for conducting literature searches, word processing, graphics, image analysis and slide preparation (Biochemistry, 1998). After the Biomedical Physical Sciences building was constructed in 2002 and the BPS branch Library in this building was completed, the Biochemistry Reading Room was closed and the reading materials, except for the Master's and PhD theses, were apparently sent to salvage (Smith, 2010). Room 210 now houses the Macromolecular Computer Facility, the Masters and PhD theses of Biochemistry students, and the Bioinformatics Core. Space for four offices was created on the west end of the Library in March 2001: three offices were for the Bioinformatics Core and one office was for the manager of the Macromolecular Computer Facility (Meeting, 2001).

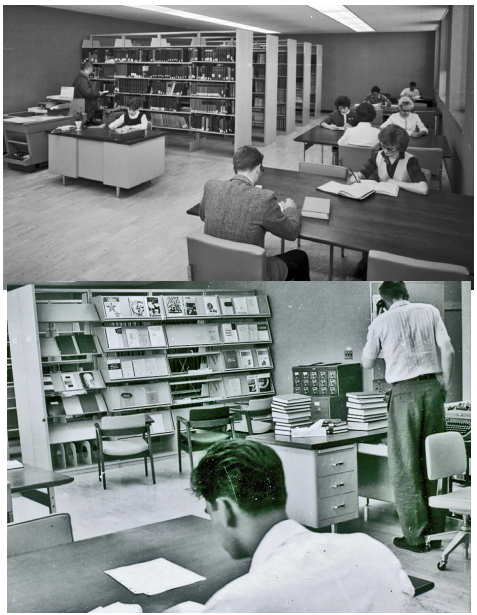

Figure 4.20: Two views of the Biochemistry Library. The upper view shows the Librarians Desk and the books on reserve. The lower view shows the shelving with the current issues of journals and chairs used by readers. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

Macromolecular Computer Facility: Michigan State University entered the computer age during the mid 1950s after faculty from the College of Engineering, the Department of Mathematics, the Agricultural Experiment Station, and other departments argued that research at MSU was handicapped by the lack of a high speed computer and that the eventual acquisition of such a device must be in the long range planning (MSU Board of Trustee's minutes May 20, 1955). Consequently, the first computer on campus, the **Mi**chigan **St**ate **I**ntegral **C**omputer called the MISTIC, was constructed early in 1957 on the fifth floor of the then Electrical Engineering Building (now the Computer Center). It had nearly 5000 vacuum tubes and 1024-40 bit storage locations. Data were input using Hollerith cards and punched tape. The finished computer was about 10 feet high, 11 ½ feet long and 2 ½ feet wide. (McGuire 1958). By December 20, 1957, the MISTIC Electronic Computer had been tested thoroughly and was operating effectively.

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In response to a request from MSU for a proposal for a new computer to replace MISTIC, the Controlled Data Corporation replied on April 6, 1962, outlining capabilities of the CDC 1604, 1604-A, and 3600. (Breslin and Muelder, 1962). Shortly after that, the Board of Trustees approved the purchase of the CDC 3600 computer system manufactured by the Controlled Data Corporation for $1,387,000 (MSU Board of Trustee's minutes, April 13, 1962). The CDC 3600 had 32,768 words of core storage, a console including a typewriter, two bi-directional data channels, magnetic tape control, six model 606 tape units, a 1,000 lines per minute printer, medium speed card reader, and a slow speed card punch (Breslin and Muelder, 1962). This computer, which used transistors instead of vacuum tubes, was placed in operation in July 1963. During the first three months of operation, a total of 26 hours of computer time was used. Four years later the CDC 3600 was operating on a 24-hour basis, seven days a week. (Von Tersch, 1967).

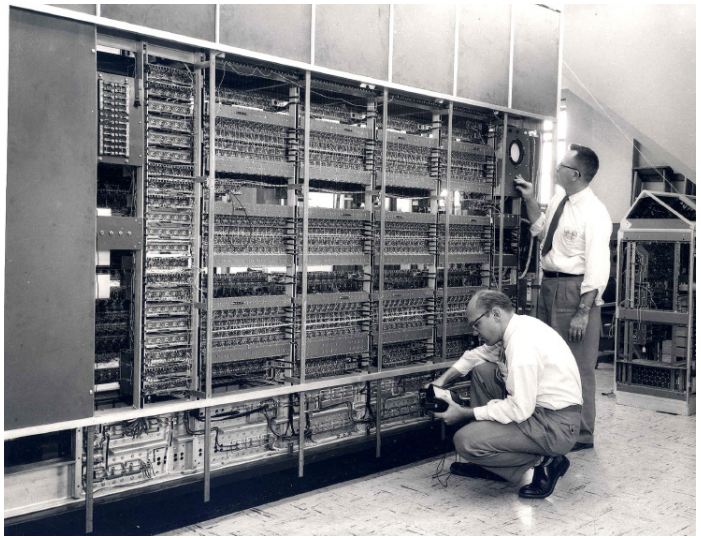

Figure 4.21: Lawrence Von Tersch (standing) and (Martin) Glen Keeney examining parts of the Michigan State Integral Computer (MISTIC) built in 1957 on the fifth floor of the Computer Center. The electronic "brain" was made of miles of wire and nearly 5,000 tubes and transistors. It performed 87,000 multiplications a minute. Today a normal processor (Pentium 4) can realistically perform approximately 1.5 Gflop (1.5×10^9 Floating Point Operations per Second) and has 125 million transistors. This image made possible courtesy of Academic Computing and Network Services.

Many scientists and mathematicians, during the early phases of the development of computer technology, created their own software and built interfaces (from components). By the mid-1980s, however, most of what was needed was commercially available. Even programming activities had diminished because software, both commercial and freeware became available, especially utility and productivity software, e.g. analyzing and plotting data, preparation of manuscripts, and correspondence (Crouch and Atkinson, 2000).

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If we look at the use of the University Computers by researchers in the Department of Biochemistry we find that Marlene Steinmetz-Kayne carried boxes of Hollerith cards with data that she collected with an analytical ultracentrifuge in 1964-65 (Memories, 2010) and around 1970 Professor Willis Wood built a highly sensitive amino acid analyzer, using a Gilford Spectrophotometer, a flow cell, and a Royson high speed paper tape punch. Then during the summer of that same year, his son William worked on a computer program for amino acid analysis using the University's CDC 3600 at the computer center (Wood, 2010). In 1968, Charles Sweeley joined the Department of Biochemistry and obtained a grant from the National Institutes of Health for continuation of his sphingolipid research that included funding for a LKB GC-mass spectrometer. As part of his appointment to the Department, MSU provided funds for a Digital Equipment Corporation (DEC) PDP-8i (Programmable Data Processor) computer and accessories such as a paper tape reader. Two programmers, Bruce Ray and Dick Teets, did most of the programming for the computer. William Wood also contributed in a significant way to that first computer system in the Biochemistry building (Sweeley, 2010).

Figure 4.22: Teletype with acoustical coupler used to transmit data to the CDC 3600 Computer via the telephone. Photograph courtesy of the Michigan State University Museum Historical Collections.

To facilitate learning opportunities, the Department purchased a DEC PDP-8L computer in 1971. The teletype of this computer was modified by adding an acoustical coupler (Figure 4.22) that enabled its use as a terminal for time sharing applications, principally involving the MSU Computer Center Intercom System. This dual use of the teletype proved to be satisfactory but the growth of the program presented a clear need for a second teletype that could be dedicated to the time shared terminal on a full time basis, thus re-

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leasing the present unit for computer use exclusively (Fairley, 1972).

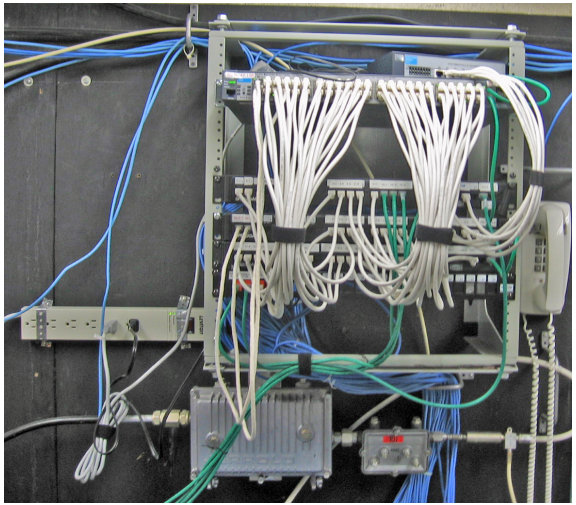

Figure 4.23: Ethernet switching staton in the basement of the Biochemistry Building in 2010. Courtesy of Ron Norris.

Figure 4.24: Meridian Norstar Computer in the basement of the Biochemistry Building for the Department's Digital Phone System. Courtesy of Ron Norris.

The first Departmental Computer Committee was appointed in the Fall of 1973 (Faculty Committees, 1973), but it was not until 1983 that it was decided to place IBM Personal Computers into each faculty laboratory over a period of several years. The Department began this project by purchasing twelve units. These computers were used for data acquisition, word processing, reprint retrieval, and data management. One centrally located computer was made available for the typing of theses and work on independent projects by students and staff (Rayburn, 1983). A new bookkeeping computer system was on line by May of 1983 so that monthly balances of grant support could be provided to the faculty. In addition, a small group of faculty, interested in obtaining computers for their research, met with Steve Rayburn to discuss word processing, DNA search, literature search, data processing, "home use," financing, and the selection of computer recipients (Rayburn, 1983a). Five years later Frank Hartman (1988-1995) was hired by the Department as a computer programmer to help usher faculty, staff and students into the computer age. He replaced Barbara

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Musselman, former programmer, who left during the summer of 1986 (Rayburn, 1988).

The Biochemistry Department acquired and installed a local area network based on the IBM Token Ring concept before 1986. After Ron Norris joined the Department as a Maintenance Mechanic in 1986, he removed the Token Ring system and replaced it with Ether-Net or more often called the Thin Net cable. This cable along with the Net/Ether-Net bus station and an Ether-Net modem provided the Biochemistry Department access to the broad-band cable network and allowed the Mass Spectrometer Facility to communicate more efficiently with collaborating investigators (Watson, 1986; Holland, 2010; Norris, 2010). Records indicate that the first portion of the Ethernet installed in the Biochemistry Building in 1986 served the Mass Spectrometer Facility, the Biochemistry Storeroom, the Departmental Office, and the Electronic Shop (Holland, 2010) (Norris, 2010) (Watson, 1986). Three or four years later it was announced that email addresses of all the faculty and staff were to be printed in the 1990-1991 MSU Faculty/Staff Directory and that electronic guides to NIH and NSF programs were available on the IBM 300 in the EMC2 mail system (News and Notes, 1990). The Biochemistry building was not completely wired with Ethernet cabling until around July 1, 1993 (Ethernet Service, 1993). The Building was rewired with a Category 5 cable that provided a 180 Mega bit network in 1998; this system was replaced with a Category 5E cable in 2006 that provided a one Giga bit system (Padmanabhan, 2010). When the ventilation system in the Biochemistry building was rebuilt in 2007, the original Category 5E cable was replaced with a new Category 5E cable (Norris, 2010). The Departmental Computer Committee reported, after the 1988-89 academic year, that they had concentrated on two major goals that year: the acquisition of DNA and protein sequence analysis programs and a computer graphics system for molecular modeling. A comprehensive package of sequence analysis programs was acquired in November 1988 from the University of Wisconsin Genetics Computing Group and installed on the MSU VAX (Virtual Address eXtension) mainframe computer. Included in the package were regular updates of the nucleic acid and protein sequence databases. By the end of the 1988-89 academic year, nearly 50 users from ten departments, including 12 from Biochemistry, had enrolled to use the programs with several groups reporting significant research progress.

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After both software and hardware demonstrations arranged by the Computer Committee and the MSU Computer Laboratory were held, the committee also chose to obtain a Stellar computer system and the POLYGEN software package. The Office of Academic Computing and the Research Excellence Fund (REF) had agreed to underwrite the purchase costs of this system. For the future, the Committee planned to examine the feasibility of departmental standards for word-processing software to facilitate exchanges between faculty and secretarial staff (Triezenberg, 1989).

In early 1990, John Wilson, then Chairman of the Department, obtained a Zenith Supersport 286 laptop computer that turned out to be a tremendous help in getting some of the departmental paper work done; he could simply pick it up and take it home at night to type letters, etc. and have them ready for dispatch the next day. WordPerfect 5 was loaded on the hard disk, along with some other programs but there was still a lot of disk space. Wilson thought that this computer might be useful someday for classroom applications, for example, in conjunction with a projector that could project computer screen images (Wilson, 1990a).

Figure 4.25: Zenith labtop computer used by Professor John Wilson when he served as Chairperson of the Department. This computer (AC 7630) was purchased by the Department in April 1989 for $2799. Photograph courtesy of Melinda Kochenderfer and K. “Pappan” Padmanabhan.

So by 1990 the Library in Room 202 began to be used as a central location for computers and as a room for training others in the use of the computers and computer software. For example, in early March 1990, it was announced that there would be another one-hour introduction to the library computer database system offered on Tuesday, April 27, 1990, at noon in the Biochemistry Reading Room. This database allowed access to about 4000 abstracts of articles in biochemistry, chemistry, plant and animal science, and allied fields (Biochemistry Reading Room, 1990). A little over a year later, the Library Committee

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obtained a copy of Current Contents Life Sciences with Abstracts. This software ran identically to the Current Contents software on the Reading Room Computer, but included article abstracts in addition to titles and keywords (Library News, 1991).

A laser printer that was connected to the PC used for database searching and for word processing in the main office, was moved to the Reading Room by 1992. This move allowed users to print hard copy of files from their database searcher, from MSU Library MAGIC and from the Journal of Biological Chemistry on disk, a service that was to be installed. These services for PCs paralleled the ones that were already available for the McIntoshes in the Reading Room (Reading Room News, 1992). The MAGIC database system included ACAD, a general-knowledge database of articles from a variety of magazines and journals. To access the database, one simply had to access MAGIC as usual and you were given a choice of the card catalog or ACAD (Magic, 1992).

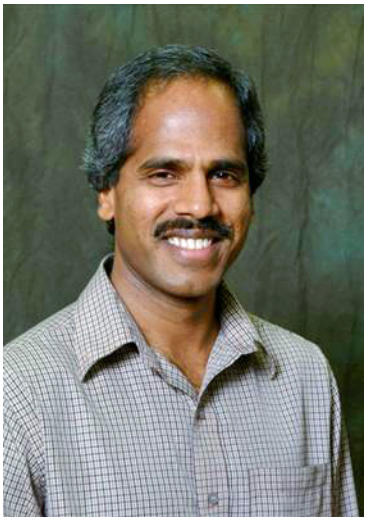

Figure 4.26: Kaillthe Padmanabhan, known as Pappan.

Early in 1993, Tom Deits, Steve Rayburn and their associates were praised for getting the computers and their accessories in the Reading Room into functional form. While there was more to come, the computers there were already getting heavy use (Wilson, 1993). Part of the room was then renovated to accommodate the various MACS, PCs, SGI minicomputer, and peripherals that were now located in other places in the building. It was also noted that access to the campus Ethernet would be continued so computer users would be able to use a variety of operating systems, including DOS, Windows, System 7, UNIX, VMS (on the FAX) and CMS (on the IBM). All that needed to be done was finish the shelving, installing the network cables, and moving the rest of the computers. One of the systems to be installed was a Compac Portable 386 with a Polaroid slide maker (News and Notes, 1993).

Kaillthe Padmanabhan, commonly known as Pappan, was appointed in 1995 to teach protein modeling to the faculty, staff and students and also to oversee the computers

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and networking in the department. At that time, there were three Silicon Graphics systems in Room 517. One was a server that housed the GCG (Genetics Computer Group) sequence analysis software suite and served the whole campus. The other two were graphics workstations that ran the Biosym software obtained from the company POLYGEN, which was used for protein modeling. All three systems remained in Room 517 until January 1996 when they were moved to newly remodeled Room 218. The department also purchased a few new Window PC's which were used for word processing, scanning, slide making etc. and had specialized software packages not available on laboratory computers. These computers were moved to the Biochemistry Reading Room or Library after the Books and Journals in the Library, except for the PhD and Master's theses, were moved to the new Biomedical Physical Sciences Library. Since then Room 202 has become known as the Macromolecular Computing Facility or simply the Computer Facility. This room also provides space for the Bioinformatics Core of the Research Technology Support Facility (Padmanabhan, 2010).

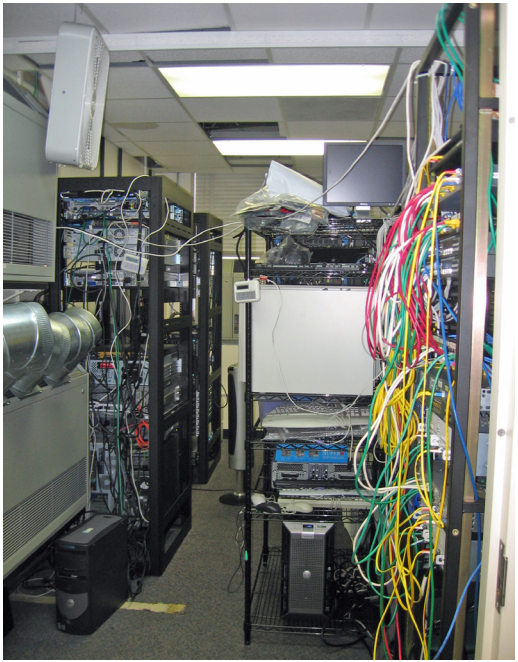

Figure 4.27: View of server and graphic work stations in Room 218 used by the Bioinformatics Center. Note the cooling service on the left required to keep the systems functioning. Courtesy of Michael Feig.

The Macromolecular Computer Facility has the following functions. First, it provides computers and classroom space for multiple courses on protein modeling, dynamics and simulations. Second, it provides UNIX computers with programs for protein structure analysis and visualization which is generally not available in the research laboratories. Third, it houses Windows PC's and a MAC with specialized programs, a large format printer for making posters for scientific meetings and conferences, and other printing and scanning equipment (Padmanabhan, 2010).

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The website for the Department of Biochemistry was first created in late 1995 by Kaillathe Padmanabhan (Pappan). He maintained the site for about two years until Carol McCutcheon served as the webmaster and graphic designer for the site from 1997 to 2005. Today many people contribute to the BMB web presence. Faculty members write their own "Research Interests" sections and provide illustrative images as well as notice of their publications. Some staff members have developed their own sites describing their courses and providing course materials (Bowlby, Foley, Stoltzfus,) while others have branched off with independent sites serving the needs of their scientific audiences (Zacharewski, Kuhn, Arnosti, Feig). Other staff members who have worked on the web include Chris Biehn, Teresa Vollmer, Katie Gallagher, Annette Thelen (BMB Store), Olga Lami-Schmizzi (BMB Store). Kevin Carr and Matt Larson have helped with-server maintenance. John Johnston is an information technologist who develops site/applications and is a Linux systems administrator. Currently Melinda Kochenderfer is serving as the Departmental webmaster (www.bmb.msu.edu).

Figure 4.28: A view of the printer in the Macromolecular Computer Facility used to print 42 inch wide posters used for a variety of purposes, most importantly, posters used in scientific poster sessions. Courtesy of Kaillthe Padmanabhan.

Since Melinda Kochenderfer became the webmaster in late 2004, the trend in the industry has moved from using plain HTML to more interactive and dynamic designs, albeit with stricter standards. Web sites today (2010) are expected to use Cascading Stylesheets for design and comply with XHTML 1.1 code. Most recently, the University has adopted a usability and accessibility policy directing how sites are to be developed to comply with governmen-

Figure 4.29: A view of the Macromolecular Computer Facility in Room 202 without students. Note the number of computer monitors and the shelves holding the PhD and MS theses on the wall to the left. The back wall holds the screen used for projection of images using the projector mounted on the ceiling. Courtesy of Kaillthe Padmanabhan.

tal mandates designed to facilitate access for users who may have a disability or may be trying to access a web site via a non-desktop computing device, such as a mobile phone (Kochenderfer, 2010). Thus, the Macromolecular Computing Facility in the Department of Biochemistry & Molecular Biology not only serves researchers within the department but also the larger MSU scientific community.

Specially equipped to aid in the study and teaching of molecular structure determination, bioinformatics, and evolutionary and systems biology, the facility also serves as a gateway to advanced computing equipment, while offering several computers and programs for the development of more general graphical and office presentations.

The forgoing discussion of the Macromolecular Computing Facility might give the impression that this facility houses all the computers in the building except personal computers in each research laboratory. It should be noted that some laboratories have multiple computers with specific software used for specialized analysis. For example, Professor Kuhn has 12 Dell PC's running RedHat Enterprise Linux or CentOS for computing; including two Xeon 3.1 GHz, one Xeon 3.4 GHz, two Xeon 3.6 GHz, one Xeon 3.2 GHz, and one Xeon 3.0 GHz dual-processor system with 2+GB RAM each; one Celeron 2.4 GHz processor, and one 2.8 GHz Pentium IV machine, and a

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dedicated laboratory firewall and switch. She also has three Pentium IV 1.8-2.4 GHz PC's running Windows XP and one Windows laptop; plus two Silicon Graphics (SGI) R12000 300 MHz IRIX 6.5 workstations with SSE/MXE stereographics and 512MB RAM for interactive 3D graphics. The lab has over 4 TB of disk space with user files protected by daily/weekly incremental and monthly full back-ups onto USB external drives (Kuhn, 2010). Also Professor Feig conducts a very computer-intensive research program. His laboratory has 18 laboratory computer workstations that use a variety of different computer systems, from regular PCs to parallel computers and high-end graphics workstations that run Linux or another type of UNIX operating system (Feig, 2010).

The RTSF Bioinformatics Core, in Room 202 Biochemistry, utilizes web designers, database experts, programmers, and systems administrators, who understand biology and biochemistry, to analyze sequence and microarray data, develop web sites to make the data available to the general scientific community, and ensure that data on the web is safe from hackers and backed up regularly. Organizing large data sets from multiple sources, such as that generated from microarray and proteomic analysis, is a complex process. The RTSF Bioinformatics Core is at the leading edge in designing and developing new data schemata for databases that allow researchers to ask complicated questions and provide insightful answers (Dewitt, 2004; Leykam and DeWitt, 2005). The facility is housed in the Biochemistry Building but is not managed by the Department.

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Macromolecular Structure and Sequencing Facility: Nearly seven years after the Biochemistry Analytical Laboratory was closed, Professor Charles Sweeley, then Chairman of the Department of Biochemistry, proposed the establishment of a Macromolecular Structure Facility in the Department of Biochemistry, that is, a laboratory to house sophisticated research equipment that could be contracted to perform laboratory analysis. This proposal, dated September 19, 1983, was sent to Robert Gast, the Director of the Agricultural Experiment Station (AES). Sweeley argued that future advances in biological sciences will be dependent on the availability of specialized equipment for structural analysis of proteins, nucleic acids, and complex carbohydrates, DNA sequencing, peptide mapping, two dimensional gel electrophoresis, mass spectrometry, and nuclear magnetic resonance spectroscopy. Such equipment was too expensive for anyone individual research laboratory to purchase. While it was true that some of these instruments were already available in some laboratories, they may not be available to researchers on a universal basis.

Professor Sweeley proposed that the Facility be established as a facilitative device, information resource, consulting service, and analytical center for specialized instrumental analysis not available elsewhere on campus. Instruments already available on campus would remain at their present location. Newly acquired instruments would be housed at the most appropriate location but would be available on a preferred basis by Agricultural Experiment Station (AES) funded project directors in cellular and molecular biology. In his view, such a facility would also be of interest to high technology firms in the Lansing area, such as the Michigan Biotechnology Institute (MBI), and the MSU-related biotechnology firm, Neogen. Furthermore, it seemed reasonable to expect that a significant proportion of the operating budget of such a facility might eventually be borne by such local firms.

A Facility Manager with a background and experience in several areas of instrumentation would be needed to provide advice and day-to-day guidance of the facility. He/She should also have experience in the isolation and characterization of proteins and nucleic acids on both the analytical and pilot scale. Users of the facility would depend upon the facilities manager to assist in the design of experiments, to characterize macromolecules, and in the interpretation of the results. It would also be expected that the manager would keep abreast of new developments in the field, in new areas of instrumentation that may not be

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commercially available, and, if necessary, could become involved in the research,.

Space for such a facility would be provided on the fifth floor of the Biochemistry Building adjacent to the fermentation laboratory which was used for the pilot scale isolation of proteins and nucleic acids from microorganisms. If funds were made available by the AES for such a facility, permission would be sought for the manager's position in the Department of Biochemistry. A full time technician would also be required to carry out analyses on instruments within the facility. Sweeley also argued that the success of such a facility would depend upon the willingness of faculty with specialized instruments to cooperate with the manager when analyses would require expertise and equipment from other laboratories. Thus he proposed that a faculty advisory committee be appointed to facilitate this cooperation (Sweeley, 1983).

After the Director of the AES, Robert Gast, received the proposal to establish a Macromolecular Structure Facility on October 7, 1983, he replied that he needed to get a better assessment of AES involvement in the biotechnology area and an overall sense of direction and priorities as to where they should be going in the future (Sweeley, 1983).

Apparently nothing was done about establishing the facility until Jack Preiss was recruited as Chairperson of Biochemistry in 1984. It turns out that Preiss had established a similar highly successful facility at the University of California, Davis, while he was Chairman of the Department of Biochemistry. So after an inquiry was made as to Jack Preiss's interest in being the Chairman of the Biochemistry Department, he, in a letter dated May 15, 1984, stated that it would be important that the campus and the department maintain and enhance the availability of sophisticated equipment to enable biological researchers to make important advances in areas pertinent to solving major problems in agriculture as well as in animal and human health. Providing support for advanced instrumentation for structural analysis of proteins, nucleic acids, and carbohydrates as well as instrumentation for synthesis of oligodeoxynucleotides and even peptides would be important to him. Since he was aware of Professor Sweeley's proposal of September 19, 1983, to establish a Macromolecular Structure Facility, he went on to suggest that it would be best if the Facility be housed in the Biochemistry Building. He also requested that an Assistant Research Professor position with security of employment be established for Dr. Young Moo Lee (Preiss, 1984). Dr. Lee had received his degree with Dr. Duane Brown, a well-known

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protein chemist and had post-doctoral experiences at the University of California at Davis with Bill Benesik and Francisco Ayala, well known geneticists. In a letter dated June 16, 1984, Dean Anderson, College of Agriculture and Natural Resources, informed Jack Preiss that Lee would be supported and in the future, upon approval from the Biochemistry Faculty, he would get security of employment. (Preiss, 2010).

Before Jack Preiss assumed the position as Chairman of the Department of Biochemistry at MSU in May 1985, Fred Horne, Associate Dean for Research and Graduate Programs, College of Natural Science, in a memorandum dated January 7, 1985, proposed, after considerable planning and discussion with Professors Jack Preiss, Bob Hausinger, Lee McIntosh, Pete Magee, and Charles Sweeley, that the new University Macromolecular Instrumentation Facility contain the following initial components: A Beckman System 890 M Protein/ Peptide Sequencer; two Waters HPLC Systems with appropriate gradient programmers, pumps, UV/VIS detectors, data modules, autosamplers, heaters, and Pico-Tag Accessories; an Applied Biosystems Model automated 3-column DNA Synthesizer and accessories; and renovations to convert Room 5 Biochemistry for the above equipment. This proposal included requests for financial support from the Biotechnology Research Center, Agricultural Experiment Station, College of Natural Science, College of Agriculture and Natural Resources, College of Engineering, College of Human Medicine, College of Osteopathic Medicine, College of Veterinary Medicine, Office of the Vice President for Research, and the Office of the Provost (Horne, 1985). This memorandum implies that the Facility had already been created although no official paperwork can be located. The implication is that it was created in the official offer to Jack Preiss to become Chairman of the Department and that it was actually formed in November 1985 (Preiss, 2010).

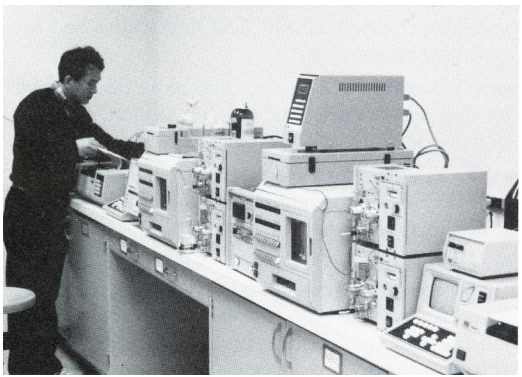

Figure 4.30: A view of the Macromolecular Structure Facility shortly after it was opened with Young Moon Lee, the first manager of the facility, examining some of the instrumentation. (Biochemistry, 1990)

After the facility had been in operation for one year, Jack Preiss, Chairperson of Biochemistry, prepared a

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report dated January 6, 1987 on the status of the Facility and addressed it to the Steering Committee of the Facility, Fred Horne, Pete Magee, Lee McIntosh, and Young Moo Lee. (Young Moo Lee was appointed manager of the Facility by Professor Preiss). He noted that since Fred Horne had left the University, he was asking Arnold Revzin, Associate Dean of the College of Natural Science, and Bob Gast, Director of the Agricultural Experiment Station to be members of the Advisory Committee since the units that they represent had been the main financial supporters of the facility (Preiss, 1987).

The Facility had provided service to 10 faculty from the Biochemistry Department, 2 from the Plant Research Laboratory, one faculty member each from Microbiology, Chemistry, Crop and Soil Sciences, and Pharmacology/Toxicology after one year. One request for service had been obtained from the outside and there was a possibility that many requests may be forthcoming from NIH scientists in the form of a contract. They had analyzed 112 proteins/peptides for amino acid composition, synthesized 47 oligodeoxynucleotides, and sequenced 76 proteins/peptides. He did point out, however, that the facility was working at a deficit and was hoping that support for the two technicians would be forthcoming from either the four colleges or the Provost's office (Preiss, 1987).

Figure 4.31: Melanie Corlew using the Protein/Peptide Sequencer in the Macaromolecular Structure Facility shortly after it opened in 1986. (Biochemistry, 1990)

The Macromolecular Structure Facility was first located in Room 5, Biochemistry Building, and consisted of a Beckman Model 890M sequencer, Water's Pico-Tag amino acid analyzer, Applied Biosystem's Model 380B DNA synthesizer, and Peptide International's model 2000AT peptide synthesizer. It was also equipped with three up to date HPLC systems as an integral part of microchemical instrumentation. In addition, the facility provided services on protein/peptide sequence analysis,

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amino acid composition analysis, and oligonucleotide synthesis. However, it was apparent to Preiss that in the very near future, there will be a demand for protein/peptide sequencing to be done at a sample level of 100 pmoles or lower so it might be the right time to order an Applied Biosystems model 477A pulsed liquid phase protein/peptide sequencer (Preiss, 1987).

A year and 10 months after the facility was created, it had provided service to 45 faculty members in 11 departments and two faculty from the Michigan Biotechnology Institute. While the facility had become very successful in terms of providing analytical services, it had not as yet become financially supportive so that the Department of Biochemistry had contributed more to its operation and it had become a drain on their budget. (Preiss, 1987a).

Figure 4.32: An Applied Biosystems Procise cLC494 Protein/Peptide Sequencer used by researchers in the Macromolecular Structure Core of the Research Technology Support Facility. Courtesy of Colleen Curry, Stacy Trzos and Joe Leykam, Research Technology Support Facility.

Then on May 30, 1990, the Facility Committee of the Department of Biochemistry, reported at a Departmental Faculty meeting that the Macromolecular Structure Facility, now called the Macromolecular Structure, Sequencing and Synthesis Facility (MSSSF), had concerns about the operation of the Facility. While staffing of the Facility was satisfactory, their salaries were paid by the Department except for 0.5 FTE that was covered by user fees. Supplies and upkeep were also covered by user fees. The Committee had six concerns: (1) should the Department consider the likelihood and/or desirability of making the Facility completely self-supporting; (2) what should be the future directions of the facility; (3) should the Department subsidize the cost to Department members to stimulate research within the Department; (4) how will plans for a competing facility in the Department of Veterinary Medicine affect the operation of our Facility; (5)

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Figure 4.33: Joe Leykan, Manager of the MSSSF 1987-2010.

should we be soliciting support from the University as a whole and/or industry to subsidize its operation; and (6) should the direction of the facility involve more input from the University as a whole or remain primarily under the Chairman of Biochemistry (Memorandum, 1990).

By July of 1990, roughly 4 ½ years after the Facility was established and a month after the report of the Biochemistry Facilities Committee, John Wilson, then Chairperson of the Department of Biochemistry, sent a letter to Frank Hoppensteadt, Dean of the College of Natural Science expressing some of the issues noted by the Facilities Committee. He pointed out that as far as could be determined, the Advisory Committee that was appointed when the Facility was created had never met, in fact, one of its members had been gone for several years. Young Moo Lee, who had been appointed as Manager of the Facility in January 1985 by Professor Preiss, left in 1987: he was replaced by Joe Leykam in 1987. Furthermore, as far as could be ascertained, there was no official paperwork that placed the operation of the Facility under the administration of the Biochemistry Department. Therefore, given that the Facility is housed in the Biochemistry Building, that it has been administered by previous Chairpersons

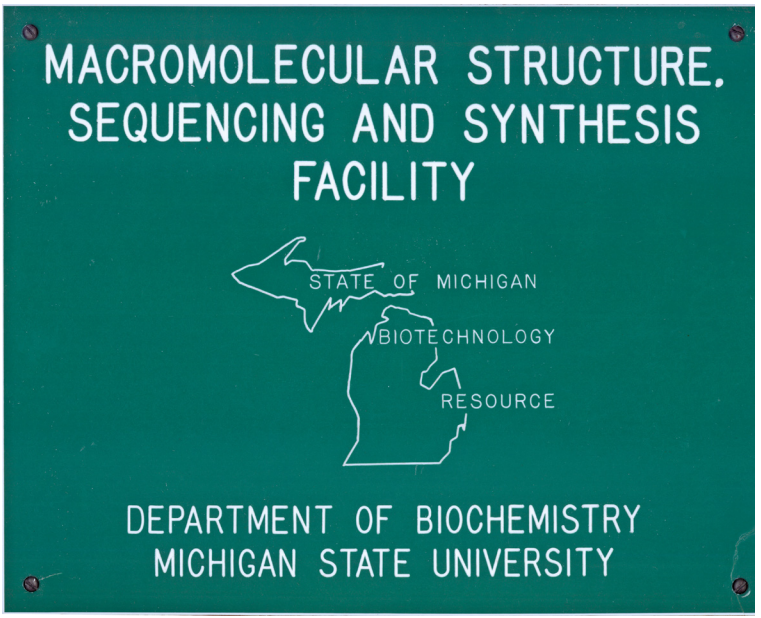

Figure 4.34: A view of the sign outside the door to the Macromolecular Structure and Sequencing and Synthesis Facility.

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of the Department and that its effective operation is of importance to Biochemistry Faculty, it is reasonable that the Department be charged with administration of the facility. On the other hand, it was also important to realize that it is truly a University resource, serving many researchers from departments other than Biochemistry, and indeed, from other institutions. As a result of these arguments, he suggested that some paperwork be created that states that the Chairperson of the Biochemistry Department have the administrative responsibility for the Facility. Handwritten comments on Wilson's letter states that John E. Cantlon informed Arnold Revzin, Associate Dean of the College of Natural Science, that Wilson should not worry about the situation but go ahead and appoint a new advisory committee (Wilson, 1990).

Figure 4.35: Colleen Curry, Research Assistant I in the facility in 2002, when it became part of the RTSF (Biochemistry, 1990).

Figure 4.36: Stacy Trzos Bloom, Research Assistant I in the facility in 2002, when it became part of the RTSF (Biochemistry, 1990).

Figure 4.37: Joe Leykam, Manager of the facility in 2002, when it became part of RTSF (Biochemistry, 1990).

Then on August 27, 1991, John Wilson, Chairperson of Biochemistry, received a memo from Arnold Revzin, Chairperson of the MSSSF oversight committee noting that Jack Preiss, Jerry Dodgson, and Arnold Revzin met with Joe Leykam on August 26, 1991 and discussed Joe Leykam's attached 1991 Annual Report of the MSSSF. From all indications the operation of the Facility was going well. Income was growing to the extent that some new instrumentation could be purchased. However, the committee felt that it was appropriate for the University and investigators to bear primary responsibility for funding equipment purchases while user fees should, if possible, be set to cover maintenance and technical salaries. Whether this arrangement could be maintained in the existing competitive market, remained to be seen. Joe Leykam, as Manager of the Facility, reported that the MSSSF earned $5000 additional income by conducting a workshop for visiting Egyptian Scientists. Also dur-

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ing the previous year, several new instruments had been installed which allowed the MSF (Mass Spectrometry Facility) and the MSSSF the ability to map proteins more accurately and to detect posttranslational modifications of these proteins. He also noted that over 1,600 oligonucleotides had been synthesized and over 1000 proteins had been sequenced since 1986 (Revzin, 1991)

The next year, John Wilson, Chairperson of Biochemistry, received a letter from Arnold Revzin, Chairperson of the Advisory Committee to the Macromolecular Facility stating that the Committee had met on November 13, 1992: those present were Joe Leykam, Jerry Dodgson, Lee McIntosh, Jack Preiss, and Arnold Revzin. He noted that the Facility appeared to be operating well. The number of users was up and the satisfaction level was excellent. About 25% of the business came from off campus. However, the facility could use more space and will need new equipment in the near future. Needed were new injectors ($15k each), a microtome ($40k), capillary zone electrophoresis apparatus ($40k), computers, etc. (Revzin, 1992). After nine years of operation, the number of users of MSSSF had grown to 390 users and 60 institutions (Report, 1994).

As noted earlier, the MSSSF was originally located in Room 5 of the Biochemistry Building. It remained there until 1995 when it moved to Room 223. Three years later in 1998, it was moved to Room 110 but after two years in Room 110, it was moved back to Room 223, where it remained until 2010 (Leykam, 2010). In 2002, the Macromolecular Structure, Sequencing, and Synthesis Facility became part of the Research Technology Support Facility as the Molecular Structure Core funded and managed by the office of the Vice President for Research and Graduate Studies (Suelter, 2007).

In 2010, the facility offered both N-terminal and C-terminal sequence analysis with interpretation for the novice or seasoned investigator. Microbore and capillary High Pressure Liquid Chromatographic columns (HPLC), easily facilitate investigators desiring separation of micro-protein digests for N-terminal sequencing or mass mapping by Liquid Chromatography ElectroSpray Infusion (LC-ESI-MS). Purification at a wide variety of levels was available by HPLC, Poly Acrylamide Gel Electrophoresis (PAGE), and capillary electrophoresis for proteins, peptides, DNA, and small molecules. Molecular weight determinations of biomolecules are performed by direct infusion electro-

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spray mass spectrometry (ESI-MS) and mass mapping by liquid chromatography electrospray mass spectrometry (LC-ESI-MS).

The availability of a BIACORE 2000 gave researchers the ability to probe protein and DNA interactions with real-time monitoring without the use of labels. MSSSF staff were available to search data bases and assist with the design of experimental protocols including the preparation of experimental samples. They also maintained an online ordering system for oligonucleotides and its other services. The facility served a diverse group of over 800 researchers throughout the world, in fact, they were accessible to all institutions in the United States and abroad, and were committed to the training of faculty, staff, graduate students, and undergraduate students. Unfortunately, the Facility ceased operation in December 2010 (Leykam, 2010).

Figure 4.38: Sign beside the door to the Mass Spectrometry Facility in the basement of the Biochemistry Building.

Mass Spectrometry Facility: Mass Spectrometry was first available in the Department on June 1, 1968 when a LKB-9000 magnetic sector mass spectrometer with a gas chromatograph and direct probe inlets was delivered to the Biochemistry Building. This instrument was provided by Michigan State University as part of the offer extended to Professor Charles Sweeley who came to Michigan State from the University of Pittsburgh on May 1, 1968. MSU also provided funds as part of his appointment to the Biochemistry faculty to purchase a PDP-8i minicomputer with accessories such as a paper tape reader that allowed the development of GC-MS (Gas Chromatography-Mass Spectrometry) and SIM (Selected Ion Monitoring) analyses. At the same time, Jack Holland (Manager of the departmental Instrument Shop) was provided with funds to support the purchase of a computer

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and to collaborate with Sweeley who had obtained a grant from NIH in March 1969 to upgrade the PDP-8i computer in the development of the world's first low-resolution mass spectrometry data system (Sweeley, 1968). The creation of computer interfaces and software in support of innovative mass spectrometry has, from the start, been a significant core research activity of the facility. The computer system that evolved was due to the efforts of undergraduate students such as Bruce Ray, Dick Teets, William Wood, Norman Young, Mike McPherson, Kevin McNitt, and Steve Johnson, many of whom were Merit Scholars. These students made it possible for the core research to reach into areas such as the automation of peripheral hardware for selected ion monitoring, field desorption emitter current, and time-array detection for time-of-flight GC-MS. A second mass spectrometer (a Varian MAT CH5-DF mass spectrometer) was added to the facility in 1973 (Watson, 1986). When the Varian MAT CH5-DF arrived, it was set up by Berndt Soltmann (1974-1979), a technician with Varian who later returned to MSU as a Specialist in the facility (Sweeley, 2010).

In 1977, Professors Sweeley and Holland were granted funding by the National Institute of Health Division of Research Resources to develop a regional resource that was named the MSU Mass Spectrometry Facility (Sweeley, 2010). Under the charter of NIH, the activities of such a facility were to be directed into 4 major areas: core research in mass spectrometry, collaborative research, service, and training (Barker, 1977). However, shortly after they received notification of the grant, they encountered a problem as noted in a letter dated August 18, 1977, from Professor Sweeley sent to NIH requesting a change in the budget for the first year of the MSU Mass Spectrometry Facility grant. It seems that mechanical vibrations on the fifth floor of the Biochemistry Building were greater than the specifications set by Varian for real-time high resolution measurements on gas chromatographic peaks. To rectify this situation and to provide the space necessary for additional equipment and personnel, they proposed to move the facility from the fifth floor to the basement. The total amount needed for the renovation of the basement room was $96,000 of which the University was prepared to cover one half of these costs (Sweeley, 1977; Barker, 1977). NIH agreed to this translocation and so the Facility was moved in 1979 from a 1049 sq. ft. area on the fifth floor of the Biochemistry Building to a 1824 sq. ft. area in Rooms 7, 9, 11, and 15C in the basement (Sweeley, 1977).

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After the Facility was moved to the basement, various University departments and offices contributed funds to purchase two Hewlett-Packard quadrupole GC-MS-DS systems equipped with capillary columns and combination electron ionization/chemical ionization (EI/CI) sources. These units greatly increased the GC-MS productivity and were excellent for SIM (Selected Ion Monitoring) analyses. Shortly thereafter, a magnetic GC-MS instrument (LKB-2091) was added to the Facility for the express purpose of supporting metabolic profiling; this instrument was funded by a Diabetes grant to Professor C. C. Sweeley (Watson, 1986).

In 1980, after Charles Sweeley became Chairman of the Department of Biochemistry, Jack Throck Watson was recruited from Vanderbilt University to become Director of the Facility and Principal Investigator of the main NIH grant that funded the Facility. Appointed as Professor of Biochemistry and of Chemistry, Watson encouraged Professors Christie Enke and John Allison of the Department of Chemistry to join forces with Professors Holland and Sweeley as Co-investigators in the research and training aspects of the Facility. As Principal Investigator, Professor Watson changed the direction of the core research to focus on developing technology for acquiring mass spectra on the chromatographic time scale. This new theme promoted a renaissance of time-of-flight (TOF) mass spectrometry as applied to gas chromatography. Through the electronics expertise of Professors Holland and Enke, an integrating transient recorder was developed that allowed acquisition of up to 100 mass spectra per second compared to 2 mass spectra per second with conventional mass spectrometers. The rapid acquisition of mass spectra has had a profound impact on the field of GC/MS by allowing the integrity of both the chromatography and the spectra to be preserved during the analysis of complex mixtures that could not be resolved by chromatography or mass spectrometry alone. The resulting new generation of GC/MS instrumentation based on TOF was first commercialized by Meridian Instruments (founded by Sweeley, Holland, and Schindler) in Okemos, and eventually by LECO Instruments in Benton Harbor, Michigan (Watson, 2010).

In 1982, the Center for Environmental Toxicology at MSU provided funds for the purchase of a PDP 11/44 computer to upgrade the mainframe computer in the Mass Spectrometry Facility. A year later, contiguous space (485 sq. ft.) was renovated to accommodate the installation of a new CVC-2000 time-of-flight mass spectrometer

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(purchased with NIH funds) and to permit the construction of the energy-filtered-time-of-flight (E-TOF) hybrid instrument. During this time a prototype triple quadrupole mass spectrometer (TQMS) was acquired (funding: 60% from contracts to Professor C. G. Enke in Chemistry with Office of Naval Research and 40% from MSU); this instrument was initially installed in the Chemistry Building where a data system was designed and implemented under the direction of C. G. Enke. A year later, the TQMS and data system were moved into the Facility space in the basement of the Biochemistry Building, made available by moving the magnetic dispersion-time-of-flight instrument (B-TOF) from the Facility to the Chemistry Building. The B-TOF was fabricated from an existing LKB-9000 GC-MS instrument by equipping it with a pulsed source and time-resolving detector (box-car integrator). A supplement to the Facility grant was approved and funded in 1984 to provide equipment, supplies, and personnel to process biological samples for metabolic profiling collaborations (Watson, 1986).

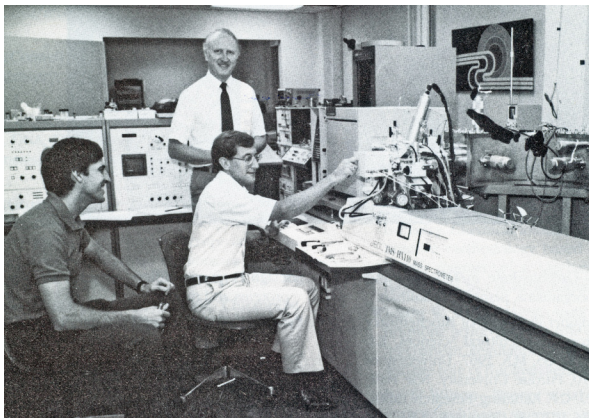

Figure 4.39: (l to r) Brian Musselman, Jack Watson (standing) and John Stults working with the JEOL-HX 110 double focusing magnetic sector mass spectrometer obtained with funds from the Department of Energy (Biochemistry, 1990).

In 1984, Charles Arntzen, Plant Research Laboratory, and Jack Throck Watson, as Co-PIs, obtained funding from the Department of Energy (DOE) for a double-focusing magnetic sector mass spectrometer (JEOL HX-110) equipped with a fast atom bombardment ion source to support budding efforts in protein characterization on the MSU campus. At that time, this $495,000 grant was the largest ever awarded to a University by DOE for instrumentation. This 'work-horse' instrument remained in service until 2009! The instrument was acquired to support peptide and hormone chemistry in the DOE-funded Plant Research Laboratory; the instrument was also available for application to NIH and biomedical research problems on a second priority basis. Funds for operating personnel and instrument maintenance were committed by a pool of MSU

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units through June 1990. Contiguous space (300 sq. ft.) was renovated (100% funded by MSU) to accommodate this new instrument in the Mass Spectrometry Facility (Watson, 1986).

A week-long, hands-on laboratory short course in mass spectrometry presented in a teaching laboratory in the Biochemistry Building at MSU by faculty and staff of the facility under the auspices of the American Chemical Society (ACS), was initiated in the early 1980s. This program not only extended mass spectrometry technology to hundreds of scientists and technicians throughout the country, but also provided in-depth advanced training for MSU graduate students, who served as teaching assistants. This emphasis on formal training in the art and science of mass spectrometry, combined with the research programs of the co-investigators, led to the MSU/NIH Mass Spectrometry Facility (MSU/NIH/MSF) becoming one of the pre-eminent training programs in mass spectrometry in the country. (Over 60 PhD students participated in fundamental research relating to mass spectrometry mostly through the department of Chemistry during the 1980s and 90s).

Figure 4.40: Another view of the JEOL HX-110 Mass Spectrometer in the Mass Spectrometry Facility.. Courtesy of Beverly Chamberlin, Research Technology Support Facility and Jack Watson, Biochemistry and Molecular Biology.

The week long outreach program was expanded, in collaboration with O. D. Sparkman and F. Klink of the Department of Chemistry at the University of the Pacific, Stockton, California, by adding a second week-long laboratory short course focusing on the characterization of proteins by mass spectrometry. By 1998, over 60 scientists and technicians not from MSU per year were participating in one or both of the laboratory short courses on mass spectrometry under the auspices of the ACS, but presented on the MSU campus. In 1999, these ACS short courses

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were moved to the University of the Pacific, Stockton CA, under the management of Sparkman and Klink (Watson, 2005).

From the beginning, computers (See Computer Facility Section) allowed the Mass Spectrometry Facility to acquire the mass spectra, store them as files, and generate plots of the data. Further development of an automated, highly interactive GC-MS data system led to the generation of a sophisticated set of programs, called MSSMET, that employed a reverse library search routine. The result of this evolution was a distributed computing network with a time-shared midi-computer as the host and several front-end mini-computers as nodes in the network. This configuration provided for efficient data collection, processing and storage from several mass spectrometers, and optimized the utilization of the various attached peripherals, i.e. disks, graphic terminals, plotters, line printer, etc (Watson, 1986; Sweeley, 2010).

The facility was very fortunate to have some excellent graduate students and postdoctoral fellows who served as managers of the facility. Included were Rich Chapman, who later became President of Finnigan Instruments, Jim Gerber, who went on to become a specialist in mass spectrometry with Hewlett-Packard, Frank Martin, who became a programmer for a NASA project in Houston, Brian Musselman, who joined JEOL as a mass spectrometry marketing specialist, and Douglas Gage, who left for Pfizer and then returned to MSU Administration. Over the years, the Service function has been successful largely due to competent technical support, especially Bev Chamberlin, who not only did analyses but also trained students in other departments to run their own samples.

After Douglas Gage joined the MSU/NIH MSF in 1990 as manager, he used his background in biology to promote collaborations with other biochemists on campus and throughout the country. Also, at this time, the theme of the core research program changed to development of methodology for protein characterization by Matrix-Assisted Laser Desorption Ionization (MALDI) with emphasis on disulfide bond determinations. Because MALDI produces little fragmentation from which to deduce structural information, especially from cystinyl proteins, cyanylation was used to produce cysteine specific cleavage fragments for disulfide mass mapping. The cyanylation approach to disulfide mass mapping allowed the research group to pursue difficult protein structural problems that were refractory to others (Watson, 2005).

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By 1993, the Mass Spectrometry Facility in the Biochemistry Building had been in existence for 24 years with continuous funding from the National Institutes of Health. It was one of 70 Research Resources funded through the Biomedical Research Technology Program of the National Institutes of Health; in fact, it was the only Research Resource in the State of Michigan. In addition, it had become a critically important component of the research base in more than 120 academic laboratories in Michigan as well as in collaborative work with more than 50 biomedical investigators across the United States. There were eight mass spectrometers in the Facility, of which half were used for research in the development of the technology of mass spectrometers and for training of more than 15 PhD graduate students (Watson, 1993).

Beginning at about 1993, the National Institutes of Health began to reduce the amount of funding made available for Mass Spectrometry Facilities because the instruments had become so widely available and thus central facilities were no longer needed. However, after considerable effort on the part of Director Jack Watson and with support of Bob Carr, a member of the United States Congress (Carr, 1993), NIH renewed the last proposal for the Mass Spectrometry Facility for four years beginning May 16, 1994. Thus the Facility was funded continuously by the National Institutes of Health for 28 years (Watson, 1994).

The Mass Spectrometry Facility became part of the Research Technology Support Facility on July 1, 2004 (Dewitt, 2004) (Watson 2005). The following instruments were in the Facility when it became part of RTSF: JEOL HX-110 Double-Focusing High-Resolution Magnetic Mass Spectrometer; JEOL AX-505 Double-Focusing Medium-Resolution Magnetic Mass Spectrometer; LKB-2091 Low-Resolution Magnetic Gas Chromatograph-Mass Spectrometer; (2 ea) Hewlett-Packard Quadrupole GC-MS; Varian Quadrupole Ion-Trap Mass Spectrometer; Bendix Time-of-Flight Mass Spectrometer; (2 ea) Applied BioSystems MALDI-TOF mass spectrometers (Watson, 2010). Currently the facility is managed by Professor Dan Jones.

Plant Growth Chamber Facility: When the Biochemistry Building was occupied in 1965, plant growth chambers were located in Room 5. They remained in Room 5 until 1985 when they were removed to provide space for the Macromolecular Structure Facility. A few plant growth chambers were added back in rooms 108 and 220 but it wasn't until 2008, after the Biochemistry Research Store

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Figure 4.41: View of the Plant Growth Chambers in Room 2 of the Biochemistry Building in 2011. Photograph courtesy of Neil Bowlby.

was moved from Room 2, that a significant plant growth chamber was reestablished in the Biochemistry Building.

Most growth chambers in Room 2 are managed by the MSU Plant Growth Chamber Committee. This committee manages facilities in several buildings and has 139 growth chambers in Room 2 with with 3,440 square feet of growing space under stringent temperature, light and humidity control. The chambers are set up to meet the expectations of the researcher. Within the facility, specialized needs, i.e. low temperature control, high light requirements, CO_2 injection, and CO_2 scrubbing, can be provided. Chambers are monitored by facility staff 365 days a year.

Transgenic Drosophila Facility: The MSU transgenic Drosophila facility, a specially equipped microinjection laboratory which is suitable for generation of lines of transgenic flies via P-element mediated germline transformation is also housed in the Biochemistry Building. Transgenic Drosophila are currently being generated for studies of gene expression in Drosophila and other dipteran species, for structure/function studies of ion channels, and mitochondrial DNA polymerase. Such recombinant flies are also suitable for overexpression of recombinant proteins. The facility is open to all users on the Michigan State Campus and is managed by the Facility Director, David N. Arnosti. (www.bmb.msu.edu)

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Chapter Five

Academic Programs

Undergraduate Program: One year after the Department was established, three undergraduate degree programs were offered by the Department of Biochemistry, one through the College of Agriculture and Natural Resources and two through the College of Natural Science: a BS in Agricultural Science with a specialization in Biochemistry, a BS in Biochemistry and a BA in Biochemistry both through the College of Natural Science. In 1967, the Agricultural Science major was changed to Agricultural Biochemistry and the BA program in Biochemistry through the College of Natural Science was dropped. The Agricultural Biochemistry degree was changed to Biochemistry/Agriculture in 1984 and then was changed to Biochemistry/Biotechnology in 1993 when the University adopted the Semester system. In 1995, the Biochemistry/Biotechnology degree program offered through the College of Agriculture and Natural Resources was transferred to the College of Natural Science.

The Agricultural Science major with a specialization in Biochemistry and the Agricultural Biochemistry degree programs were designed for those students planning to work in any area of agriculture that required a scientific undergraduate background or, with some additional work, for those who planned to pursue graduate work in one of the many specialized fields of agriculture. The program also qualified students for graduate research in biochemistry. The major difference between the degrees offered through the College of Agriculture and Natural Resources and the College of Natural Science were the differences between the College requirements for an undergraduate degree. As one might expect, the differences between the Bachelor of Science and the Bachelor of Arts degrees offered through the College of Natural Science were five fewer credits in Chemistry, fewer courses in mathematics and eight fewer credits in biological science. Of course, the total number of credits required for the degrees were the same. The courses offered by the Department from 1961 to 2011 are listed in Appendix 5.1 while Appendix 5.2 provides a view of the textbooks used by the Department over the years for undergraduate and graduate majors.

The differences between the BS in Biochemistry and Molecular Biology and the BS in Biochemistry and

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Molecular Biology/Biotechnology in 2010 can be determined by reviewing Appendix 5.2. In general, the same biological science, general chemistry, and organic chemistry courses are required. For physical chemistry, only the first semester course is required in the Biotech program. Both degree programs also require the same Biochemistry and Molecular Biology courses. The major differences occur in the requirements of 8 credits of courses that cover the Biotechnological aspects of the degree program (Catalog, MSU).

Figure 5.1 shows that ten years after the Department was created, 200 undergraduate students were majoring in Biochemistry. The number remained at roughly the same level until about 1980 after which it dropped to about 150 in 1993. After that we see an increase to 300 majors in 1995, a drop to about 170 in 2001 and then an increase to over 400 by 2010. The origin of these fluctuations is beyond the scope of this history. The Figure also shows that the number of students choosing to pursue the undergraduate degree through the College of Agriculture and Natural Resources remained relatively small throughout the years. The data shown in Figure 5.1 does not differentiate between the BA and BS degrees because very few students chose the BA program, in

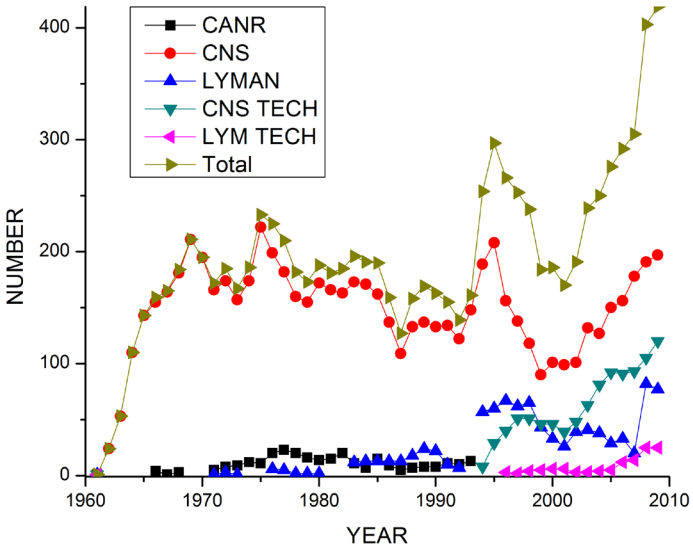

Figure 5.1: Graphical presentation of the number of Biochemistry Majors registered in the Fall Term of each year from 1962 to 2010. The abbreviations are: CANR, College of Agriculture and Natural Resources; CNS, College of Natural Science; Lyman, Lyman Briggs College; CNS TECH, College of Natural Science Biotech; LYM TECH, Lyman Briggs College Biotech; and Total, the total number of Biochemistry and Biotechnology majors. .

fact, the BA program was dropped in 1966. Over 1700 BS degrees have been conferred since the 1963 Spring Commencement. Phillenore Drummond Howard was the first and only undergraduate student to receive

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the BS degree during the 1963 Spring Commencement. The first degree in the Biotechnology option was conferred in 1995: todate over 140 Biotechnology degrees have been conferred.

The Department of Biochemistry has always had a faculty member assigned as the Undergraduate Programs Director. They were over the years: Richard Luecke (1962-1986), Clarence Suelter (1986-1989), Estelle McGroarty (1990-1994), William Deal (1995-1998), Paul Kindel (1998-2000), Zachary Burton (2000-2005) and Co-Directors Zachary Burton and Neil Bowlby (2006-). Room 105 has served as the undergraduate student records office since 1978-1979 after the room was renovated by creating two offices in the back, Rooms 105A and 105B (FAC, 1978). Beginning in 1995 or so, the front part of Room 105 has served as a place for undergraduate students to meet and use computers provided by the Department. Consequently very few undergraduate students now use the Upjohn-Haworth Student Center discussed later in this chapter.

Richard Luecke 1962-1986 | Clarence Suelter 1986-1989 | Estelle McGroarty 1990-1994 | William Deal 1995-1998

Paul Kindel 1998-2000 | Zach Burton 2000- | Neil Bowlby 2006-

Figure 5.2 View of faculty that served as Undergraduate Program Directors and the years that they served.

Beginning in 1979 or 1980, the Undergraduate Biochemistry Laboratory (BCH 404 and 405 and now BMB 471 and 472) was reorganized so that students

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experienced a more problem solving approach in their laboratory exercises. Working individually, students prepared their own reagents, wrote their own protocols and, after approval, performed the experiments. Lectures were on audiovisual cassettes and the microcomputer could be used to simulate the experiments before writing the protocol. This same approach is being used today in the undergraduate biochemistry laboratory. Students who take this course are well satisfied. They enjoy the challenge of writing their own protocols, preparing their own reagents, working individually, and the flexibility of working at their own pace (Suelter, 1982; Bowlby, 2010)

A new intensive laboratory class, BMB 473, was unveiled in the Summer of 2009. The new class met three times a week for six hours a day and covered the same topics as BMB 471 and BMB 472 including spectrophotometry, organelles and lipids, enzymes and other proteins, transformation and PCR (Polymerase Chain Reaction). Again, the students designed their own experiments and tune their record keeping skills (Biochemistry, 2008). However, the pressures that led to the BMB 473 experiment were resolved by increasing the campacity of BMB 471 and 472 and so BMB 473 is not being taught at present.

Beginning in the Fall of 1992, lectures in BCH 461 and 462 were taped and then sent to the MSU Main Library where they could be reviewed by students. Drs Preiss, Suelter, Wells, and Kroos put in the effort to tape these lectures (BW, 1992). In the Spring semester of 1993, Dave McConnell used the BCH 462 tapes to teach two graduate students at Tuskegee University (Burnett, 1998). This recording technology was then adopted by Professor William Deal to record BCH 401 and offer the course at Harrison High School in Farmington Hills, MI. (Deal, 1993). Today BMB 401 is offered on line using the Angel learning platform to post lectures, notes and accessory materials. The lectures are actually stored at MSU's Store Media site, because they are too large to store on Angel. The lectures are recorded on Mac's Keynote, then edited in iMovie, imported to Quicktime, and then exported as a Quicktime broadband streaming movie and as an iPod movie that can be accessed either on the computer or on a student's iPhone or iPod (Foley, 2010).

The educational software, ANGEL Learning and the ANGEL **L**earning **M**anagement **S**uite, LMS, evolved from research at Indiana University-Purdue University Indianapolis (IUPUI). The initial research system deployed in 1996 became Indiana University's OnCourse.

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The ANGEL LMS was created using the early system concepts and was released by the newly formed CyberLearning Labs, Inc. in July 2000. The company has since changed its name to ANGEL Learning. On May 6, 2009, competitor Blackboard Inc. announced that it purchased ANGEL Learning with the merger's completion planned for the end of May, 2009 (Stoltzfus, 2010).

After the Undergraduate Programs and Curriculum Committee reviewed the BMB courses for undergraduate students in November 2003, they submitted the following report:

BMB 100: Current Issues in Biochemistry: This course provides an overview of current topics in Biochemical research and in the impact of Biochemistry on society: it is an essential course for the BMB major. Without BMB 100 and BMB 101, no biochemistry is offered students until their Junior year. There is no redundancy with other courses. Students generally approve of BMB 100 and are interactive in course discussions.

BMB 101: Frontiers in Biochemistry: This course provides an introduction to research in the Department of Biochemistry. It is meant to be a conduit for students to enter undergraduate research projects. Because one of the best features of our undergraduate program is the access to opportunities in research, it is a necessary course. No other course is similar.

BMB 461/462: Biochemistry I/Biochemistry II: Courses for undergraduate majors in Biochemistry and Molecular Biology. Enrollment for BMB 461/462 in 2003 may be too high (>500 students) so we may not be serving the best interests of students. Some students from other majors take BMB 461/462 rather than BMB 401 because they require a 1 year, 6-credit course, making BMB 461/462 their only option. BMB 461/462, however, may be too rigorous for these students, causing problems for offering BMB 461/462 at the appropriate level.

BMB 471: Biochemistry Laboratory: This is a laboratory course in biochemical techniques. There are no comparable courses at Michigan State University, or anywhere else that I know. This is a unique offering and an essential component of the Biochemistry Major.

BMB 472: Biochemistry Laboratory: This is a laboratory course in recombinant DNA techniques. This course is project based, which differs from other recombinant DNA courses on campus. Laboratory courses must be small in size to be effective, so BMB 472 has been

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specifically tailored to the needs of Biochemistry Majors. Other courses would not be suitable and would be over-subscribed, if BMB did not offer its own course.

BMB 495: Undergraduate Seminar: Students in this course begin to learn to read the biochemical literature and critically evaluate it. They are also trained in public presentation. This is our capstone course, which is mandated.

BMB 401: Basic Biochemistry: This course has become of reduced utility because most students from other majors, who should take BMB 401, are routed through BMB 461/462 instead. In 2010-2011, however, BMB 401 enrollment increased by 400 students while BMB 461/462 decreased by 375 students thereby significantly reducing the problems noted above.

BMB 200: Introduction to Biochemistry: This course is required by some other majors and is a necessary service course, mostly for Food Science and Nutrition majors. These students cannot take BMB 401 or BMB 461/462, because they lack the chemistry and math background. (Review, 2003).

As noted in Figure 5.1, beginning in 2000, we see a sharp increase in the number of undergraduate BMB majors. As a result, there has been a large increase in the number of students enrolled in BMB 461, and 462. For example, in 2004, we find that there were 1083 total students enrolled in these two courses: this number increased to 1460 in 2008. So as noted under the review of BMB 461/462, when the total number of students exceeds 500 students, which it did every year since 2003, there is concern about the effectiveness of instruction. Thus some discussions with other departments have taken place to change the requirements for Biochemistry courses in their majors (Stoltzfus, 2010).

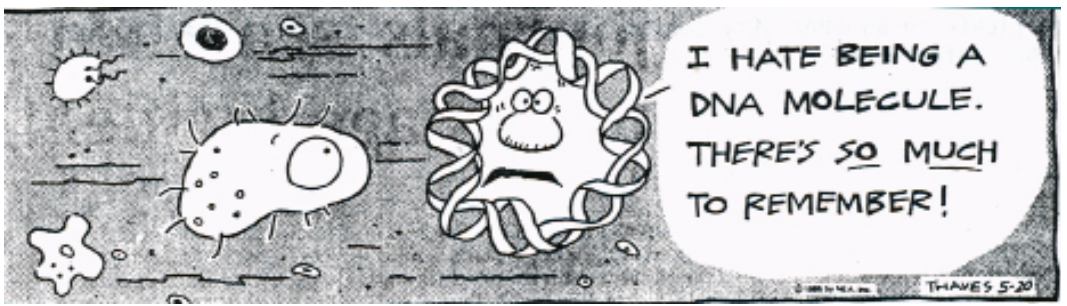

Figure 5.3: Cartoon in the Biochemistry Undergraduate Newsletter, (BUN, 1986).

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The Biochemistry Club: The Biochemistry/Biochemistry and Molecular Biology Club is a student run organization dedicated to advancing the interests of the Biochemistry undergraduates. Club activities are organized to encourage students to pursue research, internship opportunities, career opportunities, and to have fun. The club events are open to all interested undergraduates, not just BMB majors.

The Biochemistry Club was officially recognized by the University in October 1987 due to the efforts of Lanie Stephens, President. All other officers of the Club throughout the years in which the club was active are listed

Biochemistry and Molecular Biology Club Officers				
Year	**President**	**Vice-President**	**Secretary**	**Treasurer**
1987-88	Lanie Stephens	Carol smith	Anglea Lam	Susan Sullivan
1988-89	Carole Smith	Alisa Zapp	Christine LaMieux	Angela Lam
1992-93	Harry Brumer	Catherine Haluska	Cinda Rhode	Eric Betts
		Steve Lamb		
1993-94	Eric Betts	Vanita Jaglan	Melanie Kaeb	
	Catherine Haluska			
1994-95	Melanie Kaeb	M. Danish Mohmand	Heidi Hoard	Lori Hallman
1995-96	Heidi Hoard	Rebecca Zmyslo	Deb Thompson	
2001-02	Vishal Malhotra	David Taggart	Kate Cenci	
2002-03	Vishal Malhotra	David Taggart	Kate Cenci	Michelle Burns
	Janel Funk			
2003-04	Dave Taggart	Sue Ng	Vishal Malholtra	Katie Strong
2005-06	Kristy Snell	Phil Williams	Richard Taylor	James Hardie
		No-Ya Hung		
2006-07	No-Ya Hung	Chris Kloss	Bryan Mets	Vincet Lu
2007-08	Rebecca Kornas	Andrea Stavoe	Heather Born	Dennis Miner
2008-09	Saundra Hempel	Dennis Miner	Matt Karczewski	Sarah Haskins
2009-10	Dennis Miner	Sarah Haskins	Paul Leuthy	Marissa Cann
2010-11	Marissa Cann	Robin Green	April Giles	Monica Finkbiner

Table 5.1: Listing of the known officers of the Biochemistry and BMB Club from 1987 to 2011.

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in Table 5.1. The first meeting of the Club was held on October 22, 1987: the program for the meeting was a tour of the Michigan Biotechnology Institute (BUN, 1987a). The November meeting held on November 19, 1987 included a lecture by Professor Stan Howell, Botany and Pathology who spoke on "Biochemistry and Wine." (BUN, 1987b). On January 28, 1988, the Upjohn Company representatives addressed the Club on research opportunities and employment. The February meeting was set up as a relief from the winter blues by going to the Munn Ice Arena to skate (BUN, 1988a). For their first meeting in 1988-89, the Biochemistry Club sponsored a tour of the Upjohn Company, Kalamazoo, MI on Tuesday October 18, 1988 (BUN, 1988).

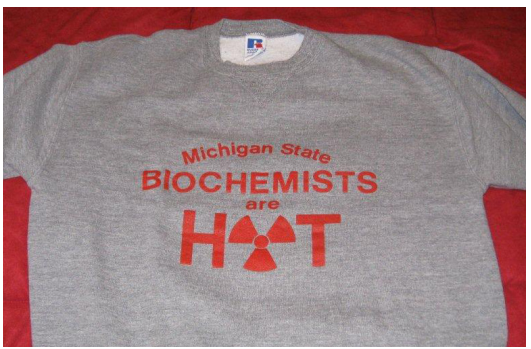

Figure 5.4: 1986 Sweatshirt. Courtesy of Susan Leavitt.

During the Summer of 1986, the Department set aside space on the Third Floor, Room 302A, for a lounge for undergraduate students to

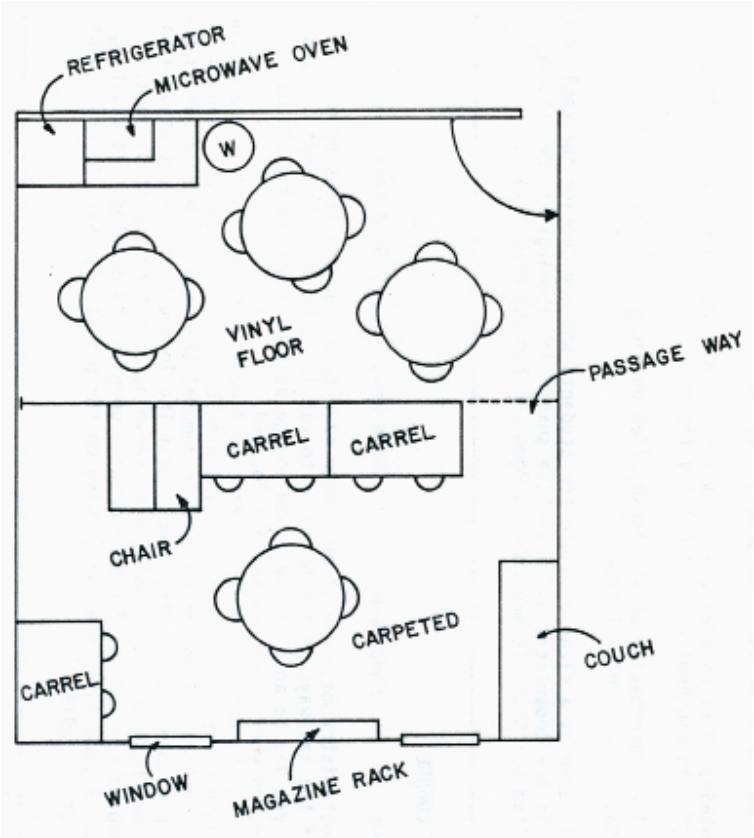

Figure 5.5: Design of the layout for converting Room 302A into a student lounge. (BUN, 1986). The bottom of the design is the view to the South.

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eat lunch, study, or meet between classes. One possible design of the room is shown in Figure 5.5. Half of the room was to be set aside for a lunch room and the other half was to serve as a study or meeting room. The only proviso was that private monies had to be used to remodel the room (BUN, 1986). Then during the Fall Term of 1986, it was decided to create a T-Shirt and Sweat Shirt and sell them to raise monies for this remodel. After these shirts were sold during the Fall term, $750 was raised (BUN, 1987); one year later, $2000 had been raised to remodel Room 302A (BUN, 1988). Shortly thereafter the Biochemistry Club was notified that the Upjohn Company in Kalamazoo, MI, donated $3,000 towards the expenses of remodeling Room 302A making a total of $5,750 (Triezenberg, 1988). Then the Haworth Company in Holland, MI, donated furniture to equip the room, now known as the Upjohn and Haworth Student Center. The Haworth Company donated panels and tables that the Mayflower Company moved from Holland, MI, to the Biochemistry Building at no cost (Suelter, 2010). Today, the Upjohn and Haworth Center is used primarily by graduate students (Bowlby, 2010).

Figure 5.6: A view of the Upjohn-Haworth Student Center shortly after it was opened in 1989 (Biochemistry, 1990).

Beginning late 1986, the Department set up a Co-op program making it possible for second and third year Biochemistry undergraduate students to spend an extended period of time in a company such as Dow Chemical Company, Upjohn Company, Kellogg Foods, Warner Lambert Company, DuPont Chemical Company and others. The following statement was written by Darrel Chandler who spent the Summer and Fall of 1986 with the Dow Chemical Company. “I have just returned

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to MSU from Midland, MI, working with The Dow Chemical Company in the Coop Program. I have been asked by Dr. Suelter to comment on my experiences there. The only "real" effort on my part to get the job was to make the trip to the BCH building and get the necessary paper work from Susan (Leavitt), making sure to return them before the application deadline. That's it! The Newsletter usually announces who's coming to interview, when things are due, etc., and Susan arranges a resume, sets up appointments, etc. for you. Corporations such as Dow, DuPont, Upjohn, and Campbell's frequently come to MSU looking for co-ops as part-time help, and even full-time employment upon graduation.

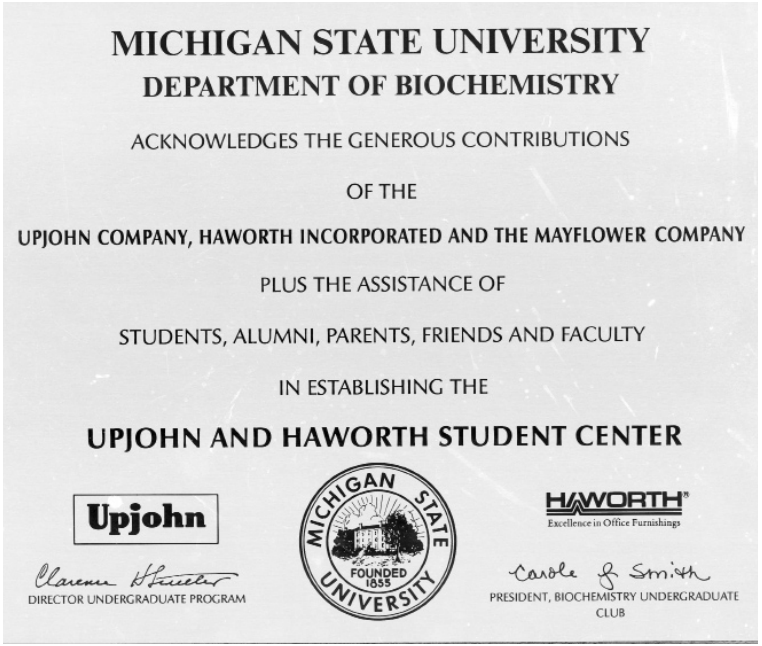

Figure 5.7: Photograph of plaque in Room 302A Biochemistry Building acknowledging receipt of monies and furniture to equip the Upjohn and Haworth Student Center.

My job specifically involved isolating secondary metabolites (namely insecticides) from certain micro-organisms. In essence, I became a specialist in separation science, using a host of techniques unavailable to the average student on campus: HPLC, Medium pressure LC(MPLC), ion-exchange, liquid-liquid extractions, solid phase systems, (both normal; reverse phase), etc. I was able to use common-place scientific equipment that is alien to students in ordinary lab classes: roto-vaps, centrifuges, lyophilizers, N_2 evaporators, etc. I had my own office, telephone, lab space and storage space; I was given responsibility and encouraged to be independent & inventive in problem solving; I was treated as a professional by professionals, and paid as professional; I was provided with a completely furnished apartment at reasonable rent, close to the plant and surrounded by other co-ops from across the country.

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Why be a co-op? I did it for the sheer experience of being in a real-life, big business environment doing what I like best--Science. But the experience goes beyond the pure science and job. It is a lesson in communication, economics, sociology, etc., and is well worth the time. If you would like more information about Dow, about the co-op experience in general, feel free to call me. Darrell Chandler, Junior Biochemistry/Fisheries & Wildlife dual major." (BUN, 1987). The Biochemistry Coop program was discontinued sometime before 1995.

The Biochemistry Club now known as the BMB Club is very active. Their activities for the 2009-2010 year were as follows:

Particpated in a clothing drive
Sponsored a Cyclotron tour
Sponsored the "lock up" of Dr. Zach Burton for Muscular Dystrophy
Sponsored Graduate and Professional Student panel
Had a T-shirt design contest
Hosted a movie night
Held Bake Sales
Participated in a Blood Drive
Collected Toys for Tots
Sponsored Ohio College of Podiatric Medicine presentation.
Sponsored Georgetown Medical/Graduate School Presentation.
Sponsored Keck Graduate Institute Presentation.
BMB Homecoming Tailgate.
Sponsored University of Wisconsin Graduate Program presentation (www.bmb.msu.edu).

Appendix 5.4 provides photographs of activities of the Biochemistry and Molecular Biology Undergraduate Club in 2009-2010, created by the Club, Dennis Minor, President.

Designing and selling T-shirts as an activity was rekindled in the early 2000s; design competitions were sponsored every year and the club members voted on the shirt to use each year. Many of the designs are shown in Appendix 5.5.

Figure 5.8 on the next page shows some of the members of the Biochemistry and Molecular Biology graduating Class of 2010.

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Figure 5.8: Biochemistry and Molecular Biology - Some members of the Class of 2010: (L to r) Front Row: Noor Mohd Isa, Sayarfa Mohammedakhiar, Catherine Nezich, Yasmin Ali, Judy Kovach, Justyne Matheny, Lindsey Johnston, Mary McCarthy, Lauren Grenzicki, Chelsea Hosey, Sarah Schroeder, Sarah Haskins, Haley Rupp. Second Row: Edita Klimyte, Jackie Brosius, Dennis Miner, Whitney Aultman, Josh Mackaluso, Jackie Lapp, Laura Schutlz, Josh Bosch, Andrew Murley, Paul Luethy, Xiaozhou (Joe) Liu, Jessica Reemer, Shaima Al Failakawi, Lisa Blakeman. Third Row: Mohamad Zainal, Shahmi Sinan, Lauren Topper, Katherine Larkins, Mike Howard, Tom Cooke, Mike Ritt, Neil White, Mahesh Chandrasekhar, “Luke Fischer”, Johhn Barta, Paul Harris, Sarah Iqbal, John Krcatovich. Back Row: Tess Jeffers, Nick Hoover, Trey Urban, Jeff Halim.

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Medical Students Program: One of the reasons that President Hannah appointed Guarth Hansen in 1957 as Chairperson of the Department of Biochemistry was that he, Guarth Hansen, had a vision for a Department that was needed to provide instruction for medical students in the planned (hoped for) College of Human Medicine. As noted earlier in this History, the Department of Biochemistry was then established on April 1, 1961, but it was not until May 21, 1963 that a 2 year preclinical program was established at Michigan State (Hannah, 1963). Over a year later, in September 1964, the Department of Biochemistry became part of the academic structure of the College of Human Medicine (CHM) (Board of Trustee's minutes, September 17, 1964). The first class of 26 CHM students enrolled in the two year pre-clinical program in the Fall of 1966 (Downs, 1966; 1967; Knisely, 1966). No special Biochemistry courses were designed for these students since they had to satisfy the Biochemistry requirements before they were admitted into the program; at a minimum, they had to have completed BCH 401, 402, and 403 (see Appendix 5.1 for a listing of the courses taught by the Department of Biochemistry from 1961 through 2010).

In 1968, the Medical School introduced focal problems, more widely known as problem based learning, that involved four basic steps: (1) the identification of important patient data, (2) creating general or refined hypothesis based on the cues, (3) gathering more data and interpreting the data to form a hypothesis and (4) ruling out or confirming hypothesis (Johnson, 2010). Faculty in the Department of Biochemistry participated in these group discussions by providing background data when needed. After the College of Osteopathic Medicine was moved to MSU in 1970 (MSU Board of Trustee's minutes, September 17, 1970), the two-year preclinical program for CHM students was expanded to a four year program so that students could now complete the requirements for a four year Medical Degree. Shortly after that, in 1973, the focal problem curriculum was changed by the introduction of an optional Track II, an alternative preclinical curriculum that relied heavily on focal problems to teach the basic sciences in the first two years. Track II also required the participation of biochemistry faculty to teach the biochemical concepts.

After the College of Osteopathic Medicine (COM) began to function as an MSU facility, the Department was responsible for also providing Biochemistry instruction to the COM students. Consequently Medical Biochemistry 501 and 502 were created for COM students (taught Fall and Winter quarters) and Biochemistry 511 and

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512 for CHM students (taught in Winter and Spring quarters). One year before the University switched to the semester system in 1993, the COM and CHM students were combined into one class for their first year basic science courses: thus BCH 501, 502, 511, and 512 were combined to form BCH 521. Biochemistry 523, Genetics for Medical Practice, was also created and taught by biochemistry faculty but cross listed with the Department of Pediatrics and Human Development, PHD 523. After these changes were made, Track II was eliminated so that year one for both CHM and COM students became totally didactic. Faculty that participated in focal problems after that were called preceptors: they were not content specialists but rather leaders of discussions (Wang, 2010).

In the Fall of 2000, the medical schools revised their curriculum prompting the creation of BCH 526, Molecular Biology and Genetics, and BCH 534/PSL 534 and BCH 535/PSL 535, Cell Biology and Physiology. The Department now teaches Cell Biology and Physiology I and II, BCH 534 and 535 (Wang, 2010).

On May 18, 2007, the Board of Trustees approved a recommendation to establish two new campuses for Osteopathic Medicine in Southeast Michigan: one at the Detroit Medical Center (DMC) and the other at Macomb University Center (MUC). The Department then hired an Instructor to have an office at each of these campuses. After the College of Human Medicine set up an academic program in Grand Rapids in 2010, now known as CHM-GR, an instructor has been appointed to manage the instruction there. These instructors then joined together with the instructors and faculty on the East Lansing campus to form the basic science teaching team responsible for delivering the medical school curriculum. The team develops and presents lectures and laboratory sessions, creates learning and assessment instruments (both hard copy and online), grades student performance, holds office hours and help sessions, addresses student queries via e-mail and course specific websites, and manages all aspects of the course administration. It is also expected that individual members of the team will be able to support student learning across more than one of the following basic biomedical science domains (biochemistry, cell biology, histology, genetics, immunology, neuroscience, pathology, and pharmacology). The specific combination depends on the background and willingness of each instructor to be cross trained. This commitment makes it possible for the faculty to become better acquainted with the overall

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basic science curriculum and more fully involved in, and dedicated to student learning.

To make this instruction process clearer, it is useful to examine how BMB 514 was taught in 2009-2010. The instructional team consisted of two MSU faculty along with three instructors. They did everything together: prepared the course pack, prepared tutorials, developed online interactive exercises, and constructed quizzes and exams. For each lecture, there was a "broadcast site" where the lecturer was live and there were two recipient sites. All three sites interacted in real time. Although the faculty delivered most of the lectures from the East Lansing campus, the instructors delivered some of them, each from their own broadcast site. At the end of each session, students were asked to submit "Spartan Quickies—One Minute Homework" in which the students were asked to write down three things they learned during that session and one burning question. The team would go over these questions, decide which one would be addressed via an online chat room, and where major misunderstandings would be addressed during the first few minutes of the next lecture session. If a question came from a student from the MUC site, the instructor at that site would lecture for two minutes to clarify the issue, after which he or she would mute the MUC microphone and the instructor at the East Lansing site would address a question from a student at the East Lansing site. A two hour clinical case discussion was held once a week during which a faculty person on the East Lansing campus would pose a situation and ask for response from all three sites (Wang, 2010). Beginning in the Fall of 2010, the department delivered instruction through four broadcast sites; East Lansing Campus, Grand Rapids Campus, Detroit Medical Center, and Macomb University Center.

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Graduate Program: In general, the program for completing the requirements for a PhD degree has not changed significantly over the years. Incoming students rotate through two or three laboratories during their first year in residence after which they decide on who will be their Major Professor. After completing the graduate courses and selecting a guidance committee, they must pass their preliminary exams as well as complete an oral examination. These hurdles are usually completed by the end of the third year. Those students who wish to complete a Master's degree may complete Plan A or Plan B. Plan A degrees require the completion of a thesis and an oral examination. The Plan B degree, which is not recommended, does not require a thesis. While the overall process has not changed significantly, a group of other responsibilities have been added over the years that a student must be cognizant of as outlined below. To understand how the program evolved over the years the reader can review the guidelines for 1967, 1980, 1986 (Guidelines, 1967; 1980; 1986).

Whether or not the Graduate Program has been directed by a Faculty person throughout the years of the Department's existence is not clear. Some colleagues thought that Professor Hansen advised the graduate students during the time that he was with the Department and thus served as the Director of the Graduate Program. When Robert Barker came on board as the Chairperson in 1974, he asked Loran Bieber to serve as the Graduate Program Director, which he did from 1977-1984. The next Documented Directors were Richard Anderson serving from 1984 to 1991, Arnold Revzin, 1991-1993, William Wells 1993-1995, Pam Fraker, 1995-2000, and Jon Kaguni, 2001- (Committees, 1968-2020).

The major objectives of the graduate programs in biochemistry and molecular biology have not changed, that is, they are to help students develop their creative potential and prepare them for careers in research and teaching in the biochemical sciences. Individual programs of study are designed to develop independent thought as well as broad knowledge and technical skills, through formal and informal courses, laboratory experiences, seminars, individual study, and, foremost, through original research that forms the basis for the student's thesis or dissertation.

Any regular faculty member in the Department of Biochemistry and Molecular Biology may serve as the major professor (research mentor, thesis advisor).

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However, as discussed later under the "umbrella program", students today may also select a major professor from any of several cognate departments and graduate programs, including the Departments of Microbiology and Molecular Genetics, Plant Biology, Physiology, Pharmacology and Toxicology, and the Programs in Genetics and Cell and Molecular Biology. The major professor serves as the student's academic advisor and normally serves as the student's doctoral dissertation research advisor. So that incoming graduate students may be able to identify the most suitable laboratory in which to do their dissertation research, they are encouraged to become familiar with the research programs of faculty in all the Departments noted above.

If the major professor (research advisor) is a regular faculty member in the Department of Biochemistry and Molecular Biology, then the major professor will chair the Guidance Committee. If the major professor (research advisor) is not a regular faculty member in the Biochemistry Department, the department will assign a regular faculty member to serve as chair of the Guidance Committee.

Graduate Student Recruitment: Because the Department saw a decrease in the number of students, both men and women, admitted into the Graduate Program beginning in the mid to late 1980s (Figure 5.9), a decision was made by the department to commission a study of the graduate admission and recruitment program. This study was conducted by the Broad Business College at MSU

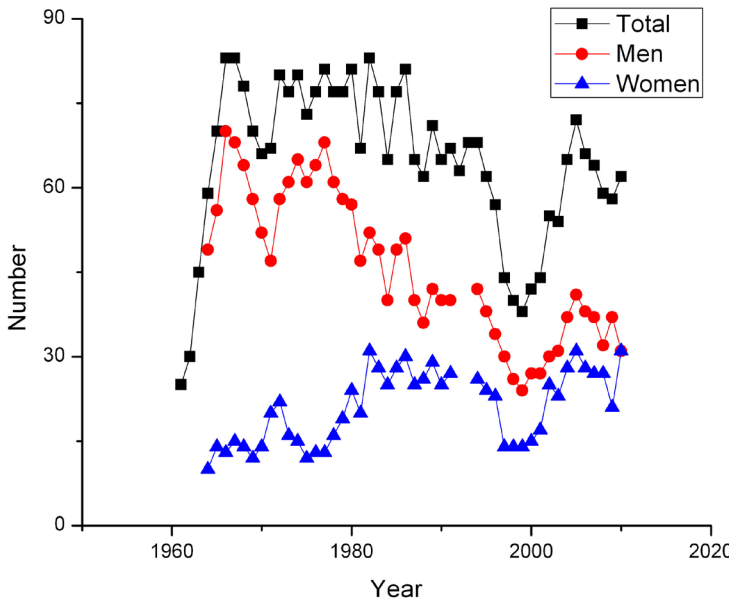

Figure 5.9: Graphic presentation of the number of graduate students in the Department the Fall term of each year 1961-2010. The total number is also broken down into the number of men and women students each Fall.

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in 1994. They critiqued the Department's website, the application procedure, response time, and all other aspects of the recruiting process. They even conducted surveys of current students, alumni, and applicants to the program including those admitted to the program but chose to pursue graduate work elsewhere.

As a result of this study, attempts were made to improve the recruitment process by increasing the pool of undergraduates exploring graduate work at MSU, particularly in Biochemistry and Molecular Biology, by revising the departmental website, by encouraging MSU faculty and graduate students to visit local institutions, by sponsoring an open house at MSU, and by encouraging alumni to meet with prospective graduate students at or near their home. Once a student submitted an application for studying Biochemistry and Molecular Biology at MSU, the department made an effort to get faculty of the department, who had research interests of the potential student, to contact the student directly. Furthermore, the Department has attempted to establish a direct relationship with chemistry/biology faculty at local Michigan institutions so that they could provide useful and positive advice to their students regarding the program. After the Admissions Committee had approved an application, the Department made a major effort to convince prospective students to come to MSU by inviting them to visit the Department and MSU over one of two specific weekends, one in early January or one late in February. These recruiting weekends were setup in conjunction with allied biological science graduate programs, that is, those departments that had entered into an "umbrella recruiting" agreement: the Departments of Microbiology and Molecular Genetics, Plant Biology, Physiology, and Pharmacology and Toxicology as well as faculty in the Cell and Molecular Biology and Genetics programs. In addition to visiting with students and faculty in the Department, students that accepted an invitation to visit the campus were provided some common activities such as visiting the Genomics Facility and/or the Electron Microscopy Laboratory. Students admitted into anyone of the umbrella graduate programs could then choose a thesis mentor from any of the participating programs. This programmatic flexibility is very attractive to students who wish to explore a range of research projects beyond the expertise of the Departmental faculty. While it is true that some BMB students choose to work in the laboratory of faculty outside of the Department, it is also true that BMB faculty gain access to students admitted into the allied biological science graduate programs (Wang,

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2010). Figure 5.9 shows that the number of graduate students registered in the department has increased rather substantially since 2002. It is also true that the number of women relative to the number of men has also increased so that by 2010 the number of women graduate students equals the number of men graduate students.

The Department also encourages students to pursue interdisciplinary research by participating in a dual PhD program in Biochemistry and Chemistry, Biochemistry and Physics, Biochemistry and Computer Science, and Biochemistry and Mathematics. Students in the dual degree program have a primary advisor in Biochemistry and a research advisor in the secondary department. The reputation of the faculty and their participation in campus-wide interdepartmental programs such as the Great Lakes Bioenergy Research Institute, Chloroplast 2010, Gene Expression in Development and Disease Focus Group (GEDD), Quantative Biology (QB), MSU Center for Mitochondrial Science and Medicine, and The Solanum Trichome Project are particularly important in attracting the attention of prospective applicants and ultimately, in getting the prized recruits to commit to MSU (Interdisciplinary, 2010).

Graduate Student Orientation: New graduate students are expected to arrive on campus at least a week before the start of the Fall semester to participate in an orientation program. After first meeting with the Director of the Departmental Graduate Program, they meet with incoming students in Cell and Molecular Biology, Genetics, Microbiology and Molecular Genetics and with upper level BMB students. Most of the students also attend the Cell and Molecular Biology/Genetics retreat where faculty and students present talks and posters. Graduate students have also organized a journal club that meets once a week and new students are invited to attend. Finally, the new students meet with the Director of the Graduate Program in February or March of their second year to discuss the comprehensive exam that the students take in September at the start of their third year (Kaguni, 2010).

Summary of the Doctoral Program in 2010

1. The First Year
a. Completion of first-year courses selected in consultation with the Graduate Programs Director
b. Laboratory rotations (each 10 weeks long)
c. Selection of the major professor/dissertation research advisor

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d. Selection of the Guidance Committee
g. Beginning of dissertation research
h. Evaluation of the student's progress by the Graduate Programs Director

2. The Second Year
a. Continuation of dissertation research
b. Enrollment in courses prescribed by the Guidance Committee including a course or workshop series in scientific ethics, if not taken in the first year
c. Initial Guidance Committee meeting. This should be held as soon as possible, and must be held within 15 months after entering the graduate program. At this meeting, the student's written proposal for dissertation research must be presented and discussed, and the complete course program must be formally decided.
d. Submission of the form entitled "Report of the Guidance Committee--Doctoral and Other Programs." The final typed form must be signed by the student and all members of the Guidance Committee. This requirement should be completed in conjunction with the initial Guidance Committee meeting.
e. Completion of a workshop for teaching assistants, if desired.
f. Participation in departmental teaching activities as a component of the BMB 961 section entitled Instructional Methods in Biochemistry & Molecular Biology
g. Evaluation of the student's progress by the Graduate Programs Director.

3. The Third Year
a. Continuation of dissertation research
b. Enrollment in courses prescribed by the Guidance Committee
c. Satisfactory completion of the comprehensive examination
d. At least partial completion of the requirement for four oral presentations
e. Presentation of a written progress report by the student to the Guidance Committee
f. Evaluation of the student's progress by the Guidance Committee
g. Evaluation of the student's progress by the Graduate Programs Director

4. Each Subsequent Year

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a. Continuation of dissertation research.
b. Enrollment in courses prescribed by the Guidance Committee and graduate seminar courses
c. Oral presentations until a total of four has been completed and documented
d. Presentation of a written progress report by the student to the Guidance Committee
e. Evaluation of the student's progress by the Guidance Committee
f. Evaluation of the student's progress by the Graduate Programs Director

5. The Final Semester
a. Seminar on dissertation research
b. Final oral examination in defense of the dissertation
c. Submission of the unbound dissertation to the University, and bound copies to the Department of Biochemistry and to the major professor.
d. Submission of manuscripts based on the dissertation to refereed biochemical journals.
(http://www.bch.msu.edu/graduate/guidelines.pdf)

Biochemistry Graduate Student Council: The Graduate Student Council was established to provide a mechanism for BMB Graduate Students to contribute to the BMB research program as well as provide a way for current students to improve their own skills. The structure and function of the Council are outlined below:
I. Council Co-Chairs (2 or 3 students)
1. Appoint and/or solicit volunteers to serve on departmental committees

2. Organize a bi-monthly meeting of graduate students to discuss:
a. Committee progress
b. Concerns of and suggestions from students
c. Miscellaneous information relevant to students

3. Disseminate information
a. regarding additional meeting
b. by posting of notices/announcements on the graduate student bulletin board

4. Organize "coffee breaks"

5. Organize informational orientation for new graduate students (e.g. coffee break format)

6. Work in association with the Undergraduate Biochemistry Club
a. organize an information session for undergrads interested in graduate school
b. organize department visits from industry to discuss career options

7. Organize annual graduate student meeting for the coming year's grad student council
a. this should occur by May 1 to allow overlap time between incoming and outgoing participants
b. call for open nominations about 1-2 weeks prior to annual meeting

II. Faculty Representative (1 student)
1. Maintain a graduate student "suggestion box"
a. bring suggestions to the attention of graduate co-chairs or department chair, if relevant
b. bring suggestions to the attention of the faculty at faculty meetings
c. submit suggestions, which should be acted on by the faculty to the Graduate Advisor so they can be forwarded to the Faculty Advisory Committee

2. Attend all faculty meetings in the same mode as faculty, except as reserved. The matters reserved to the faculty are:
a. Policy concerning salary, leaves, insurance, retirement, and fringe benefits of faculty;
b. Decisions concerning the appointment, salary, reappointment, promotion, tenure, or dismissal of individual faculty members;
c. Evidence from students regarding the teaching performance of faculty shall be considered in decisions concerning the above matters;
d. Matters affecting the professional responsibility of the faculty to establish and maintain the intellectual authority of the University;
e. Matters concerning the academic standing of students.

3. Report to the graduate students on major issues discussed at faculty meetings

4. Report to faculty on major issues discussed at graduate student meetings

III. Dean's Student Advisory Council (1 student)
Meetings with the Dean of College of Natural Science regarding undergraduate and graduate issues

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IV. Council of Graduate Students (COGS) (1 student)
1. Attend COGS meetings and report relevant information to graduate students
2. Disseminate information on COGS issues or gatherings (fall bonfire)

V. Admissions (1 student)
(Per faculty by-laws for faculty committee assignment: "To evaluate applications for admission to the graduate programs of the Department, to make recommendations to the departmental Chairperson as to whether or not the applicants should be admitted and, if so, with what conditions (if any), to supervise the administration of the evaluation process, and to ensure appropriate notification to the applicants of the results of this evaluation."

VI. Graduate Programs and Curriculum (up to 4 students)
1. General Charge - to review, evaluate, and make recommendations concerning matters pertaining to the graduate program in Biochemistry and Molecular Biology. These matters shall include, but not necessarily be limited to graduate admissions criteria, the broad issues of graduate curriculum and degree requirements, and graduate financial aids and awards. Additionally charged to review the grad student guidelines.

2. Per faculty by-laws for faculty committee assignments: The Graduate Programs and Curriculum Committee shall consist of four faculty members, and an equal number of graduate students elected by the graduate students, as specified in the Bylaws of the Biochemistry and Molecular Biology Graduate Students Association. Both faculty members and graduate students shall have the right to vote and shall serve one-year terms, beginning the first of July of each year. Members of the committee, both faculty members and graduate students, are eligible for up to two additional one-year terms. The committee has the responsibility to review, evaluate, and make recommendations concerning matters pertaining to the graduate program in Biochemistry and Molecular Biology. These matters shall include, but not necessarily be limited to, graduate admissions criteria, the broad issues of graduate curriculum and degree requirements, and graduate financial aids and awards. The committee is charged with the responsibility to review, periodically, the "Guidelines for the Doctoral and Masters Programs in Biochemistry and Molecular Biology" document and to recommend any revisions that the committee considers desirable. All recommendations of the committee shall be forwarded to the faculty for final approval and implementation. In making a formal recommendation

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to the faculty, at least three faculty members of the committee will have voted. A majority of these who voted must be in favor of submitting a recommendation. The faculty will not take final action on matters that are the responsibility of the committee without first requesting and considering a recommendation by the committee. (If the faculty wishes to substantially alter a recommendation of the committee, they will send the matter back to the committee and obtain their opinion before final action is taken.)

VII. Judiciary (1 student)
1. The functions of this committee are as specified in the related Article of the current Graduate Students Rights and Responsibilities document. Members of this committee, or alternates, chosen by the Department Chairperson, will also serve to hear grievances filed by undergraduate students under procedures prescribed in the Michigan State University Academic Freedom Report.

2. "The membership of the Student Judiciary shall consist of the Department Chairperson or his/her designate (to act as Chairperson), three graduate students, and three faculty members. The three graduate students and several alternates will be selected by the graduate students as specified by the Bylaws of the Biochemistry and Molecular Biology Graduate Student Association. The three faculty members and alternates shall be selected by the Faculty Advisory Committee at the time when normal committee assignments are made. The faculty members and alternates will be determined by random selection of names from a pool containing the names of all faculty members; the first three names drawn will be designated as regular members and the next seven names drawn will be designated as alternates to serve, as required, in the order in which they were drawn. Members are to serve a one-year term. The one-year term shall not preclude the selection of any member or alternate the following year. Members of the Judiciary involved in a case at issue shall be disqualified and replaced by alternates. The judicial process shall be that described in the related Article of the current "Graduate Students Rights and Responsibilities document."

VIII. MSU-IDEA (1 student)
"Ad-hoc" committee; prompted by the University Program for Ethnic Diversity. "How do we get more women and minorities into the sciences and keep them here?"

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IX. Web Committee (up to 4 students)
-Update and maintain Biochemistry Graduate Students website and solicit annual updates from all graduate students.

X. Speaker (1 student)
1. Meet with Biochemistry Seminar Committee and advise on seminar speakers for the coming Fall and Spring semesters
2. Invite and host one seminar speaker

XI. Holiday Party (as many as want to participate!)
1. Plan the upcoming holiday party
a. Find and book a location, decorations
b. Allocate departmental funds and/or find alternate funds for expenses
c. Order and/or solicit departmental members for food and drinks
d. Organize and communicate itinerary to department.

XII. Poster Session / Retreat Party (2 or 3 students)
1. Organize a retreat where students and post-docs can present their research (poster and/or seminar format) outside the MSU setting - can be conducted in conjunction with the Genetics retreat
2. Organize bi-monthly poster session within BMB throughout the year
   - each session to be hosted by each floor of the building
   - students outside of Biochemistry Building labs to be incorporated as room is available on the hosting floor
   - organize snacks and refreshments for the event

(Council, 2007)

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Chapter Six

Research Program

The question before us now is "how do we assess the growth and development of the research program in the Department of Biochemistry/Biochemistry and Molecular Biology over the last 50 years?" Is it possible to determine a central focus of the research over time? What about the research interest of the faculty (Appendix 7.1)? Can we observe trends in research by determining the subject of papers or the titles of MS and PhD thesis published each year? What does the total research dollars obtained each year tell us? How has technology, in particular computer technology, affected the research?

The research focus of the department is, of course, defined by the faculty of the department. To examine their interests, it seemed appropriate to first look at the evolution of biochemistry as a discipline. The diagram below attempts to display how the Department of Biochemistry and Molecular Biology came into existence at Michigan State University.

When the College/University was founded in 1855, the Chemistry Department was one of the first Departments created. Eight years later the Department of Agricultural Chemistry was established when R. C. Kedzie was appointed as Professor of Agricultural Chemistry in 1863. No doubt Kedzie, who obtained his training in Chemistry as a medical student at the University of Michigan, was influenced by Justus von Liebig in what

1855	1905	1955	2005
Chemistry →Agricultural Chemistry → Biological Chemistry → Biochemistry → Biochemistry/Molecular Biology			

Table 6.1: A timeline for the development of the Department of Biochemistry and Molecular Biology at Michigan State University.

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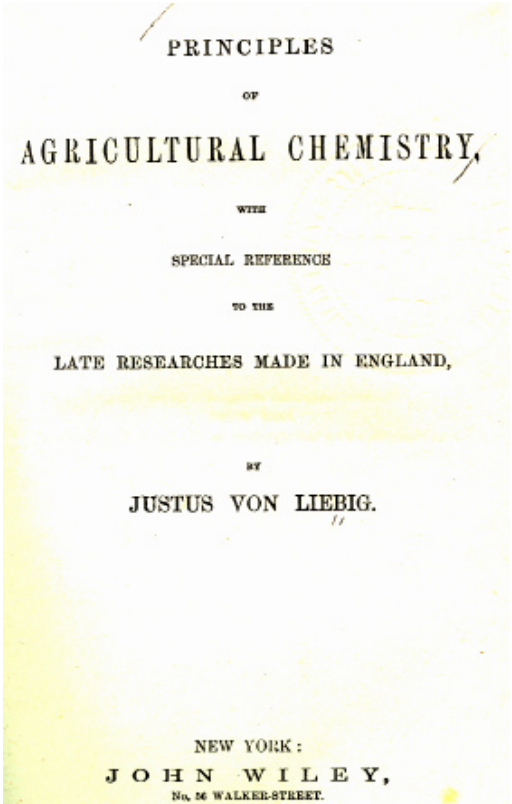
he taught and research he planned in Agricultural Chemistry. The book by Liebig (1855) entitled "Principles of Agricultural Chemistry" was in R. C. Kedzie's personal library since the volume with his signature on the inside front cover is part of the Michigan State University Special Collections of Rare Books (Figure 6.1). A course in Agricultural Chemistry was taught from 1863 to 1923, first through the Department of Agricultural Chemistry until 1883 and then through the Chemistry Department until 1923 (1883-84 College Catalog, pp. 26-30). The Agricultural Chemistry Department was eliminated in 1883 (Suelter, 2007). The 1923 College Catalog shows that in addition to Agricultural Chemistry, the Department of Chemistry offered biological chemistry, physiological organic chemistry, plant chemistry, crop chemistry, fertilizer chemistry, food analysis, dairy chemistry, and others with biological content. As noted in Chapter One, the Agricultural Experiment Station established a Department of Agricultural Chemistry in 1944 (1944-1945 Telephone Directory), however, chemists in that department did not teach or direct research, they collaborated with faculty in other departments in the College of Agriculture such as the Dairy Department (Clifford Duncan), the Department of Horticulture (Harold Sell), the Department of Poultry (Robert Evans), and the Animal Husbandry Department


PRINCIPLES

OF

AGRICULTURAL CHEMISTRY,

WITH

SPECIAL REFERENCE

TO THE

LATE RESEARCHES MADE IN ENGLAND,

BY

JUSTUS VON LIEBIG.

NEW YORK:

JOHN WILEY,

No. 56 WALKER-STREET.

Figure 6.1: Title page of book by Justus von Liebig, 1855, that was in R. C. Kedzie's personal library. His signature, shown in Figure 6.2, was on the inside front cover. Courtesy of the MSU Library Special Collections.

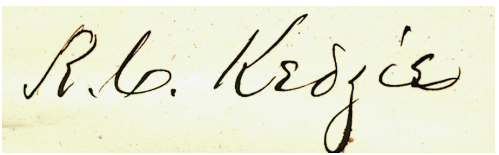

R. C. Kedzie

Figure 6.2: R. C. Kedzie's signature found on the inside of the front cover of book shown in Figure 6.1. Courtesy of the MSU Library Special Collections.

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(Richard Luecke); Ervin Benne generally consulted with all the departments (Luecke, 2001). Then the Board of Trustees at their April 16, 1959 meeting dropped the term "research" from the titles of faculty in the Department of Agricultural Chemistry so that they could now teach and advise graduate students. It is also of interest to know that by 1959 the Department of Chemistry had four Divisions: Analytical Chemistry, Organic Chemistry, Physical Chemistry, and Biological Chemistry plus General Chemistry (Quill, 1955). Two years later in 1961, the faculty in the Division of Biological Chemistry and the faculty in the Department of Agricultural Chemistry joined together to form the Department of Biochemistry. Ultimately this group changed its name to the Department of Biochemistry and Molecular Biology on July 1, 2001.

Since the research interests of faculty change over the years, the question arises – did they have a central focus each year and how do we determine it? One approximate method would be to examine their publications and or the thesis titles of students obtaining a MS or PhD under their supervision. Since it is not possible to examine the publications of all the faculty over the years, the decision was made to examine the PhD and MS thesis of all students receiving graduate degrees from 1931 to 2010 (Appendices 6.1, 6.2, 6.3, and 6.4). Appendix 6.1 lists the MS and PhD theses published by students of faculty that became members of the Department but the students did not receive advanced degrees in Biochemistry between 1931 and 1965. The name of the student receiving a graduate degree, the year the degree was granted, the type of degree obtained, the thesis title, and the name of the major professor are given. Appendix 6.2, 6.3, and 6.4 show the same type of data for students receiving graduate degrees in Biochemistry between 1961 and 2010 but in three different formats. First Appendix 6.2 lists, in chronological order from 1961 to 2010, the name of the student receiving the degree, the type of degree awarded, the year it was presented, the title of the thesis, and the name of the Major Professor. The second presentation, Appendix 6.3, does not include the thesis titles but does include the name of the student receiving a degree in alphabetical order, the year the degree was awarded and the Major Professor. Finally, the third presentation, Appendix 6.4, includes the thesis titles and the year the degree was awarded listed under each Major Professor: the student's name and the type of degree awarded are not listed in Appendix 6.4.

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At this point, it is of interest to examine the list of graduate thesis published from 1931 till 1965 by students of faculty from the Chemistry Department and of faculty from the Department of Agricultural Chemistry. (See Appendix 6.1). What you find is that the majority of the theses deal with the study of vitamins and minerals and some with proteins and oils. These studies involved the use of plants, animals, and microbes. By the 1950s and 1960s, we see more faculty involved and the first thesis involving a study of ribonucleic acid in 1961. Thus we can say that Agricultural Chemists and Biological Chemists at Michigan State between 1930 and 1960 were involved with the discovery, isolation, identification, concentration, structure, function, and regulation of the components of living organisms. In other words, they were biochemists studying the chemistry of the components of living organisms.

Living Organisms
Animals
Plants
Insects
Microbes

Next if we examine the thesis titles of students receiving graduate degrees in Biochemistry between 1961 and 2010, we note that 590 degrees were granted, an average of nearly 12 per year. The first thesis in this group involving the study of nucleic acid was published in 1966. Examining the remainder of the theses shows that the studies involve the use of all different types of living organisms, all different components of living organisms, and different laboratory equipment including the use of computers. After the DOE Plant Research Laboratory was constructed in June 1966 (Suelter, 2007) and several faculty were appointed jointly in Biochemistry and the Plant Research Laboratory, there was an increase in the number of theses involving plants. So the bottom line is that Agricultural Chemists, Biological Chemists, Biochemists, and Molecular Biologists have asked the same questions about the components of living organisms since before 1850 or that they were interested in the discovery, isolation, identification, structure, function, concentration, and regulation of all components of living organisms. Such knowledge is a prerequisite for understanding normal and abnormal functions that underlie biochemical and genetic disorders. The dramatic changes that have occurred over the past 50 years are due to the availability of advanced laboratory instrumentation

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now normally found in the research facilities but not always. Unfortunately, unless we examine each thesis in detail, it is not possible to show what equipment was used in a study and when it was first used. A history of the development of laboratory equipment over the years is beyond the scope of this presentation.

From 1961 until about 1970 or so, researchers in the department had access to the Biochemistry Library, the Biochemistry Storeroom, the Electronics and Machine Shop, the Plant Growth Chambers, the Animal Room, the Analytical Laboratory, and the University Computer System. These facilities provided conveniences in the sense that a researcher could call on any of the staff in these facilities to provide a service if needed. Except for the Analytical Laboratory, they did not directly provide data to solve a research problem. This began to change dramatically in 1980 with the introduction of computers and the creation of the Mass Spectrometry Facility and the Macromolecular Structure Facility as described in detail in Chapter Four. These facilities could be contracted to analyze a sample and thus provide data to solve a research problem.

It is not our plan to discuss the availability of the laboratory instruments over the years. General laboratory equipment was usually obtained by a faculty researcher if needed. However, after instruments became more sophisticated and expensive, it was normally not possible for a faculty member to obtain the funds necessary to purchase such equipment. In many cases then the equipment could be provided through the establishment of research facilities as discussed in Chapter Four. These facilities made it possible for researchers to answer many questions that they were not able to answer before. All the researcher needed was to prepare a sample and cover the cost for someone in a research facility to analyze the sample for a designated component and provide the data to help solve the problem (Dewitt, 2003).

Research Focus Areas in 2010: Faculty hiring that was done by the Department of Biochemistry beginning in 1961 until about the mid 1990s was always aimed at finding the best young biochemist available. Relatively little emphasis was placed on the research area of the new faculty member. This turned out to be a very successful approach. In terms of extramural grant support, by the mid-1990s the Biochemistry Department had become the best funded academic department on the MSU

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campus. However, by the early 1990s, it was becoming increasingly clear that the Department had not achieved a national stature reflecting its actual level of productivity (Smith, 2000, p. 12).

On February 11, 1995, shortly after William Smith was appointed as Chairperson of the Department, he organized a Faculty Retreat. As a result of this retreat, a five year plan was developed with the following goal: To improve the research stature of the Department while maintaining hgh quality instruction in their undergraduate, graduate, and medical programs. It was decided that one of the reasons for this lack of stature was that the Department had not developed well recognized research niches nor advertised themselves very effectively (Biochemistry Self Study, 1995). As a result, they decided to address this issue by hiring future faculty with research interests that represented three emerging strengths in the Department: Structural Biology, Plant Biochemistry, and Biochemistry of the Cell Nucleus. In addition, the Department improved the research infrastructure by establishing a first rate computer graphics/bioinformatics facility, upgraded an already strong Macromolecular Structure Facility, obtained NSF funding for a new high field NMR and purchasing state-of-the-art equipment for the crystallography, mass spectrometry, and flow cytometry facilities (Smith, 2000). In addition, five faculty members and two Chemistry faculty succeeded in getting the first NIH Program Project to study the structural biology of membrane proteins (Biochemistry, 2000, page 12)

In 2010, research in the department is categorized under three major research focus areas: genes and regulation, plant biochemistry, and structural & computational biology. Research under genes and regulation involve studies of signaling pathways and apoptosis, DNA replication, mutagenesis and human disease, Gene expression, and regulation and toxicology. Faculty in plant biochemistry are studying genomics and systems biology, biomass, and metabolism while those in structural and computational biology are involved in a study of computational modeling, X-ray crystallography, NMR and mass spectrometry, membranes and membrane proteins, structure and function studies, and enzyme catalysis and metalloproteins (Research, 2010).

Genes and Regulation Research Focus Area: The focus area entitled, “Genes and Regulation” brings together the shared interests of half the faculty. Under the topic of the enzymology of nucleic acids, specific research programs focus on DNA replication and mechanisms

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to maintain the genetic integrity of DNA, including the study of biochemical pathways that lead to aberrant cell proliferation or cancer when cells experience DNA damage. Several research programs focus on the mechanism of transcription and its regulation, and an exciting new initiative of interdisciplinary research centers on Gene Expression in Development and Disease (GEDD). Other laboratories investigate RNA-based catalysis, RNA splicing, and signaling pathways in response to various stimuli and include apoptotic pathways leading to programmed cell death.

GEDD Focus Group: To enable students to reach their peak potential in gene expression research, a group of faculty in and outside of the Department of Biochemistry and Molecular Biology have initiated an extensive array of support activities through the **G**ene **E**xpression in **D**evelopment and **D**isease Initiative (Arnosti, 2010a). This project coordinates efforts of over 20 research-active laboratories with a common interest in gene expression, ranging from structural, to biochemical, to evolutionary studies. They sponsor a weekly journal club involving regular participation of a dozen faculty members and around 40 students and postdocs who present their research that focuses on contemporary literature in transcriptional regulation. The GEDD Focus Group sponsored a June 2010 summer course on next-generation sequence data analysis. This two week course introduced 23 biologists from academia and industry to the cutting-edge computational techniques required for analyzing short-read sequencing data. The group has supported intergroup research projects with seed money provided by the College of Natural Science, Michigan Agricultural Experiment Station, the Graduate School, and the MSU Foundation, and are currently planning the 2011 Transcriptional Mechanisms, Evolution and Systems Biology Conference, together with colleagues at the University of Chicago (East Lansing, July 22-24, 2011), following on a highly successful conference organized in 2008 (Arnosti, 2010).

Plant Biochemistry Research Focus Area: Plants produce most of the biomass on earth, provide directly or indirectly all food for humans and increasingly will become the source of sustainable biomaterials that replace non-renewable resources. MSU has one of the largest groups of plant biochemists in North America, most of whom are affiliated with the Department of Biochemistry and Molecular Biology, the Department of Plant Biology or the DOE Plant Research Laboratory. According to “The

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Web of Science Citation Index", MSU researchers have published more papers in the areas of plant biochemistry and metabolism than any other university in the US.

Plant biochemists at MSU are developing new ways to produce renewable resources as replacements for fossil fuels and are devising strategies for improving the nutritional quality of foods to improve the health of humans around the world. They are also working on novel and environmentally safe approaches for protecting plants from pathogens and insects as well as climatic stresses. As such MSU plant biochemists provide the creativity and technology to solve some of the most challenging problems humankind is facing in the future: sustainability of our way of life, feeding an increasing world population, and maintaining a safe environment. To meet these challenges, plant biochemists use cutting edge genomics technologies, genetic approaches, metabolite analysis, metabolic flux analysis, enzyme analysis, and structural analysis of proteins. Lipids and related molecules play a large number of critical physiological roles in plants, and are nutritionally important for the animals that consume them. There is a very strong presence on campus of plant biochemists that study metabolism of structurally diverse lipids, including polar membrane lipids and neutral seed storage lipids, vitamins such as carotenoids (vitamin A) and tocopherols (vitamin E), and lipid-derived signaling compounds such as jasmonates. Plants are also master carbohydrate chemists, creating an array of unique structural and storage forms. MSU plant biochemists also perform cutting-edge research on the regulation of synthesis and transport of primary carbohydrate metabolites and on complex carbohydrate biosynthesis and partitioning, particularly of the cell wall and starch (Plants, 2010).

Structural and Computational Biology Research Focus Area: Researchers in this focus area are interested in enzyme catalysis and metalloproteins and membranes and membrane proteins. They probe molecular structure to understand binding and catalysis by biological molecules and design or discover new ligands to enhance or suppress function, for both biomedical and biotechnological applications. X-ray crystallography, nuclear magnetic and electron paramagnetic resonance, visual spectroscopy, fluorescence and visual microscopy, circular dichroism, confocal laser scanning microscopy, computational and mathematical modeling, mass spectrometry, organic synthesis, and recombinant DNA techniques are among the broad range of methods used (Biology, 2010).

This area of research received a major support in 2001 when the State of Michigan invested its tobacco settlement by targeting the life sciences under the umbrella designation of the Michigan Life Sciences Corridor. Expected funding is $50 million per year for 20 years. One of the five areas initially targeted for development was structural biology at MSU. The Co-Directors of this Center for structural biology are Drs. Ferguson-Miller and Preiss (Smith, 2001; Biochemistry, 2001, pages 10-11).

Several faculty in the Structural Biology focus group were pleased to learn in 2002 that the Argonne National Laboratory in Illinois signed a Memorandum of Understanding with four Michigan institutions and Northwestern University to establish the Life Sciences Collaborative Access Team. This agreement provided unparalleled access to cutting-edge synchrotron radiation facilities for structural biology. To exploit this new research availability, faculty in BMB and throughout MSU began a concerted effort to acquire funding from the **M**ichigan **L**ife **S**cience **C**orridor (MLSC) to establish state of the art facilities for X-ray crystallography, multidimensional NMR and other structural methodologies. There efforts were rewarded with the establishment of the MLSC Core technology alliance, which is composed of 5 new research centers including the Michigan Center for Structural Biology at MSU (Garavito, 2002, pp. 24-27).

Quantative Biology (QB)**:** The program in Quantitative Biology got its start on July 1, 2000 as the Center for Biological Modeling funded by the Research Excellence Funding (REF) Center. Its purpose was to foster interdisciplinary research between the biological and physical/computational sciences in modeling important biological processes. Faculty from the Departments of Biochemistry and Molecular Biology, Chemistry, Computer Science and Engineering, Crop and Soil Science, Epidemiology, Microbiology and Molecular Genetics, Physics and Astronomy, and Zoology were involved: Leslie Kuhn, Biochemistry and Molecular Biology served as the Director and Robert Cukier, Chemistry, served as the Co-Director. The plan was to develop a range of programs emphasizing interdisciplinary approaches toward modeling of biologically important processes such as protein folding, biomolecular catalysis, the spread of disease, rational development of drugs, and the evolution of organisms and molecules. This would be accomplished through graduate/postdoctoral research awards, new courses in biological modeling, a seminar series as well as annual conferences and workshops

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(Ferguson-Miller and Kuhn, 2001 p. 24; Kuhn, 2003, pp. 18-20; Kuhn, 2003a, pp. 22-23).

In early 2004, the Center for Biological Modeling became known as the Quantitative Biology and Modeling Initiative (QBMI) when it was funded by the Strategic Partnership Grant (SPG). QBMI was under the guidance of three directors: Leslie Kuhn, Shelagh Ferguson-Miller, and Rober Cukier from Chemistry. After the SPG ended in June 2007, it was funded as part of the appointment of Shelagh Ferguson-Miller as Chairperson of the Department of Biochemistry and Molecular Biology at which point it became known as the Quantitative Biology Initiative (QBI): QBI was directed by Robert Hausinger and Peter Bates (Mathematics); Claire Vieille served as an Assistant Director. However, QBI was discontinued in the Summer of 2010 because of the lack of financial support and the inability to obtain grant support outside of the University.

The Quantitative Biology Initiative had two areas of focus: 1) graduate education in the area of QB and 2) enhancing campus-wide interactions in this area by sponsoring workshops and conferences, running the Science At The Edge (SATE) seminar program, stimulating joint projects among local colleagues, seeking external support such as training grants, etc. They were successful in some areas, and less so in others. In 2007, a dual major Quantitative Biology (QB) graduate program was established. Several internal and regional meetings were supported by QBI, resulting in positive interactions among the participants and enhancement of MSU's status in the QB area. The SATE series has continued to have good participation. Multiple training grant proposals were submitted, with one on Molecular Biophysics getting close to being funded.

The Quantitative Biology Graduate Program has four research concentrations: Molecular Biophysics, Ecological and Evolutionary Modeling, Systems Biology, and Genomics, Bioinformatics, and Computational Biology. Faculty from several departments are involved including, Biochemistry and Molecular Biology, Chemical Engineering and Material Science, Chemistry, Computer Science and Engineering, Microbiology and Molecular Genetics, Physics and Astromony, and Plant Biology. Graduate students are trained in their primary discipline along with one of the interdisciplinary concentration areas of Quantitative Biology. Thus students are required to have two mentors, that is, one mentor is to be from

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the department in which he or she is appointed and the second mentor from a complementary program (Hausinger, 2010; Biomodel, 2010)

Research Dollars:- Figure 6.3 presents the total amount of grant support received by the Department of Biochemistry/Biochemistry and Molecular Biology each fiscal year beginning in 1961-62. If one calculates the effect of inflation, the best guess is that the $202,000 awarded to 16 faculty members ($12,625 per faculty member) in 1961/62 would be $1,417,193 in 2009 to 41 faculty or $34,566 per faculty person. If we assume that 1970 was the startup year, then the amount of money expected in 2009 for 41 faculty would be $122,517 per faculty person (Friedman, 2010). Clearly the $8 million awarded in 2009/10 ($195,122 per faculty person) exceeds the amount expected if the increases noted in Figure 6.1 were the result of inflation.

In summary, the faculty of the Department conferred on average 12 graduate degrees per year (3 MS and 9 PhD degrees) during the last 50 years. The amount of research grant support awarded has exceeded the rate of inflation. The most striking point to be made about the research program in the Department is the impact of the computer.

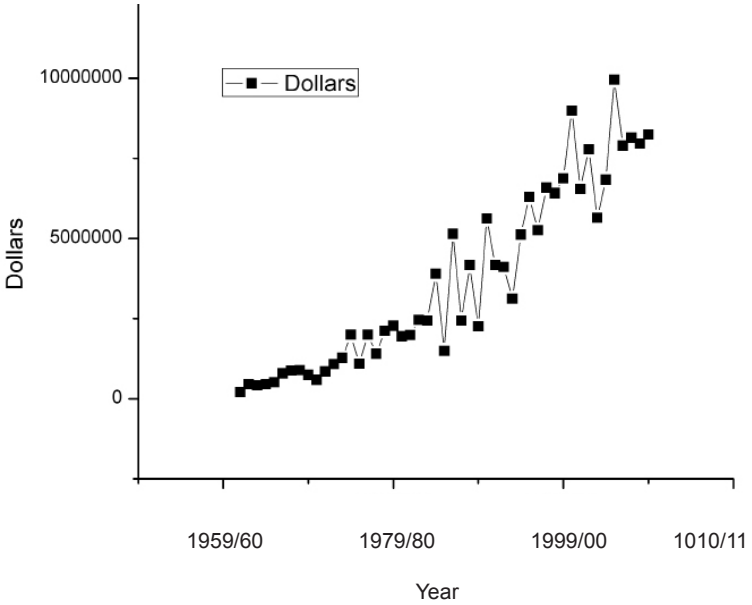

Figure 6.3: Total amount of grant support received by the Department each year beginning in 1962.

Before the computer came onto the scene, research data were recorded by hand and calculations completed by hand, by using a slide rule, or calculator. Now the research data can often be recorded and processed directly by a computer interfaced with the instrument being employed. Grant applications were hand written and

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then generally given to the Secretary to type so it could be mailed to the granting agency. Now the researcher completes the application on his or her computer and then emails it to the granting agency. To stay abreast of the research progress in ones field of study in 1961, the researcher had to either subscribe to the research journals or the paper version of Current Contents to follow the publications which then had to be obtained by requesting a reprint, read it in the library or purchase it. Today, most research journals are published on line. It is not necessary to leave one's office to read the literature. Research publications jointly published with colleagues at another institution can be reviewed on line before being emailed to a journal for publication. The computer has also made it possible to study the structure of proteins and nucleic acids by using special software to examine their sequences or by comparison to known structures. Advances in electronic technology have also had an impact.

Another point to be made is that the organization of the faculty and students has changed over the years. Generally laboratory research was conducted, beginning as far back as 1850, by the research supervisor or faculty member working with his or her students. Collaborations with other members of the faculty within the Department were limited except that they often attended the same departmental seminar. On the other hand, collaborations with faculty outside of the Department were more common. An interdepartmental program in Genetics was formed in 1972 by the College of Natural Science. Two years later the Neuroscience Program was formed in the College. This was followed by the formation of the Cell and Molecular Biology Program in 1996 (Suelter, 2007). As a result of these actions, more and more faculty of the Department became involved in Interdepartmental programs and seminars. By 2010, however, the atmosphere is much different. The faculty today collaborate with many other faculty even from within the department as they participate in the three research focus areas. Seminars and journal clubs are organized with in the focus area. Journal clubs are organized by graduate students. It also turns out that research grant applications by faculty in the Department of Biochemistry and Molecular Biology are slightly more successful if they involve the collaboration of more than one faculty person (CGA, 2010).

Another way to view the success of the research programs of the Department is to examine the awards made by the National Academy of Science, the University, the College

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and the Department to faculty, students, and alumni listed in Appendix 6.5. The most significant award is being elected to the National Academy of Science as have the following four faculty: Charles Arntzen in 1983, N. Edward Tolbert in 1984, Joe Varner in 1984, and Pamela Fraker in 2007. Examine Appendix 6.5 for a listing of the many other awards made to students, alumni, and faculty over the years by the University, College of Natural Science and the Department.

Figure 6.4 shows the current most commonly used method to present research data at meetings, both locally and nationally. This is different from the oral presentations that were made to groups both at the national or local level in the old times. Posters (42 inch maximum width) were printed in the Macromolecular Computer Facility and then carried to the site for mounting on a wall or other device so they could be discussed privately with whomever was interested.

Finally Appendix 6.6 portrays, in visual form, several instruments used in the research laboratory from 1961 to 2011. It is intended to portray a bit of the history of the development of instrumentation over the years and bring back some memories. Note the impact of the computer.

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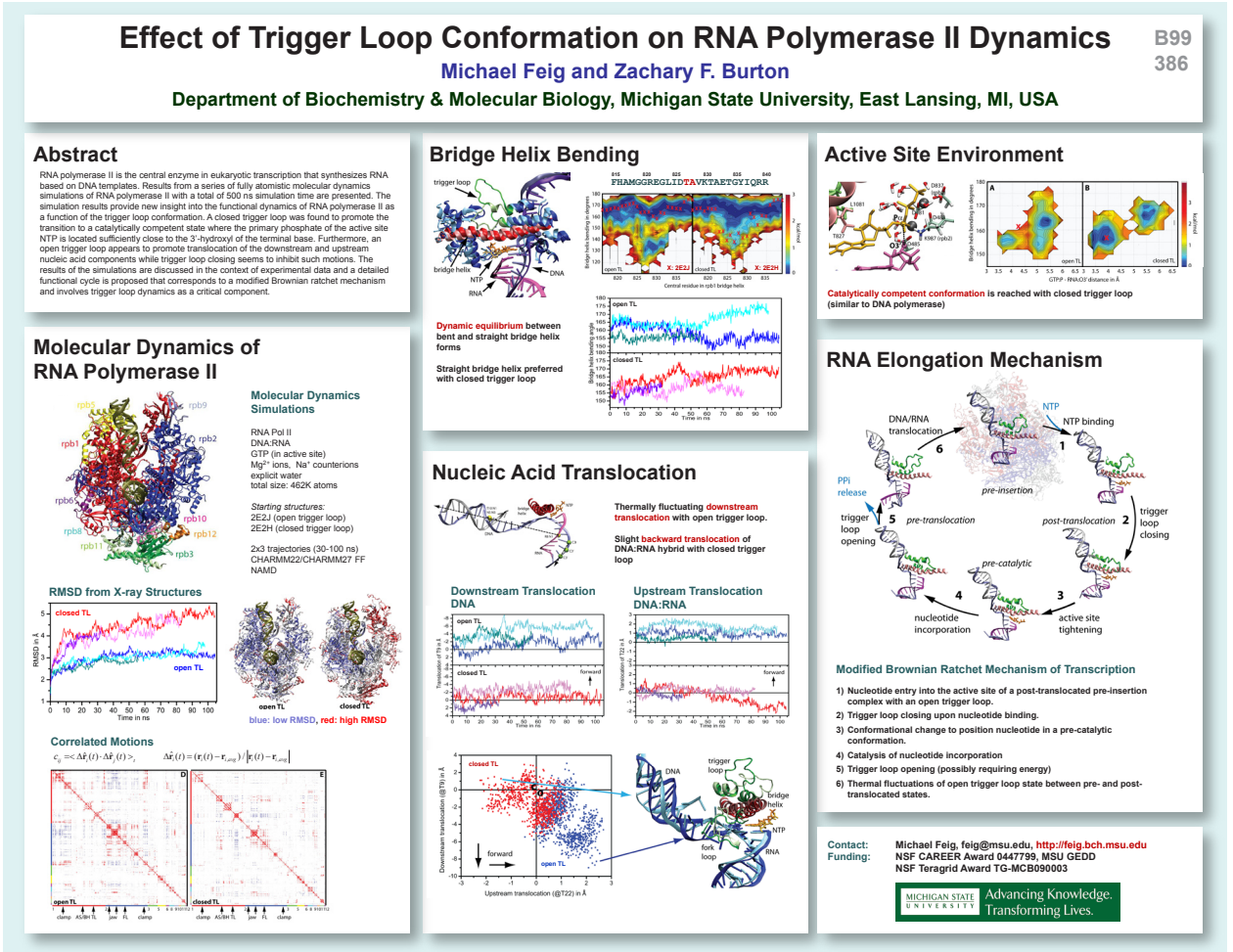

Figure 6.4: Poster created by Michael Feig and Zachary Burton that was used to present research data at a meeting. Courtesy of Michael Feig and Zachary Burton.

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Chapter Seven

Administration

Administrative Staff: As noted earlier, the Department of Biochemistry was created by the MSU Board of Trustees on April 1, 1961 within the College of Agriculture and Natural Resources and the College of Science and Arts with the College of Agriculture as the lead college. The new Department replaced the Department of Agricultural Chemistry and included the Biological Chemists in the Department of Chemistry. The College of Science and Arts was then restructured in July of 1962 by splitting it into three Colleges: College of Social Science, College of Arts and Letters, and the College of Natural Science (MSU Board of Trustee's minutes, January 19, 1962). It was felt that splitting the College of Science and Arts into three colleges would make it easier to obtain funds to upgrade the sciences (Byerrum, 2000).

The College of Human Medicine was created at roughly the same time as the College of Natural Science when the state Legislature approved the two-year pre-clinical program in July 1962. Two years later in September 1964, the Board of Trustees established an academic structure for the College of Human Medicine that included the following jointly administered departments: Microbiology and Public Health, Physiology, Biophysics, Zoology, and Biochemistry. Also involved was the School of Medical Technology which at the time was in the College of Veterinary Medicine. Five years later, the MSU Board of Trustees voted unanimously to establish the College of Osteopathic Medicine on December 12, 1969, with the understanding that the College of Human Medicine would become a four-year Medical College. The College of Human Medicine was then restructured and the Michigan Osteopathic College, previously established in Pontiac, MI, was moved to the MSU Campus (Mikols and Osborn 1998). The College of Osteopathic Medicine began to function as an MSU facility on July 1, 1970 (MSU Board of Trustee's minutes September 17, 1970).

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After both Medical Schools were established, the Department of Biochemistry was jointly administered by four Colleges: Colleges of Agriculture and Natural Resources, Natural Science, Human Medicine, and Osteopathic Medicine. Then in May 2003, the College of Agriculture and Natural Resources was removed as a partner in the administration of the Department so now the Department is jointly administered by the College of Natural Science, College of Osteopathic Medicine, and the College of Human Medicine with the College of Natural Science as the lead college (Suelter, 2007).

The Department of Biochemistry was renamed the Department of Biochemistry and Molecular Biology on July 1, 2001. This name change was requested by Chairperson William Smith in a letter to Dean George Leroi, College of Natural Science, dated June 10, 1999, as a result of a vote of the departmental faculty. The change was requested to more acccurately reflect the teaching and research foci of the department. In addition, he noted that the national association of the discipline was called the American Association of Biochemistry and Molecular Biology (Smith, 1999). After receiving support for the name change from Dean William S. Abbett, College of Human Medicine, dated June 21, 1999 (Abbett, 1999), Lonnie J. King, College of Veterinary Advisory Committee on September 3, 1999 (King, 1999), William W. Taylor, Acting Dean, College of Agriculture and Natural Resources dated October 15, 1999 (Taylor, 1999), and Dean Allen W. Jacobs, College of Osteopathic Medicine dated October 13, 1999 (Jacobs, 1999), Provost Lou Anna Kimsey Simon sought the advice of the Executive Committee of the Academic Council on January 26, 2000 (Simon, 2000). Five months later, Provost Simon sent a memorandum to President Peter McPherson stating that she concurred with the request to change the name of the Department of Biochemistry to the Department of Biochemistry and Molecular Biology. She also requested the approval of the President under the authority delegated to the President to approve changes in the names of departments, school, institutes, centers, bureaus, and similar units. The name change became effective July 1, 2000 (Simon, 2000a).

The chief administrative officer in each department was initially designated as “head” or sometimes “in charge” and served an indefinite term. This practice continued until 1961, when, as a result of increasing demands for democratization, the Michigan State University Trustees decreed that “heads” would henceforth be designated as

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"chairman" and that chairmanships would be subject to review at least every five years (Morrill, 1979, p. 124). The chief officer was designated as chairman until March 21, 1975, when the Board of Trustees approved the By-Laws for Academic Governance which stated that a department chairperson, not chairman, or school director shall serve as the chief administrative representative of his or her department (By-laws, 1975).

When the Department of Biochemistry was created on April 1, 1961, with R. Guarth Hansen (1957-1968) as the Head of the Department (1961-1968), the faculty in the Department of Agricultural Chemistry: Nathan Ed Tolbert (1961-1990), Willis W. Wood (1961-1982), Erwin J. Benne (1961-1970), Clifford W. Duncan (1961-1963), Harold M. Sell (1961-1974), Allan S. Fox (1961-1963), Robert J. Evans (1961-1977), Selma Bandemer (1961-1966), Robert L. Salzbury (April 1, 1961 – August 31, 1961) (MSU Board of Trustees minutes 22 Sept. 1961), and Richard W. Luecke (1961-1988) became members of the Department of Biochemistry along with the Biological Chemists in the Department of Chemistry: Gordon

Figure 7.1: View of the first faculty meeting in the new Biochemistry Building on March 17, 1965 in Room 208. (Back Row, l to r, behind table) Robert Evans, John Speck, Richard Anderson, John Boezi, Allan Morris, and Jack Holland; (Head of meeting) R. Guarth Hansen; (inside of tables, l to r) Harold Sell, Clarence Suelter, Hans Lillevik, Paul Kindel, and Erwin Benne; (front of tables, l to r) Selma Bandemer, N. Ed. Tolbert, William Deal, and Willis Wood..

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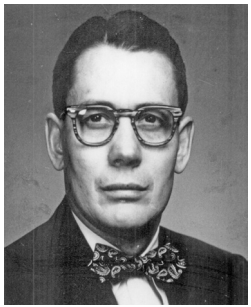
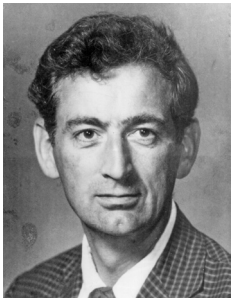


R. Guarth Hansen
1961-1968

Willis A. Wood
1968-1974



Robert Barker
1974-1979

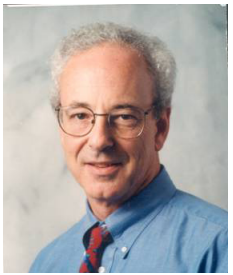
Charles C. Sweeley
1979-1985

Jack Preiss
1985-1989

John E. Wilson
1989-1994

Kilgour (1961-1963), Richard U. Byerrum (1961-1991), Hans Lillevik (1961-1986), John C. Speck, Jr. (1961-1988), Carl Hoppert (April 1, 1961-July 1, 1961) and James L. Fairley (1961-1987) (MSU Board of Trustees meeting, June 15, 1961).

One of the major responsibilities of the Chairperson and faculty of any University Department is to recruit new faculty to replace those that retire or resign as well as to retain those that are recruited. Figure 7.2 shows the faculty that served as Chairpersons of the Department during its first 50 years of operation. The faculty recruited into the Department of Biochemistry/Biochemistry and Molecular Biology during each Chairperson's tenure are listed in Table 7.1. A short version of the



William E. Smith
1994-2003

Shelagh Ferguson-Miller
2003-2008

Thomas Sharkey
2008-

Figure 7.2: Photographs of the Chairpersons of the Department of Biochemistry/Biochemistry and Molecular Biology from 1961 to 2011 plus the years that they served.

Curriculum Vitae of all tenure stream faculty appointed to the Department is provided in Appendix 7.1. Adjunct

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Chairperson (Years as Chairperson)	Appointments (Years on Faculty)
R Guarth Hansen (1961-1968)	R Guarth Hansen (1961-1968)
	N. Edward Tolbert (1958-1990)
	Willis W. Wood (1959-1982)
	Richard Byerrum (1961-1991)
	James L. Fairley (1961-1987)
	Gordon Kilgour (1961-1963)
	John C. Speck (1961-1988)
	Allen Fox (1961-1963)
	Carl Hoppert (1961-1961)
	Hans Lillevik (1961-1986)
	Robert L. Salsbury (1961-1961)
	Clifford W. Duncan (1961-1963)
	Robert J. Evans (1961-1977)
	Richard Luecke (1961-1988)
	Harold Sell (1961-1974)
	Selma Bandemer (1961-1966)
	Erwin Benne (1961-1970)
	Richard L. Anderson (1961-1996)
	Clarence H. Suelter (1961-1994)
	William C. Deal (1962-1998)
	Olaf Mickelsen (1962-1974)
	Paul Kindel (1963-2000)
	Allan Morris (1963-1988)
	John Boezi (1963-1980)
	John F. Holland (1965-1996)
	William W. Wells (1965-2001)
	Burke K. Zimmerman (1966-1969)
	Loren L. Bieber (1966-2002)
	Steven D. Aust (1967-1986)
	John E. Wilson (1967-2004)
	Fritz M. Rottman (1968-1980)
	Charles C. Sweeley (1968-1992)
Willis A. Wood (1968-1974)	Phil Filner (1968-1980)
	Alexander Tulinsky (1968-1973)
	Joseph Varner (1968-1973)
	Robert A. Ronzio (1969-1977)
	Hyram Kitchen (1970-1974)
	David G. McConnell (1973-2002)
	Pamela J. Fraker (1973-)

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Robert Barker (1974-1979)	Robert Barker (1974-1979) William L. Smith (1974-2003) Deborah P. Delmer (1974-1982) Arnold Revzin (1974-1999) Hsing-Jien Kung (1977-1984) John L. Wang (1977-) Shelagh Ferguson-Miller (1978-) Rodger D. Kobes (1978-1982)
Charles Sweeley (1979-1985)	Charles Arntzen (1980-1985) Jerry Dodgson (1980-2004) Edward Fritsch (1980-1982) Veronica M. Maher (1980-2009) Justin J. McCormick (1980-) Melvin Schindler (1980-2006) Karel R. Schubert (1980-1983) Jack T. Watson (1980-2007) Ronald Davis (1982-1987) Estelle J. McGroarty (1982-) Gregory Zeikus (1984-2009) Lee McIntosh (1984-2005) Laurie Kaguni (1984-) Jon Kaguni (1984-) Robert Hausinger (1985-)
Jack Preiss (1985-1989)	Jack Preiss (1985-2009) Douglas Gage (1987-) Zachary Burton (1988-) Thomas Deits (1988-1995) Michael Denison (1988-1994) Rawle Hollingsworth (1988-) Lee Kroos (1988-) Steven Triezenberg (1988-)
John E. Wilson (1989-1994)	Diana Marinez (1990-1995) David P. Thorne (1991-1998) Honggao Yan (1993-) Leslie Kuhn (1994-)

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William L. Smith (1994-2003)	Dave L. Dewitt (1994-)
	Donald Jump (1995-)
	William Spielman (1997-2003)
	Kenneth Keegstra (1997-)
	David Arnosti (1997-)
	Christoph Benning (1998-)
	Kathleen A. Gallo (1998-2008)
	R. Michael Garavito (1998-)
	Gregg Howe (1998-)
	Pamela Green (1998-2002)
	Timothy Zacharewski (1998-)
	Natasha Raikhel (1998-2000)
	Dean Della Penna (2000-)
	R. William Henry (2000-)
	Min-Hao Kuo (2001-)
	John Lapres (2001-)
	Charles Hoogstraten (2002-)
	Robert Larkin (2003-2010)
Shelagh Ferguson-Miller (2003-2008)	Michael Feig (2004-)
	Aizhuo Liu (2004-2009)
	Kevin Walker (2004-)
	William Wedemeyer (2004-2010)
	Robert Last (2005-)
	Jennifer Ekstrom (2005-2010)
	Daniel A. Jones (2006-)
	Beronda Montgomery-Kaguri (2006-)
	Gavin Reid (2006-)
	Eric Hegg (2007-)
	Markus Pauly (2007-2010)
	Curtis G. Wilkerson (2007-)
Thomas Sharkey (2008-)	Thomas Sharkey (2008-)
	Claire Vielle (2008-)
	Barbara Atshaves (2009-)
	Suzanne Hoffman-Benning (2010-)
	Hideki Takahashi (2010-)
	David Kramer (2010-)
	Christina Chan (2010-)

Table 7.2: A listing of the Chairpersons of the Department of Biochemistry/Biochemistry and Molecular Biology over the time of its operation and the faculty that were appointed during each Chairperson's tenure.

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Adjunct Faculty (Yrs served)	Affiliation
Alberts, Arthur (2005-)	Van Andel Research Inst. Grand Rapids
Arntzen, Charles (1985-1986)	DOE Plant Research Lab, MSU
Chan, Christina (2006-2009)	Comp Sci & Egr, MSU
Deits, Thomas L. (1996-)	Lansing Community College, Lansing, MI
Denison, Michael (1993-1994)	Biochemistry, MSU
Duesbery, Nicholas S. (2007-)	Van Andel Research Inst. Grand Rapids
Gage, Douglas (2002-)	Research & Graduate Studies, MSU
Green, Pamela (1990-1991)	DOE Plant Research Lab, MSU
Haab, Brian (2008-)	Van Andel Research Inst. Grand Rapids
Hawkes, Susan (1981-1985)	Michigan Molecular Institute, Midlannd
Knott, Jason G. (2010-)	Animal Husbandry, MSU
Ledden, David (1997-1998)	Unknown
Lamport, D. T. A. (1987-1992)	DOE Plant Research Lab, MSU
Leach, Karen (2002-2003)	Upjohn Pfizer Co., Kalamazoo, MI
Mackiegan, Jeff (2007-)	Van Andel Research Inst., Grand Rapids
Panayotatos, Nikos (1987-1990)	Michigan Biotechnology Institute, MSU
Schubert, Jack (2001-2003)	Univ of Pittsburgh, Pittsburgh, PA
Schutte, Brian (2010-)	Microbiol and Mol Genetics, MSU
Spielman, William (1989-1993)	Physiology, MSU
Triezenberg, Steve (2009-)	Van Andel Research Inst., Grand Rapids
Weber, Darrell J. (1975-1976)	Brigham Young Univ., Provo, UT
Weinreich, Michael (2006-)	Van Andel Research Inst., Grand Rapids

faculty appointments made between 1961 and 2010 are listed in Table 7.2. These appointments were made by the Chairperson, in consultation with the Faculty Advisory Committee, and upon approval of the regular faculty of the Department. The arrangements with each appointee are made on an individual basis according to the following guidelines: time to be spent in the Department; service on department committees; service on graduate committee; voting at the Department level; office space to be provided by the Department; laboratory facilities to be provided by the Department; secretarial or graduate assistant help to be provided; authority to teach, do research, or advise students in the Department; authority to publish as a member of the Department; authority to propose, receive, and implement research

Table 7.2: Listing of Adjunct Faculty that were appointed between 1961 and 2010, the years they served, and their affiliation within the University or outside organizations.

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grants. Thus each adjunct appointee has different goals (By laws, 2010).

The administrative structure of the Department has changed little over the last 50 years. A five member Faculty Affairs Committee or the Faculty Advisory Advisory Committee, as its been known as since 1977, is elected by the faculty and advises the Chairperson on a regular basis. From 1968 to 1971, the remaining committees were divided into two groups: Policy Committees (Curriculum, Graduate Student Affairs, Graduate Student Recruitment, Library, and Undergraduate Majors) and Administrative Committees (Preliminary Examination, Undergraduate Advising, Admission of Graduate Students, Class Scheduling and Catalog, Plant Room, Animal Room, Storeroom, Student Placement, and Alumni Relations). Beginning 1974 until 2010, the Committees have been divided into three groups: the Faculty Affairs Committee, Standing Committees, and Ad Hoc Committees. The actual committees grouped under these classifications varied over the years. Generally the Standing Committees included the Curriculum Committee, Graduate Admissions Committee, Graduate Program Committee, Graduate Student Judiciary, Preliminary Exam Committee, Safety Committee and the Undergraduate Programs Committee. Committees listed under Ad Hoc Committees also varied considerably over the years: often you will find the Awards Committee, Computer Committee, Equipment Committee, Facilities Committee, Graduate Student Recruitment Committee, Library Committee, Undergraduate Advisors Committee, Vertebrate Animal Use Committee, MSU-IDEA Committee, Web Committee, and the Building Committee. Except for the elected Faculty Advisory Committee, all other committees are appointed by the Chairperson.

Sometime around 1980, during a discussion of recruiting students at the College of Natural Science Dean's meeting, Charles Sweeley, who was the Chairperson of the Department from 1979 to 1985, conceived of a publication for high school students in which scientists describe their careers and the scientific fields they represented. After crafting a couple of pages, he went to Washington D. C. and visited several organizations that might have an interest in such a publication. Because of the interest shown by the National Science Foundation, National Institutes of Health, American Society of Biological Chemists, American Society for Microbiology and other organizations, a Science Career Magazine was

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created with the help of many individuals, particularly Diana Marinez, Jim Hamiliton, Perry Clark, an Okemos science writer and photographer who interviewed several astronauts, and Linda Halsey from University Publications, who served as the Associate Editor. The intent of the publication was to help students become aware of what scientists and engineers do, what's new and exciting, and what satisfactions might be expected from a career in one of the many different areas of science and engineering. The magazine illustrated the careers of those in Anatomy, Biochemistry, Biology, Chemistry, Engineering, Microbiology, Pathology, Pharmacology, Physics, and Physiology plus a feature article entitled "Women and Minorities in Space." Funds were obtained from a variety of sources to print 10,000 copies in 1984 and 25,000 copies in 1985. Steve Rayburn, the Administrative Assistant to the Department, took on the task of mailing the magazine, at no cost to those who expressed an interest in receiving it (Sweeley, 2010). In 1985, Charles Sweeley received the Michigan ADDY Award of the American Advertising Federation for Excellence after being nominated by the Lansing Advertising Club (Halsey, 2010)

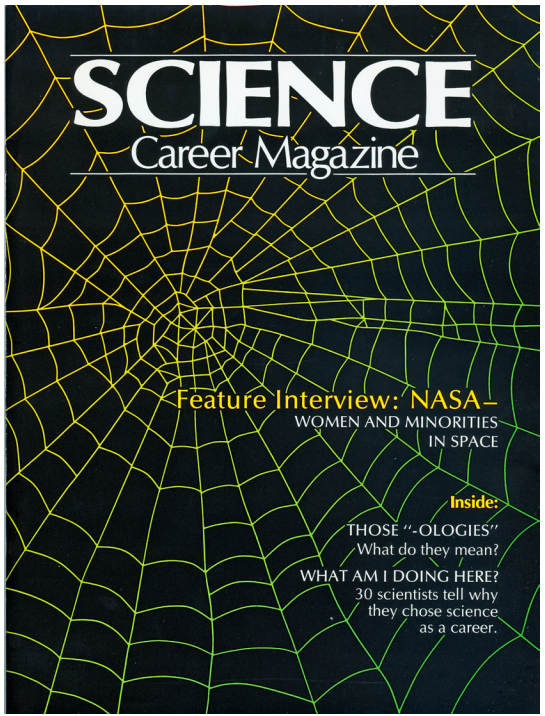

Figure 7.3: Cover page of the Science Career Magazine printed in 1984 and 1985. UA 16.18. Michigan State University Archives and Historical Collections, East Lansing, MI.

It is of interest to note that on April 7, 1989, five years after the Science Career Magazine was published, the President of MSU, John A. DiBaggio, informed the campus community of a new plan to advance diversity, pluralism, and excellence at Michigan State University. This plan was prepared by the Office of the Provost after more than two years of study and discussion and published under the name: MSU IDEA (**M**ichigan **S**tate **U**niversity, **I**nstitution **D**iversity: **E**xcellence in **A**ction) (Jay, 1990).

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In response to a request from the administrative colleges of the department, then Chairperson Wilson prepared a report outlining the activities of the Department related to the MSU IDEA program that he sent to the Associate Dean of the College of Natural Science, Sharon Zablotney, dated 6 December 1989. He pointed out that the Department had for some time attempted to recruit minority faculty and that the previous Chairperson Charles Sweeley, along with other colleagues, had published a Science Career Magazine for teachers and students in junior and senior high schools. Dave McConnell was teaching a summer course for newly admitted students in the medical colleges and that the majority of these were minority students. Other faculty were involved in efforts to improve science instruction at the K-12 level. It was hoped that these efforts would increase the chances of recruiting more minority students into both the undergraduate and graduate programs. Finally, he noted that plans were underway to establish links with faculty at Historically Black Colleges and Universities (Wilson, 1989). After the above report was completed, Chairperson Wilson appointed a Departmental MSU IDEA Committee composed of Andrea Von Tom, a first year graduate student, and two faculty, Diana Marinez and Dave McConnell (Wilson, 1990b).

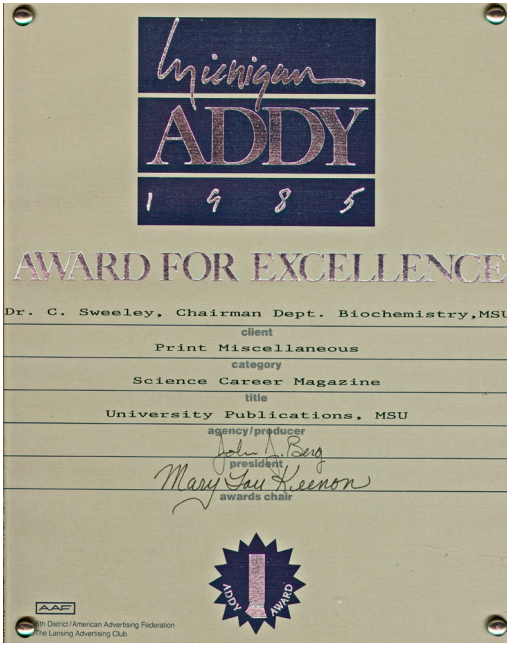

Figure 7.4: Photograph of the plaque presented to Charles C. Sweeley in 1985 by the Michigan Chapter of the American Advertising Federation. Courtesy of Charles C. Sweeley.

In January 1991, Chairperson Wilson sent a letter to over 30 Historically Black Colleges and Universities (HBCU) that included information about the Department of Biochemistry at MSU hoping to identify faculty members who might be interested in coming to MSU for extended periods (Wilson, 1991). Then by March of 1992, David McConnell had visited Virginia State University and Tuskegee University, both members of HBCU, to present seminars and

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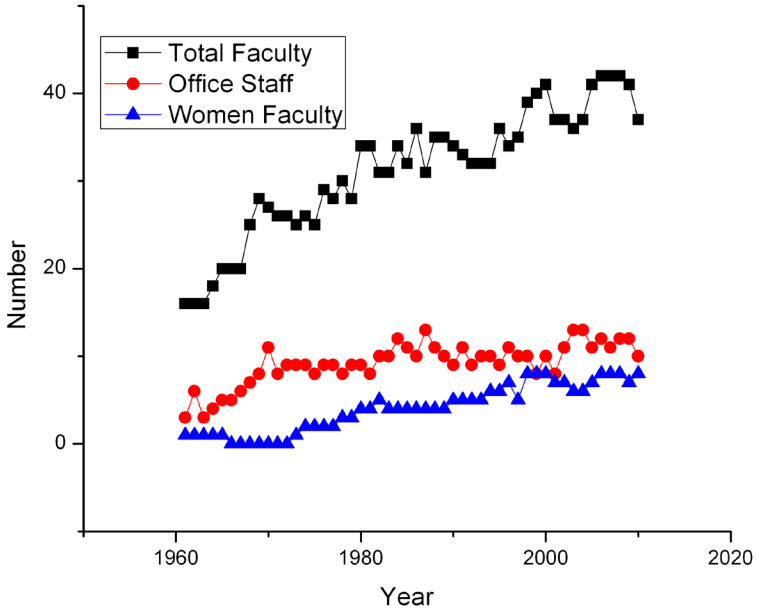

Figure 7.5: A view of the number of faculty and office staff in the Department of Biochemistry/Biochemistry and Molecular Biology from 1960 to 2011.

introduce prospective graduate students to our program. Beginning in 1994 through 2006, Dave McConnell taught Biochemistry 401 to students at Coppin State College: from 1994 through 1998, he used the Optel Distance Education Technology and then from 1999 through 2006, Coppin State purchased videotapes of lectures that he delivered from MSU's ITV Studio. McConnell was appointed as an adjunct professor at Coppin State from 1999 through 2006 (Burnett, 1998; McConnell, 2010). It is of interest to note that in 2010, another MSU IDEAS program was initiated but in this case the IDEAS acronym stands for **I**ncreasing **D**iversity and **E**ducation **A**ccess to **S**ciences. This program was developed at Harvard University by Dr. Richard Losick and funded by the Howard Hughes Undergraduate Research Program. This program provided three undergraduate minority students at MSU with research stipends in 2010 (Burton, 2010).

As noted earlier, one of the major responsibilities of the Chairperson is to recruit departmental faculty and staff. Figure 7.5 shows the numerical results of this obligation. As noted, there were 16 faculty in the Department when it was first organized in 1961; by 2010 that value more than doubled to 37 faculty. Of these, 11 had laboratories outside of the Biochemistry Building. More importantly, the number of women faculty has remained low over the years. Selma Bandemer, who was a member of the Agricultural Chemistry group that came into the Department in 1961, was the only woman on the faculty from 1961 to 1965. The next woman appointed to the faculty was Pamela Fraker in 1973, and currently the

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only woman who is a member of the National Academy of Science at MSU. After Shelagh Ferguson-Miller was appointed the next year, they were the only women on the faculty until 1978. Since that time the number of women gradually increased to eight in 2010. It should be noted however, that the Department in 2009-2010, has been rather aggressive in increasing diversity in that five out of six tenure stream offers went to women; not all accepted, however (Sharkey, 2010).

At this time, it is important to note that through the years, the Department appointed a few instructors, in fact, nine instructors have been appointed, six since 2004. As far as can be determined, all were appointed to teach specific courses:

John F. Holland (1964-1972) set up the Instrument Shop and taught electronics to interested students.

Ruth Allen (1966-1971) taught Biochemistry 200 by recording the lectures on magnetic tapes and allowing students to listen to the tapes in Room 105.

Gertrude Busdiecker (1977-1980) taught Agriculture 051.

Susan Ellen Gruber (1971-1972). Probably replaced Ruth Allen and taught Biochemistry 200.

Pamela Osenkowski (2009-2010), Carol Wilkins Mindock (2006-) Jana Simmons (2010-) and Raquel Ritchie (2010-) are involved in teaching the Biochemistry Courses for the Medical Students.

Kathleen Foley (2006-) is involved in teaching the undergraduate laboratory courses and other courses such as BMB 401 on line.

Jon Stoltzfus (2004-) is responsible for organizing and teaching the undergraduate lecture courses for the Biochemistry Undergraduate majors.

One might ask, why have so many instructors been appointed since 2004? According to Chairperson Sharkey, the use of computers has driven specialization, both in research and in teaching, making it more difficult to have one type of appointment (tenure stream professor) that can do all things as well as they need to be done in a modern university. In his view, a mix between 10 and 20% of instructors relative to tenure stream professors is ideal in 2010. The instructors can (and do) help the tenured stream faculty in using new computer technology more effectively and rapidly than they would do otherwise. So in 2010, the Department has instructors who have stronger interests in teaching and research in teaching than in biochemical research. They also have more time to devote to teaching. Furthermore, the presence of outstanding instructors improves the teaching of others. In Sharkey's

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view, if managed properly, the mix of instructors and tenure stream professors improves the university. If not managed properly the situation could deteriorate into a two-tiered professoriate (Sharkey, 2010). Figure 7.6 is a photograph of most of the faculty, including adjunct faculty that attended a retreat on January 11, 2011.

At this point in our discussion, we need to go back to August 10, 1987 and to a meeting of the Faculty Affairs Committee. Sometime prior to that meeting, Professor Pete Magee, Chairperson of the Department of Microbiology, had proposed that since he had accepted a position outside of Michigan State University, they had an opportunity to merge the Department of Microbiology

Figure 7.6: BMB Faculty, 11 January 2011: Front Row: Hideki Takahashi, Shelagh M. Ferguson-Miller, Leslie A. Kuhn, Honggao Yan, R. William Henry, Carol A. Wilkins Mindock, Kathleen M. Foley, Jon R. Stoltzfus, Kaillathe Padmanabhan: Second Row: David M. Kramer, Min-Hao Kuo, R. Michael Garavito, Beronda L. Montgomery, Claire Vielle, John L. Wang, Dean DellaPenna, Susanne Hoffmann-Bennning, Robert L. Last: Third Row; A. Daniel Jones, Curtis G. Wilkerson, Lee R. Kroos, Zachary F. Burton, Christoph Benning, Eric L. Hegg, John J. LaPres, Timothy R. Zacharewski: Fourth Row; Thomas L. Deits (Adj), Thomas D. Sharkey, Gregg A. Howe, David N. Arnosti, David L. DeWitt, Charles G. Hoogstraten, Michael Feig, Robert P. Hausinger: Not pictured; Barbara P. Atshaves, Neil R. Bowlby, Christina Chan, Pamela J. Fraker, Douglas A. Gage (Adj), Rawle I. Hollingsworth, Jon M. Kaguni, Laurie S. Kaguni, Kenneth Keegstra, Jason G. Knott (Adj), Brian J. Schutte (Adj), J. Justin McCormick, Estelle J. McGroarty, Gavin E. Reid, Kevin D. Walker. Jana Simmons and Racquel Ritchie; Adjunct faculty in the Van Andel Research Institute; Arthur S. Alberts, Nicholas S. Duesbery, Brian B. Haab, Jeff A. MacKeigan, Steven I. Triezenberg, Michael Weinreich. Photo by G. L. Kohuth, University Relations.

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and Public Health with the Department of Biochemistry. The merger would enhance the programs of both faculties and particularly the molecular biology program and provide advantages in recruiting both undergraduate and graduate students. He also noted that the medical school deans were in favor of such a merger primarily because they would have to deal with one department not two. The Faculty Affairs Committee agreed after hearing Professor Magee's proposal to call a faculty meeting in September (FAC, 1987).

After considerable discussion, the faculty voted with one person in favor of the merger and 22 opposing the merger. It was pointed out that the Council of Deans originally favored the merger but later had reservations. Others noted that the aims of the merger were laudable but way too overwhelming, that is, advantages did not outweigh the major administrative problems. It was also noted that Penn State University had undertaken such a merger but that some of the faculty at the University wished that such a merger had not been made (Faculty Meeting, 1987).

Office Staff: In 1961, before the Biochemistry Building was built, the office staff consisted of three individuals serving multiple faculty in the Soil Science Building - each of whom had their specific needs and time frames, sometimes conflicting. As per the Senior Department Secretary in 1961, "Supplies included a typewriter, regular paper, onionskin paper, carbon paper and an eraser. It was frustrating when the occasional typo occurred - original plus perhaps four carbons meant putting pieces of paper behind each of the carbons and erasing each page separately (hoping that none of the pages slipped out of position) while still in the typewriter. Revisions to papers, letters, proposals, and other documents often meant retyping the whole document to keep it in sequential order for submission to journals or whatever. Tests were typed on stencils, inking the stencil drum and hand operated for the number of copies required. Stencils either had to be locked away or destroyed - how much easier it would have been to have such in the computer under a password. For coffee, water and coffee grounds were heated in a large beaker over a Bunsen burner in the laboratory, strained through cheesecloth into smaller beakers for drinking. Ice machines supplied the ice – a cup or glass was dipped right in the bins for your ice water or soft drinks (who knew what else from the laboratories had been dipped in the bin as well)" (Bretthauer, 2010).

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After the Biochemistry Building was occupied in early 1965, a secretary was hired for each floor that housed research laboratories, the 2nd, 3rd, 4th, and 5th floor. These secretaries served the needs of the research faculty housed on that floor. In the beginning they performed the functions as noted above using manual typewriters and calculators. They were not responsible for maintaining a station for serving coffee. If coffee was needed, each individual laboratory prepared its own coffee. This was the case until 9 January 1992, when the Michigan Occupational Safety and Health Administration (OSHA) adopted its recommendations that prevented drinks or food of any kind in the laboratory that used chemical- or bio-hazardous materials (Ceru, 2010).

At this point, it should be noted that the computer has drastically changed the role of the office staff in the administration of the Department. In 1983, the Department decided to place an IBM Personal Computer in each laboratory over a period of several years. They began this project by purchasing twelve computers that were used for data acquisition, word processing, and data management. One centrally located computer was made available for the typing of theses and work on independent projects by students and staff (Rayburn, 1983). A new bookkeeping computer system was available by May of 1983 so that monthly balances of grant support could be provided to the faculty (Rayburn, 1983a). Shortly after computers became available in each laboratory and faculty office, the need for a secretary on each floor who typed letters and proposals for faculty no longer existed. So the number of Office Staff has not kept up with the number of faculty that joined the Department (see Figure 7.5).

In 1961, when the Department was formed the Office Staff had the following titles: Senior Department Secretary, Clerk Stenographer, and Clerk Typist. Clearly the Senior Department Secretary was responsible to the Chairperson. The Clerk Typist typed letters, proposals, and exams for faculty while the Clerk Stenographer typed the stencils and used them with the mimeographs to duplicate examinations and or other documents. This practice was in place until 1970 when the Senior Department Secretary probably became known as the Executive Secretary. The person today that responds to the requests of the Chairperson is called the Office Supervisor. The person first known as the Clerk Typist probably became known later as the Secretary. A Bookkeeper was first hired in 1965; today that person is known as the Accountant. Then around 1984 or 85, the University revamped

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Teresa Vollmer
Office Supervisor

Katrina Gallagher
Secretary II

Mary Villarreal
Office Assistant III

Melinda Kochenderfer
System Assistant I

Jessica Lawrence
Secretary II

William Yang
Management Analyst

Carol VanderJagt
Administrative Assistant III

Patricia Ungren
Accountant I

Laurie Secord
Office Assistant III

Lesley Reed
Office Assistant III

Helen Geiger
Administrative Assistant I

Figure 7.7: Office Staff of the Department of Biochemistry and Molecular Biology and their titles in 2010.

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the titles of the Office Staff so that today we have six different positions: Accountant, Adminsitrative Assistant, Secretary, Office Supervisor, System Assistant who replaced the Typist Technical, and the Office Assistant. Of course, some of the positions have different levels so that the 10 office staff in 2010 have the following titles: Office Supervisor, Administrative Assistant III, Administrative Assistant I, Accountant, two Secretaries II, three Office Assistants III, Systems Assistant and management analyst. The Office Supervisor is directly responsible to the Chairperson and provides administrative support to the two Secretaries II, the System Assistant, and one Office Assistant III. The Administrative Assistant III provides administrative support to the Accountant, and two Office Assistants III. Figure 7.6 provides photographs of the Office Staff in 2010. An alphabetical listing of all Office Staff who served the Department of Biochemistry/ Biochemistry and Molecular Biology from 1961 to 2011 is provided in Appendix 7.2.

The Responsibilities of the Office Staff in 2010 are noted below.

General Administration

Provide first point of contact to the Department
Provide clerical and telephone support for various faculty and committees
Make travel arrangements for seminar, symposia, and conference speakers
Administer shipping requests for the Department
Distribute US and campus mail
Supervise and train student employees
Organize the Annual Awards Banquet by sending announcements, collecting money etc ...

Academic Administration

Schedule and maintain undergraduate and graduate BMB courses and classroom assignments
Use the online textbook requisition system to order text books for all BMB courses
Initiate changes in the curriculum, program, and courses through the online systems
Work with faculty to coordinate cross- listed/ interdepartmental courses
Process course overrides and manage enrollment of all graduate and undergraduate BMB courses
Collect and compile student assessment of BMB program and course evaluations for college/departmental reports
Manage all BMB course transfer equivalency evaluations
Link instructors to BMB courses using the University internet linking system

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Process departmental faculty/staff requests for using university classrooms for special events
Assist faculty with such things as reporting grades, advising students etc.
Coordinate/facilitate administrative action forms for students

Undergraduate Student Administration
Advise current BMB undergraduate students
Maintain student information in the University degree computerized auditing system
Initiate correspondences to students informing them of important and pertinent information
Organize and coordinate undergraduate academic and social events
Prepare recruiting information packets for academic events.
Track undergraduates involved in research (labs, manuscripts, etc.) for reports
Collect and compile data regarding student future plans (professional/graduate school, industry, etc.),
Prepare certification records of BMB undergraduates planning to graduate
Schedule visits of prospective undergraduates and graduate school representatives
Manage the BMB Tutor room (recruiting tutors, making announcements, turning in time sheets)
Assist the BMB Undergraduate Club President with club related activities

Graduate Student Administration
Maintain the Graduate Tracking System through the College of Natural Science
Sort, compose, type and track correspondence in order to reply to graduate student inquiries
Monitor TA enrollment for BMB 961 for both Fall and Spring semesters
Maintain graduate student rotation schedules and rotation evaluations
Collect, input and process data for graduate student annual reports
Schedule and maintain all aspects of Comprehensive exams as well as Dissertation defenses
Evaluate graduate student file before finalizing final certification
Process prospective student applications from review to final decisions
Coordinate all recruiting weekend activities for prospective graduate students
Maintain information request database for potential graduate student applicants

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Create and distribute graduate program admissions folder for prospective applicants
Schedule and coordinate orientation week for incoming graduate students
Initiate various correspondences relating to information pertinent to the graduate program as a whole
Monitor graduate student teaching appointments and fellowships
Organize and coordinate academic and social events for graduate students
Process course overrides and manage enrollment of graduate level courses
Produce statistics for training grant proposals
Coordinate Peterson's Guide information for Biochemistry Department

Personnel Administration

Authorize personnel transactions, review employment recruitment, review classification requests for faculty, specialist and staff positions.
Serve as liaison to University administrative offices, college administrators and external agencies on personnel matters.
Establish and maintain personnel files for current and inactive employees
Complete labor and student payrolls on a biweekly basis
Maintain the department directory and list of employees working in Biochemistry Building for building safety
Oversee completion of staff evaluations
Monitor Family and Medical Leave Act workman's compensation requirements
Maintain attendance system
Oversee and process criminal background checks for all new academic positions
Process VISA and United States Citizenship and Immigration Services for international employees

Financial Administration

Prepare, recommend and implement all budget allocations for the department
Analyze and prepare budget projections and planning documents
Prepare and administer the budget process for the Agricultural Experiment Station and three Colleges: Natural Science, Human Medicine, and Osteopathic Medicine
Serve as liaison to University administrative offices, college administrators, deans and faculty and external agencies on financial matters
Complete departmental fiscal reports for the University

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Prepare requisitions, material return forms, and reconciliation of purchasing card transactions
Maintain new faculty set-up support and sub-accounts on general fund accounts.
Retain financial records of all accounts
Prepare billings and maintain records for:
Instrument Shop
Computer Facility
University Laboratory Animal Resources
Telephone, fax and copier machines
Reimbursements for cell phone usage
Reimbursements for internet service
Process moving expenses for faculty and academic positions

Research Administration
Administer all pre and post grant awards.
Assist faculty with preparation of proposals
Monitor award expenditures of federal, state and private funds in order to comply with University and agency regulations
Analyze and make recommendation of the financial aspects of contractual agreements.
Work with Contracts and Grants on new account set-ups, amendments and new allocations.
Coordinate various seminar series

Computer/Internet Administration
Assist with system design - (Access, eXtplore-secure document site)
Create BMB web site structure. Design, implement, and maintain web site pages.
Collaborate with MSU Academic and Technology Services to follow University standards and improve website accessibility and functionality.
Maintain departmental email group lists and the alumni database.
Assist in maintaining two webservers.
Install new software programs on staff computers.
Assist with converting e-mail systems to MS Outlook Exchange.
Assist staff with computer software, hardware, and net work problems.
Assist faculty with formatting and uploading attachments for Grants.gov applications.
Trouble shoot computer malfunctions

Departmental Communications
Maintain Department photo board
Create photographic and graphic design work
Photograph departmental events
Produce print advertisements upon request
Coordinate various meetings for faculty

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Send announcements about new courses, job openings, etc for faculty
Generate thank you letters for donors and note these in alumni database.
Generate the weekly Departmental Newsletter
Write News link articles

Building Administration
Manage Biochemistry & Molecular Biology Building Keys/Access Cards
Contact Department of Public Safety for all requests for access to the Biochemistry Building before or after hours and weekends
Obtain reports from the Department of Public Safety to maintain key and card access information.
Maintain copiers for repairs and supplies

Professional Responsibilities
Keep current on policies and regulations of University Administrators by becoming a member or attending conferences sponsored by the National Council of University Research Administrator (NCURA), Society of Research Administrators (SRA)
Participate in training programs sponsored by Michigan State University
Attend and contribute to the MSU WEB Development CAFÉ (Communities for Advising, Facilitating, and Enabling)
Participate in yearly MSU IT Exchange and Libraries, Computing, and Technology courses

It is clear that the Department of Biochemistry/ Biochemistry and Molecular Biology could not function without the office staff. It is also clear that the office staff do have times when they can relax (see Appendix 7.3)

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Chapter Eight

News and Memories of Alumni, Staff, Faculty and Students

Department of Biochemistry and the Department of Biochemistry and Molecular Biology

1961-2011

The news and memories provided in Chapter eight came from several sources. Many are from responses to emails sent to alumni, students, and faculty in 2010. Others were obtained from the Biochemistry Magazine created by the Department in 1986, 1990, 1998, 2000, 2001, 2002, 2003, 2004, 2008, and 2009. They can be viewed in the Michigan State University Archives and Historical Collections, UA 16.18.

Adah, Steven A.—B.S '86

I was pleasantly surprised to hear from you after all these years. I was in your BCH 405 course in the Fall of 1986 back when MSU was still on the quarter system.

I am writing in response to your request for stories and/or updated information for department alumni. I did not have any real noteworthy stories but felt I could provide an update.

I did obtain my B.S. in Biochemistry in December 1986. I began graduate school at Marquette University in Milwaukee in the Fall of 1987 in Chemistry but ultimately transferred to the University of Iowa where I completed a M.S. in 1991 and a Ph.D. in 1995 both in Organic Chemistry. Specifically, with an emphasis on drug design and development.

I held a couple of postdoctoral positions. The first was in the Department of Chemistry at the University of Tennessee working mostly on potential anti-viral (i.e. anti-HIV) agents. I then moved to the Laboratory of Medicinal Chemistry (LMC), NIDDK, NIH in Bethesda, MD where I worked on the design and synthesis of anti-sense oligonucleotides. My first NIH adviser retired so

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for the last year I moved to the lab of the Chief of LMC and worked on opiates and opioid type compounds until I could find a permanent position.

From NIH I went to the FDA as a chemistry, manufacturing and controls (CMC) reviewer in the Office of Generic Drugs (OGD). I actually believe I obtained this position because of my biochemistry and anti-sense work as I was hired to work on the follow-on biologics applications that were beginning to trickle in to OGD. I spent almost 5 years at OGD reviewing a variety of drug applications from solid oral dosage forms, to parenterals, nasal sprays, inhaled drugs, extended release solid orals, and even on a drug to be placed in the U.S. stockpile to be used following a nuclear attack.

In 2005, I left FDA to return to NIH. I work for the Division of Allergy, Immunology, and Transplantation (DAIT), NIAID, NIH as a Senior Regulatory Officer. I handle communications between DAIT and the FDA for our clinical trials conducted in the U.S. and between DAIT and the various health authorities that oversee our trials outside of the U.S. Currently, I have 26 trials in various forms that I am involved with which, is far over the usual number for an individual to cover. Unfortunately, we have a couple of positions that we are trying to fill and until we fill them someone has to provide coverage. Contact Information: Steven Adah, Senior Regulatory Officer, Office of Regulatory Affairs, DAIT, NIAID, NIH, 6610 Rockledge Dr., Bethesda, MD 20892 (Phone: 301.451.0141) adahs@niaid.nih.gov (Memories 2010)

Amey, Roxane, L.—BS '98
Assistant Research Associate, Instrumentation Laboratory, Ann Arbor, MI (Biochemistry, 2000)

Anderson, Matt - BS '80
Matt is currently a Senior Research Fellow at the Merck Research Laboratories in Rahway, NJ. He can be contacted by e-mail to matt_anderson@merck.com. (Biochemistry, 2003)

Anderson, Richard L. Biochemistry Faculty (1961-1995)
My association with the Department began at the time of its inception and even before that through my interactions with two of its founding faculty members--R. Gaurth Hansen and Willis A. Wood. At that time (late 1950s) I was a graduate student in the Microbiology Department

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at the University of Washington in Seattle, where I was doing field work on fish diseases in addition to my lab dissertation project. In 1957, Willis A Wood (a Professor of Dairy Science at the University of Illinois) was enjoying a sabbatical leave in our department. We became acquainted and I agreed to do postdoctoral work in his lab after I graduated. However, before that could happen, he left Illinois in 1958 for a faculty appointment in the newly formed Dept. of Agricultural Chemistry at Michigan State University that was being headed by R. Gaurth Hansen. Hansen's research involved a study of reactions in fish liver, and he needed to compare the reactions in livers from fish freshly caught in rivers with those freshly caught in the ocean. Upon learning form Willis Wood (Woody) that I had full access to Columbia River salmon, he contacted me and I agreed to get what he needed and ship the fresh livers to him on dry ice. As a bonus for him, I chartered a small fishing vessel and went out into the Pacific Ocean, where I caught some salmon on hook and line, cut out their livers and put them on dry ice for shipping to East Lansing. Then, after getting my Ph.D. degree in 1959, I was awarded a two-year NIH postdoctoral fellowship to study with Woody in East Lansing, which I did from 1959 to 1961. After that, Gaurth Hansen offered me a position in the department as Assistant Professor, which I accepted. Then it was all fun. As we changed the name from Agricultural Chemistry to Biochemistry, I helped design the Biochemistry building, designed and taught courses, helped form a college of Human Medicine, applied for research grants, and all the rest. It's been nothing but good times ever since! (Memories, 2010)

Armstrong, Robert—PhD '66

Professor, Department of Chemistry, Albion College, Albion, MI. From 1966-1968 I did a Postdoc at Princeton University. I then became an Assistant Professor at the University of Michigan from 1968-1974 and then took a position at Albion College as a Professor of Chemistry in 1974-present. I have done sabbatical research with Drs. John Wilson and Bill Smith (BMB Brochure 2000).

When I first visited MSU in March, 1963, I saw a steel frame sticking out of a mud hole and was told that was to be the new Biochemistry building. In September of that same year, I was assisting in a Biochem Lab in Kedzie Hall and we taught students how to throw a rope out of the window as a fire escape. November, 1963, while studying in the library, I was told President Kennedy had been assassinated. In December, I joined John Boezi's Lab as one of his first graduate students (with Lucy Lee).

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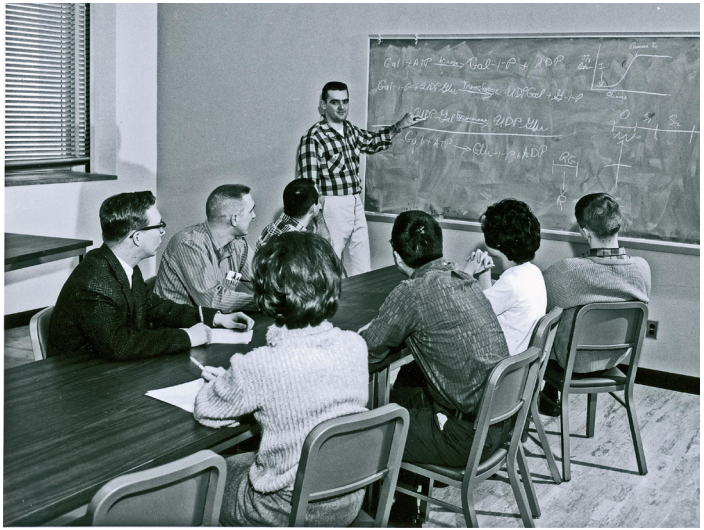

Figure 8.1: Professor John Boezi's research group. (l to r) John Boezi, Robert Armstrong, Ken Payne, Bruce McDonald (standing) Lucy Lee, Jim Johnson, Katherine Liang, and unknown. (UA 16.18 Michigan State University Archives and Historical Collections).

In the summer of 1964, we had strawberry tasting for the Food Science Department, determining whether there was a difference in taste between irradiated and non-irradiated strawberries. Then in December, we moved from the basement of food science to the new building. I received a parking ticket while moving fragile items. As soon as we moved we had to have a second 220 volt line added for the ultra centrifuge.

During my prelim exam, Dr. Kindel, asked me to tutor vet students since I had sat in on their course as a review for myself. I received an NIH predoctoral fellowship that paid less than assistantships so I was able to attend Federation Meetings and had the costs associated with my thesis paid. Each year Dr. Hansen would have to argue with Deans to facilitate the above agreement.

The most memorable time was moving to the fifth floor of the new building over the 1964-5 holidays. I loved the excitement when we opened all of the new equipment. When I talked with Dr. John Boezi at the Federation Meeting during my first year of Post-doc work at Princeton University, I told him that MSU did a better job of teaching than Princeton did. The main reason was that MSU professors placed a high value on teaching and spent more time preparing for lectures.

In July 1966, I was John Boezi's first PhD graduate. Following his death, Lucy Lee and I wrote an obituary for him for the American Society of Microbiology. Robert Armstrong (Memories, 2010)

Arntzen, Charles - Biochemistry Faculty (1980-1985). My favorite memories of MSU relate to walking across

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campus, along the river and the botanical garden, in the winter when there was a light snowfall. The beautiful scene, and the soft silence that coincides with falling snow, stay with me as a reminder of my enjoyment of that campus, and of my colleagues in the Plant Research Laboratory and Biochemistry (Memories, 2010)

Arny (formerly McIntyre), Nicole—BS '92; DO '96
Flight Physician, U.S. Navy, Virginia Beach, VA. Graduated from MSU College of Osteopathic Medicine in May 1996 and continued on to an internship at Naval Hospital, Virginia. I then attended Naval Flight School from October 1997 to March 1998 and graduated as a naval flight surgeon after flying T-34C's. I am currently working as a flight physician at Oceana, VA. I recently married on 6/20/98 to a naval flight officer in Annapolis, MD (U.S. Naval Academy). Attached to the U.S.S. Enterprise, 6 month Mediterranean cruise beginning 11/6/98. (Biochemistry, 2000)

Ashendel, Curtis, L.—BS '77
Associate Professor, Department of Medicinal Chemistry & Molecular Pharmacology, Purdue University, West Lafayette, IN. I received a Ph.D. in 1982 from the University of Wisconsin-Madison in oncology. My research focused on tumor promotion and signal transduction. I then moved on as an Assistant Professor and then to Associate Professor at Purdue University. Our research is currently focused on oncogenes, PKC, and signal transduction in cancer. (Biochemistry, 2000)

Bariola, Pauline—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 BariolaP@edenbio.com. (Biochemistry, 2002)

Barker, Robert, Biochemistry Faculty (1974-1979).
My time at MSU as department chairman was most enjoyable despite the need to keep four deans and the director of Cooperative Extension content, if not always happy. But a few things stick with me as memorable. First, it was a time of renewal for the department in the sense that we were appointing new faculty members and the talent was terrific plus the attraction at MSU of one of the best laboratories in the country and an excellent support staff made recruiting a pleasure. Then there were

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the poker games and fishing trips with the old guard. I have a picture (not mental) of John Wilson emerging naked from an ice-cold lake in Canada like neptune rising from the waves. But two events that didn't immediately affect the department were significant for me. One was the accidental contamination of dairy cattle feed with PBB fire retardant which went undiscovered for 6 months and resulted in thousands of cattle, pigs and sheep plus 1.5 million chickens being culled. I served as chair of a group asked to advise the State on a safe level of contamination to allow in products intended for human consumption. At that time virtually nothing was known of the mixture's effects on animals and we decided to recommend that a level that was 10-fold lower than the accepted level for PCBs was reasonable. This level was a few parts per billion. When I reported this at a public meeting, I was challenged to alter the recommendation to parts per million on the basis that billions are 1000 times more than millions. A real but challenging educational opportunity. Both Pam Fraker and Steve Aust contributed significantly to our current understanding of the risks and, if any, permissible levels in food.

The second was my service as chair of a 17 member committee charged to find the next president for MSU following Cliff Wharton's retirement. The process took 12 months due in large part to interference by some of the Board of Trustees members. And after Cecil Mackey was appointed, one more meeting was held to ask the members to agree not to write a book about the process. It would have made C. P. Snow's descriptions of academic politics seem tame indeed. Robert Barker (Memories, 2010)

Barran, Les PhD '69

Stories at the Biochem Dept.. We christened Woody's lab "The Wood Institute" and a number of us were known around the department for pulling crazy stunts (Mark Roseman, Don Schneider, Les Barran, Bob Niederman, Kenny Warren). Among the crazy things we did were the following:

1. The space alien taking a leak.
We took an oxygen cylinder and put a lab coat on it. Glass wool was put on top to resemble hair, a fire mask (taken from corridor fire fighting equipment) was placed over the hair and became the face. For hands, rubber gloves were attached to the bottom of the sleeves of the lab coat. The dressed up alien was then positioned in front of the urinal on the fifth floor washroom as if it was casually taking a leak. We got a lot laughs by startled users of the

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washroom. Never mind that we violated both the fire code by removing the fire mask from the closet in the corridor and the safety code by not securing the oxygen cylinder by the urinal. We did take pictures of the space alien by the urinal but I do not know if anyone still has them.

2. Racing on the stairs.
We used to race up from the basement stairs to the fifth floor and back down again. Timing was by stopwatch. The person that was fastest won a pint of beer.

3. Departmental Christmas party skits.
At the annual Christmas party, we organized skits satirizing the professors. One year the professors returned the compliment by satirizing the students. That was great fun. Someone must have pictures.

4. Bob Niederman returns for a visit.
Bob Niederman, a former Woody post-doc was returning to the lab for a visit and asked to be picked up at the Lansing airport. We arranged for Don Schneider to pick him up on his scooter. Meanwhile a number of us went to the airport by car and watched as Neiderman (who is a relatively small guy) wrestled with his big suitcase while hanging on for dear life at the back of the scooter. The expression on Niederman's face when he was told that he would be riding on a scooter was something to behold. Good luck with your project. Les Barran (Memories 2010)

Barton, Brian K.—BS'85
Optometrist, Barton Eye Associates, Colleyville, TX. Just recently opened my own independent optometric practice. (Biochemistry, 2000)

Baum, Michael E.—BS'81
President, Surgical Associates of Putnam, Putnam, CT. After graduation I attended St. Louis University School of Medicine, graduating in 1985 with an M.D. degree. I then did a surgical residency in Albany, NY and since 1990 have been in private practice in Putnam, CT as a general surgeon. I live in Brooklyn, CT with my wife and 3 children ages 10, 12 and 15. (Biochemistry, 2000)

Baxter, Jeffrey—PhD'84
Senior Research Scientist, Ross Products Division - Abbott Laboratories, Columbus, OH. Since Graduation - Did a 2 year postdoctoral study at UC Boulder, then 2 years as Assistant Professor of Chemistry at Eastern Kentucky University, then settled down at RPD Abbott,

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where I've been for a bit over 10 years. Work now centers on bioactive nutritional components. We've issued a growing number of patents in this area (6 at last count) and I'm finally publishing again (submitted 2 manuscripts last month). We're focusing on prevention of infections, as well as more insidious diseases such as hypertension and diabetes. Hopefully, several new nutritional products which help people fight these problems will result from the current effort. It's interesting, since the work spans the gamit from bench through pilot production scale of these novel active ingredients. I am also the head of the Proteins Discovery Team here at Ross, and am currently reporting in the Medical Nutritional business unit. (Biochemistry, 2000)

Behnke, James - PhD 73
James retired from Asbury College in Wilmore, KY. He recently went on a medical trip to Moldova with a group organized by the Christian Medical and Dental Association where he lectured on the molecular biology of diseases, ethical issues in science, and the philosophy of science and religion. (Biochemistry, 2009)

Bennett, Joseph—BS '68
Quality Assurance Coordinator, Commonwealth Technology, Inc., Lexington, KY (Biochemistry, 2000)

Beitz, Donald C. PhD '67
Don did a joint degree, receiving a PhD in both Biochemistry and Dairy Nutrition in 1967. Upon completion of his PhD, Don joined the faculty at Iowa State University in Ames, IA, where he has had an outstanding academic career and currently holds the position of Charles F. Curtiss Distinguished Professor of Agriculture. Don says that he and his wife, Judy, have very much enjoyed their life in Ames, where they raised two children and now have five grandchildren to enjoy. Judy has been a social worker at the local hospital and served as Director of the Social Services Department. Don holds appointments in the Department of Animal Science as well as the Department of Biochemistry, Biophysics, and Molecular Biology.

Figure 8.2: David Schingoethe, now a distinguished professor of Dairy Science at South Dakota State University, and Don Beitz (front left), a distinguished professor of Animal Science and Biochemistry at Iowa State University, are cleaning up a young Holstein heifer for a dairy show in the stock pavilion at MSU in about 1965. Courtesy of Don Beitz.

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His research in the area of nutritional biochemistry has brought him numerous honors, including most recently election as a Fellow of both the American Dairy Science Association and the American Society of Animal Science. (Biochemistry 2003) Don Beitz told us how much he enjoyed the article about his old mentor, Willis Wood ("Woody"), in last year's issue of the magazine (Biochemistry 2003, page 24-25). Don continues in his position as Charles F Curtiss Distinguished Professor of Agriculture at Iowa State University, and noted that, in Fall, 2003, he was teaching a biochemistry class to veterinary medical students for the 37th time. Don did not mention the "R" word, but after 37 years of teaching the same course, well, Don? Don can be contacted by email to dcbeitz@iastate.edu. (Biochemistry, 2004)

Berglund, Robin BS '67

I graduated from the Honors College in 1967 with a BS in Biochemistry. You were my Honors College advisor in my last year. I have many memories of the Department, all of them positive, some a bit humorous. I first heard the term "biochemistry" when, as a high school student, I attended a summer program at MSU called the High School Honors Science Institute. My immediate reaction was "This is something new. I want to get in on it." Thus when MSU offered a National Merit Scholarship, I came already knowing what my major would be.
Family circum- stances dictated that I should graduate in 3 years and that I should earn some money. Thanks to the Honors College and the availability of good summer courses, I did graduate in exactly 3 years with a 3.87 GPA. Thanks to the Department and a NSF student research program, I was also able to earn some money.

Earning money was a journey. The first available jobs were as a "sheet fluffer" in the campus laundry and a data clerk in the Social Science Research Center. Then an opening came up in Dr. Richard Anderson's biochemistry lab. I jumped at it and spent the next year washing research glassware to a high standard of cleanliness---which has remained with me for the rest of my life!! I think I have EDTA stored in my body fat. Due to some leaky rubber gloves, I had some interesting episodes of dermatitis.

Watching the grad students in the lab gave me the idea that I might escape the boredom of dishwashing by doing some research. So one day I summoned up the courage to ask the somewhat unapproachable Dr. A if this would be possible. His response was a very cold and annoyed

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"Why, what can you do?" I was crushed and ready to quit his lab. However, to my great surprise, he came up to me a few days later and said that he had talked to Dr. Erwin Benne about me and there could be a summer research opportunity.

Dr. Benne had a NSF research program for undergraduates but it was full. This kindly man created a spot for me in his own lab. What an interesting experience it was to work with one of the older agricultural chemists! I was assigned to a project involving bovine nutrition. It started with retrieving raw cow manure, drying it in the basement of the biochemistry building, then chemically analyzing it. As you can imagine, I had some interesting discussions with friends and family about my research activities--"fertile" material for their humor. I had to go through a lot of BS in the lab and at home to get my B.S.!!! Dr. Benne continued my research funding for the next year. During the summer program, we were lectured by most of the departmental faculty---a unique and outstanding experience.

I still have humorous memories of the very serious and dedicated Dr. Anderson driving his Corvette around campus and walking his girlfriend's small dog in the biochem building. He thought I was nuts to want to take Swahili, so I didn't. It turns out that I have been to Africa 4 times and it actually would have helped. Who would have figured that out!

I needed a job upon graduation and accepted a position as Photographic Engineer with Eastman Kodak Company. Two years later, at the urging of my MSU classmate Chuck Stoddard, I went to the Harvard Business School for an MBA. After that, I had a 20 year business career in banking and real estate development. In my final years, I was the President and CEO of several development companies in California, Washington and Oregon.

Then I decided to "go home" again. At age 45 I entered the Medical University of South Carolina and received my M.D. in 1995. I finished residency and fellowship in Psychiatry and Child/Adolescent Psychiatry in 2000 and have been in private practice since.

I will turn 65 on October 12. My youngest child is now applying to college and seriously wants to attend MSU. His interests lie in the biological sciences. It seems the cycle is about to start over.

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Good luck with your project. I hope that some of the above is of interest. Sincerely, Robin G. Berglund, M.D., M.B.A., MSU Class of 1967, berglundrg@gmail.com (Memories, 2010)

Betts, Eric—BS '94
Resident, Fort Wayne Medical Education Program, Fort Wayne, IN. I graduated from Medical School at Ohio State University in 1998. I am currently doing a family practice residency. I have two children, Alison Mary-Alexa born on 2/17/98 and Cayden Theron born on 1/14/96. (Biochemistry, 2000)

Bezek, David M.—BS '84
Principal Investigator, The BVOV Institute, Portland, MI. Received a Ph.D. in virology from Cornell in 1992. I then did a large animal residency at Ohio State University in 1994. I am currently in private practice (relief vet), and virology services planned. In 1998 I received a CVM Young Achiever Award. (Biochemistry, 2000)

Bieber, Loran, Biochemistry Faculty (1966-2002).
I was extremely fortunate in having very talented, undergraduates, graduate students, research associates (Post docs) and visiting scientists. At least 20 became professors and 4 departmental chairs or unit directors. One of the undergraduates, Ray Dingledine, who also worked with John Wilson and Steve Aust, is chairman of the Department of Pharmacology at Emory University. Another undergraduate shared with George Leroi had/has(?) a major research leadership role at Dow Chemical. Larry Sellers (Professor at Louisiana Tech), Peter Clarke (a neurologist), Pat Sabourin (Professor at U Toledo), Carol Fiol (U. Colo), Mary Ann Markwell (deceased), Kathy Lilly and Fred Schroeder (Texas A & M professor) had major impacts on my research direction. The discovery of the multi-organelle location of a family of carnitine acyl-transferases in mammalian cells by Mary Ann Markwell (in collaboration with the Tolbert group) and the development and implementation of methodology to quantify acylcarnitines by Dr Janos Kerner (research Prof, Clinical Pharm. CWRU) and Dr Lysiak (Prof and Chair Med Biochem., U Gdansk) provided the framework for NIH grant support until retirement. Numerous research associates and visiting scientists who significantly impacted the research efforts include Larry Lewin (prof Chem Path, U. Tel Aviv), Pat Kelly (Prof. Chem., Utica Rome), Chang Ho Chung (Prof Biochem, Cheju U.), Chang Chung (Director Mol Biol., Kumho Petrochemical), Bela Melegh (Chair Peds, Med

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Acad Pecs), Fabio DiLisa(Prof Surgery, U Padua?), Pat Fogel (Physician), Alan Snoswell (deceased), Dr Alkyoni (Retired Chair, Med Biochem, U Pecs),Gebre Woldegioris (Oregon Primate Center, Res Scientist), Duna Penn (Prof Peds, Tulane), E. Schmidt-Sommerfeld (Prof Peds, Tulane, deceased) and Dr Murthy.

With hindsight, MSU was an excellent institution to develop a research and teaching career. The lack of departmental barriers, the opportunity to explore different service and administrative opportunities and the openness to furthering ones research activities at other institutions including overseas provided an ideal setting for pursuing a multidisciplinary research program. This facilitated research opportunities in several countries and in 5 continents while still having time to clean smelt in the plant growth room, take credit for all flies in the building for about a decade and cook burgers at the annual departmental picnic for almost 30 years. NO REGRETS'! Loran Bieber (Memories, 2010)

Bieber, Mark – PhD '73

In Memoriam: 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 93rd

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annual meeting of AOCS in Montreal, Ouebec. 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 students. (In retrospect, it seems interesting that the first "Christmas Party" should have been organized by the two Marks, both of Jewish heritage.) 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. (Biochemistry 2002, p. 13)

Birkmeier, Jill M.—BS '89
Senior Medical Writer, Vysis, Inc., Downers Grove, IL. In 1991, I received an M.S. in Medicinal Chemistry from the University of Michigan. (Biochemistry, 2000)

Blakkan, Kenneth P.—BS '73
Principal Engineer, MicroModule Systems, Inc., Cupertino, CA (Biochemistry, 2000)

Blosser, James—PhD '72
Section Head, Research Planning & Support, Astra Arcus, Worcester, MA. Employed with Astra since 1995 in Astra CNS research group which recently relocated to Boston area. Responsibilities: external collaborations and project leader. (Biochemistry, 2000)

Boak, W. Bryan—BS '82
Dentist, Pittsburgh, PA. Attended dental school following graduation and am now in general practice. (Biochemistry, 2000)

Boezi, John A. – Biochemistry Faculty (1963-1980)
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. (Biochemistry, 2002, p. 9)

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Borders, Jeffrey S.—BS ’92
Medical Student, Wayne State University, MI. I earned an M.S. in Basic Medical Science in 1995 from Wayne State University. I am currently attending Medical School at Wayne State University. My M.D. degree will be conferred 06/99 and will graduate with Alpha Omega Alpha National Honors. I will begin residency training in general surgery thereafter. (BMB Brochure 2000) 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. (Biochemistry, 2002)

Bradford, James R.—BS ’75
Anesthesiologist, Kalamazoo Anesthesiology, P.C., Kalamazoo, MI. Received my M.D. at Stanford University. I then did a residency in Anesthesiology at Massachusetts General Hospital. I returned home to West Michigan in 1982. Julie and I have three children - Christopher, 20, and Catharine and Elizabeth, both 17 (and considering M.S.U.). (Biochemistry, 2000)

Bratus, Karen - BS ‘79
Karen was recently promoted to Dean of Health Sciences at Baker College in Allen Park, Michigan. (Biochemistry, 2009)

Bretthauer, Donna - Office Staff (1961-1963)
First, I will give you a brief history of my years at MSU for perspective. I became a freshman in 1955. At that time, freshmen were not allowed to work. My sophomore year I started working in the Agricultural Chemistry Department as a laboratory dishwasher for Professor Clifford Duncan. Eventually, I transitioned to working in the office (also worked a couple of summers) so was in the department for a total of seven years. I subsequently worked at a large clinical laboratory (South Bend Medical Foundation, Inc.) for 28 years - most of which were as Administrative Assistant to the President (a pathologist) as well as assisting other upper management members.

When I think back to how much easier responsibilities would have been with computer capabilities, it is a bit mind-boggling. In those days office staff consisted of two serving multiple faculty - each of whom had their specific needs and timeframes, sometimes conflicting.

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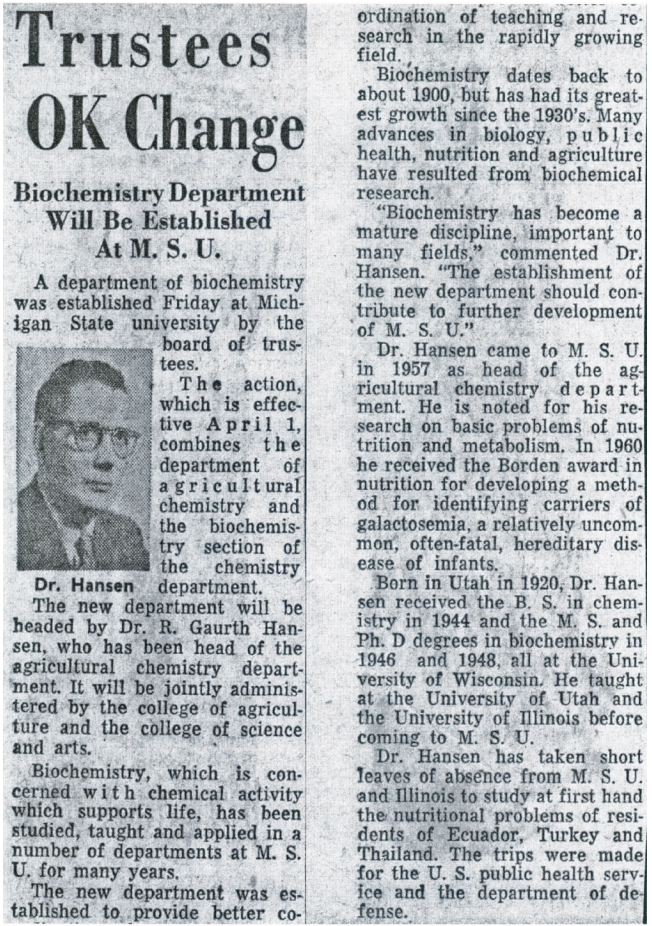
Supplies included a typewriter, regular paper, onionskin paper, carbon paper and an eraser. How frustrating it could be when the occasional typo occurred - original plus perhaps four carbons meant putting pieces of paper behind each of the carbons and erasing each page separately (hoping that none of the pages slipped out of position) while still in the typewriter. Revisions to papers, etc., often meant retyping the whole document to keep it in sequential order for submission to journals or whatever. Tests were typed on stencils, inking the stencil drum and hand operated for the number of copies required. Stencils either had to be locked away or destroyed - how much easier it would have been to have such in the computer under a password.



Trustees OK Change

Biochemistry Department Will Be Established At M. S. U.

A department of biochemistry was established Friday at Michigan State university by the board of trustees.

Dr. Hansen

The action, which is effective April 1, combines the department of agricultural chemistry and the biochemistry section of the chemistry department.

The new department will be headed by Dr. R. Gaurth Hansen, who has been head of the agricultural chemistry department. It will be jointly administered by the college of agriculture and the college of science and arts.

Biochemistry, which is concerned with chemical activity which supports life, has been studied, taught and applied in a number of departments at M. S. U. for many years.

The new department was established to provide better coordination of teaching and research in the rapidly growing field.

Biochemistry dates back to about 1900, but has had its greatest growth since the 1930's. Many advances in biology, public health, nutrition and agriculture have resulted from biochemical research.

"Biochemistry has become a mature discipline, important to many fields," commented Dr. Hansen. "The establishment of the new department should contribute to further development of M. S. U."

Dr. Hansen came to M. S. U. in 1957 as head of the agricultural chemistry department. He is noted for his research on basic problems of nutrition and metabolism. In 1960 he received the Borden award in nutrition for developing a method for identifying carriers of galactosemia, a relatively uncommon, often-fatal, hereditary disease of infants.

Born in Utah in 1920, Dr. Hansen received the B. S. in chemistry in 1944 and the M. S. and Ph. D degrees in biochemistry in 1946 and 1948, all at the University of Wisconsin. He taught at the University of Utah and the University of Illinois before coming to M. S. U.

Dr. Hansen has taken short leaves of absence from M. S. U. and Illinois to study at first hand the nutritional problems of residents of Ecuador, Turkey and Thailand. The trips were made for the U. S. public health service and the department of defense.

Figure 8.3: Lansing State Journal article announcing the formation of the Biochemistry Department on Friday April 1, 1961. Courtesy of Donna Bretthauer.

Beginning in 1958, Agricultural Chemistry was housed in two locations, the newer segment being housed in the small old dairy building. It consisted of Dr. Hansen, Dr. Wood, Dr. Tolbert, Dr. Fox and Professor Duncan plus post doctoral, graduate students and laboratory assistants. The smaller setting led to a great deal of interaction and camaraderie.

Most likely no-no's in this day and age - Coffee breaks - water and coffee grounds heated in a large beaker over a bunsen burner in the laboratory, strained through cheesecloth into smaller beakers for drinking. Ice machines - cup or glass dipped right in the bins for your

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ice water or soft drinks (who knew what else from the laboratories had been dipped in the bin as well). Donna Bretthauer (Memories, 2010)

Brody, Mark—PhD '78
Investment Advisor & Portfolio Manager, Financial Planning Analysts, Melville, NY. Hi! Well, it's only been 20 years or so since I've had the chance to "talk" to anyone at MSU Dept. of Biochem. and, truth be told, my life has taken many "unusual" twists....so, here goes: I'm an investment advisor and portfolio manager for my own firm. I've been in the investment business since 1986 - started 3 years after receiving my D.O. degree (YES, that's right!!) from the NY College of Osteopathic Medicine. Additionally, I operate a small broker/dealer in securities, Planned Financial Programs, Inc. from the same office. My career in Biochemistry was limited to two one-year positions primarily as a lecturer - one year at the University of California, Riverside and one year at Portland State University, before moving back to NY (my home state) to attend medical school. My wife Alanna (a former secretary in the department) lives with me along with our two daughters, Rebecca, 16, and Elizabeth, 15. My stepdaughter Jennifer, 27, lives nearby and works for Bell Atlantic. I'd love to hear about the lives of some of my fellow grad students from the early and mid 70's. Greetings to all!!! (Biochemistry, 2000)

Brooks, Steve PhD '86
Life at MSU seemed to centre around 3 things and all three things strengthened the feeling of community in the Department of BMB . First, there was the lab work. We all were working many hours, struggling with our individual projects but there was always someone around to share a problem and to suggest something that might help - and usually there was someone around at odd hours to keep you company no matter what time you found yourself there. My fellow students taught me techniques, discussed approaches to problems, helped me with computer work, lent me equipment and chemicals and got me through the days. They were there to share the triumphs (few and far between) but mostly to tease the heck out of you when you screwed up. Everything can be made better by having a laugh at the final result. I could name several people who should have their names printed beside mine on my official degree and I'm sure that everyone else can do the same. This isn't to take anything away from our supervisors, although I heard that some of them were less than helpful and rather driven (unlike my situation - I have to put that in since Clarence Suelter has editing power).

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The second important thing was the social activities. We formed intramural teams and played hockey, volleyball, and softball. We hung around together and played golf. We had picnics together, partied together, went to bars together and took trips together. I fondly remember Friday afternoons with the Ferguson-Miller gang making pina coladas with the lab 4L blender. We celebrated births, commiserated when parents passed away, went to weddings and saw couples break up. We were a group of people from around the US and also from different countries - there were people from Texas, New York, Tennessee, California and all through the Mid West not to mention Mexico, Canada, Australia and China. There were agnostics atheists and people of many different religions. There were liberals and conservatives. We were all welcomed. We made up a community, worked hard and had fun as only people with few resources but determined to have a good time can do. In lucky cases (mine included), the social activities also included the professors and their wives. I remember quite a few lab parties, one where I spilled a large glass of white wine on the white pants of my supervisor's wife. I laugh now but was embarrassed at the time. Trips to conferences included everyone and their wives/husbands. My wife still remembers touring Washington with Loretta Suelter and the good time she had. We recently took the family to Washington for a holiday and recounted many stories from that original conference trip.

The third focus was the university itself. It was big. I came from a university with 2500 full time students - MSU was a shock - it had as many students as the population of the city where I grew up. The university itself occupies a large area of the city and dominated downtown. There are few parallel situations in Canada - the big universities tend to be in big cities with the exception of, perhaps a Saskatoon and Guelph. Football Saturdays were an experience. Canadian professional football is lucky to draw 20-30,000. MSU football brought in 80,000 people - and the team was in the basement during my time at MSU. Basketball was a similar revelation - 15,000 people watching a basketball game was an experience. Heck, even the hockey team drew a crowd of 6,000 per game rivaling some of the OHL games, and Canada is hockey crazy. University married housing was an experience. We lived on campus for the first two years until we had enough money to move. One of the basketball players lived at the end of the row of apartments with his friends and they were partiers. There was an Australian family living beside them and

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they complained frequently to us about their neighbors. Apparently, they entertained ladies during the evening and the parents were trying to shelter the kids from the goings-on there. I remember my wife telling me one morning that she woke up during the night hearing someone moaning like she was in trouble - my wife almost called security until she heard the "yes, yes" and then tried to go back to sleep. Yes campus housing was interesting. Steve Brooks, Bureau of Nutritional Sciences, Health Canada (Memories, 2010)

Byerrum, Richard U. – Biochemistry Faculty (1961-1991)
In Memoriam: Richard U. Byerrum, professor emeritus of biochemistry, died September 28, 2008, at the age of 88. Byerrum joined the Michigan State faculty in 1947 and his research dealt with plant metabolism. He was the dean of the College of Natural Science from its creation in 1962 until 1986, and was an instructor at MSU for more than 40 years. Byerrum authored Experimental Biochemistry in 1956 and served as author or co-author of more than 90 abstracts, articles, book chapters and reviews for professional journals. He also held four patents. Byerrum is survived by his wife Claire, three daughters, six grandchildren and two great grandchildren. Memorial contributions can be made to the Dr. Richard U. Byerrum Scholarship, 103 Natural Science Building, East Lansing, MI 48824. (Biochemistry, 2008)

Carlson, Todd A. PhD '86
Associate Professor, Department of Chemistry, Grand Valley State University, Allendale, MI (Biochemistry, 2000)

Cedergren, Robert A.—PhD '96
Research Analytical Chemist, Abbott Laboratories, Abbott Park, IL (Biochemistry, 2000)

Chang, Wei-Hsien—MS '63 PhD'68
Professor Emeritus, National Taiwan University, Taiwan, Republic of China. Professor of Department of Agriculture Chemistry at the National Taiwan University, Taipei, Taiwan and also Director, Graduate Institute of Food Science & Technology, National Taiwan University. (Biochemistry, 2000)

Chen, Chun-Nan—PhD '87
Senior Staff Scientist II, Celera Genomics, Foster City, CA (Biochemistry, 2000)

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Christeller, John T.—PhD '74
Scientist, Horticulture & Food Research Institute of New Zealand, Palmerston North, New Zealand. My lab has a major focus on novel insect management technology. We carry out research on transgenic plants, baculovirus and entomopathogenic fungi. (Biochemistry, 2000)

Chrusciel, Don, 'BS, 1978, Biochemistry Staff (1978-1983).
I have fond memories working with Dr. Tanis who was the business officer there for the majority of my time. He hired me. I think you have sufficient detail about the person who followed him. I don't know why, but I do recall having significant interactions outside of the stockroom with not only the business office staff, but also the secretaries stationed throughout the building.

I do have my B.S. degree in Biochemistry from MSU and my advisor was Dr. Bieber. He was one of the best and helped out through some academic snafus which allowed me to work in his lab, get to know some of his staff and eventually a recommendation for the stockroom supervisor position.

During my time, I and Marilyn were one of only three couples where both spouses worked for Biochemistry. She worked for Dr. Barker who was the chair at the time. As a matter of fact that is where we met, but that is a different story. I will say that thru the relationship, I was exposed to more than just the business/administrative side. Because of the affiliation we had there was an opportunity to nurture friendships that would not have normally developed with post-docs and graduate students. A whole different aspect of the organizational culture.

I remember stocking the rafters with tissue culture plastic bottles and tracking down fetal calf serum. We could barely keep up with the demand. Pipette tips were also a hot item back then. Buy them cheap, in bulk, sterile, but most of all don't run out.

I remember Lydia Coleman who I never saw get upset, was always willing to discuss things, and took pride in what she did. We always had close ties with the other support services, electronic & machine shops, mass spec, and animal care. I do recall being assigned the waste management handling, sorting through stockpiles of chemicals and assorted glassware - especially when a lab was recycled. I remember damaging a pair of dress shoes when the bottom of a waste container gave way and spilled its contents onto the floor. I always found it interesting handling the variety of chemicals in different

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ways, such as dry ice, liquid nitrogen, and pumping solvents from the drum.

These are just of the memories as I reflect back. If there are specific items/issues/times that you are looking for some insight, let me know. Otherwise take care and stay in touch as time permits. Don Chrusciel, Director of Business Services, **F**acilities **P**lanning & **M**anagement (Memories, 2010)

Cichy, Michael G. BS '78
Mike is Environmental Technology Manager for Rohm & Haas, and can be contacted by mail to 7449 Leonard, Manistee, MI 49660. (Biochemistry, 2001)

Cieslik, Joseph D.—BS '83
Chief Chemist, Essroc Cement, Frederich, MD (Biochemistry, 2000)

Conlan, Lori (Hallman) - BS '66
Lori is a nationally recognized speaker in career development topics and is at the NIH in the Office of Intramural Training & Education assisting the 4,000 NIH postdocs in their personal career choices. She also serves as a Board member for the National Postdoctoral Association. (Biochemistry, 2009)

Cook-Mills, Joan M.—PhD '87
Assistant Professor, Pathology Department, University of Cincinnati, Cincinnati, OH. Currently working on two research projects: (1) High endothelial venule cell phagocytosis of HIV-infected apoptotic lymphocytes, and (2) Vascular cell adhesion molecule-1 signal transduction. I married in 1987 and have a baby son, Alexander, born in 1998. (Biochemistry, 2000)

Coon (Ricotta) Melissa R.—BS '96
Research Assistant, Department of Pediatrics, University of Michigan, Ann Arbor, MI. I graduated Melissa S. Ricotta from MSU Biochemistry in '96. Since then I got married 8/23/97 to Steven W. Coon, a fellow '96 Biochemistry graduate. I go by Melissa R. Coon now. After graduation I worked for Lab Support, a lab temp. service. Through Lab Support I worked at Heublien in the quality control lab, and at Flint Ink in their quality control facility. As of November '96 up to the present I work as a research assistant at the University of Michigan. I am doing cancer research in the Department of Pediatrics. It has been a productive couple of years and two papers will be submitted in the very near future. (Biochemistry, 2000)

Cooper, Scott BS '86
Hi Dr. Suelter, it is good to see you are still working at

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MSU. I hope everything is going well for you. I earned my Ph.D. from UW-Madison and I've been teaching at UW-La Crosse for 15 years now. I teach molecular biology, but my biochemistry background has come in handy.

My fondest memory of the biochemistry program was the open ended lab we had as a senior. I loved being able to come and go in a loosely structured lab environment. Some of the experiments we did in lab I still teach my students today. It has also shaped how I structure my labs. I feel lucky to have gotten my undergraduate degree at MSU under professors with such foresight. Scott Cooper, Professor of Biology, University of Wisconsin - La Crosse, 3022 Cowley Hall, 1725 State St., La Crosse, WI 54601, Phone 608-785-6983, FAX 608-785-6959 http://www.uwlax.edu/biology/faculty/Cooper/cooper.htm, <http://bioweb.uwlax.edu/> Director, Institute for Biomolecular Sciences <http://www.uwlax.edu/biomolsci/>, Advisor, Cellular and Molecular Biology Concentration <http://www.uwlax.edu/biology/Biology-Tracks/Cell-Biology/index.html> Co-Editor, MERLOT Biology <http://www.merlot.org/Home.po> (Memories, 2010)

Cowles, Elizabeth PhD '90

I began my MSU career by rotating through Laurie Kaguni's laboratory. At that time, she and Jon had arrived recently from California. I remember Laurie laughing about how the wine was protected in the moving van and all of the houseplants in the back froze. I went to your lab next, where I met Steve Brooks and Peter Toth. Vicky Bennett came and taught me how to culture chick embryo myoblasts (explaining why washing the eggs with ethanol was important and why I shouldn't flame the eggs and the carton after the alcohol treatment). The paper on chicken creatine kinase was my first MSU publication. Sadly, you informed me that you didn't have funds to keep me. So, I went to Steve Aust's laboratory, where there was a bull whip hanging above the office door. The lab work on toxicology was interesting and I was introduced to the infamous rat parties, when we harvested the livers while others used nut crackers to get at the brains. I still have dreams about the guillotine and John Wilson's lab coat. I was uncomfortable in the Aust lab and did a fourth rotation in John Wang's lab.

I fit into John's lab, because I liked sports (and could hold an intelligent conversation) and could punt a football. We

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had lab meetings with Mel Schindler's lab every week and Jim Brauker took me under his wing. I spent a couple of years on a storage disease project, enough to pass my first hurdle. However, nothing was working out (ah, the vagaries of science!), so I moved onto the CBP35 work. I was the reigning 2D gel queen and reeked enough of mercaptoethanol that my husband complained. The Wang lab liked to have fun. We went to Tiger Stadium on the corner of Michigan and Trumbull every year for a game. One year we went to Cedar Point; unfortunately, some of us were quite tired because we camped out the night before and the tent fly leaked. Patty Voss arrived and she told me all about the early Wang lab years. She and her husband Jerry were Erins' first baby sitter; for that we were eternally grateful and we "pass it on" by offering to babysit for new parents.

Things I remember

1. Introducing Peter Toth to Cornell classmate Karen Ireland. We all went to their wedding in 1989 (correct year??).
2. Watching the coverage of the Challenger disaster on the television (St. Paul Hilton castoff, if I remember correctly)
3. Playing UNO with you, Steve, Peter, and the gang. You were very wicked with the Draw 2 cards.
4. The ice cream from the dairy store. We were walking back one chilly winter day (below zero) and someone asked why we had ice cream. Response—it doesn't melt all over your hands at this temperature
5. Moving Jim Braukers' bar-sized pool table from one apartment building to another, down the stairs, over icy sidewalks, and up two flights. That sucker was heavy!
6. Going to the MSU retreat center (old hunting lodge) on the Au Sable river.
7. Trying to complete all of the work on my thesis before Erin arrived. Erin was early and the defense had to wait. The writing was done though!
8. The day John's youngest daughter, Callie, was born, and how excited John was when he came into work
9. The lunches in John's office where we argued, talked, and laughed.
10. All of the great folks in John's lab: Marco, Jim, Ioannis, Jamie, Neera, Shizhe, and Kim.
11. Having my first student come to MSU and earn his Ph.D. (Uri Mbonye, now a post doc at Case-Western)
12. John and Lucille's hospitality, which extends to this day. Elizabeth A. Cowles, Ph.D., Professor and Assistant Chair, Biology (Memories, 2010)

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

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 Postdoc and Andrea as a Research Associate. Doug is now (2002) 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 bye-mail to dougandrea@hotmail .com or to - cressd@moffitt.llsf.edu. (Biochemistry, 2002)

Dahms, A. Stephen· PhD '69

In 1972, Steve joined the faculty at San Diego State University (SDSU), 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). Since 1987, he has also served as Executive Director of CSUPERB (www.csllschico.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 Chairelect 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 bye-mail at sdahms@sciences.sdsu.edu. (Biochemistry, 2002)

Dana, Bruce W.—BS '71
Northwest Cancer Specialists, Portland, OR. I'm a medical oncologist in private practice in Portland. (Biochemistry, 2000)

Daube, David C.—BS '95
Pharmaceutical Sales Rep., Bayer Corp. I received an M.B.A. (marketing) from the Katz School of Business at the University of Pittsburgh in 1996. I also was married on August 9, 1997. (Biochemistry, 2000)

Deal, William C. Jr. – Biochemistry Faculty (1962-1998)
In Memoriam: On Sept. 11, 2003, Professor Emeritus William C. Deal, Jr., succumbed after a brief battle with ALS (Lou Gehrig's disease), which had been diagnosed in May, 2003. Bill joined the Department as an Assistant Professor in 1962, and was thus one of the first faculty members recruited to join the newly-formed (in 1961) Department of Biochemistry at MSU. Born in Louisiana in 1936, Bill's early years were spent in his native state, and he received a BS in Chemistry from Louisiana College in 1958 before heading north where he earned his PhD degree in Physical Chemistry from University of Illinois (Champaign-Urbana) in 1961. Bill's particular expertise was in the use of ultracentrifugal and other physical methods for the study of protein structure. His laboratory was home to two Beckman analytical centrifuges which he and his students applied to studies of the molecular properties of various enzymes, a particular interest being enzymes of the glycolytic pathway. He and his students developed several innovative methods for ultracentrifugal analysis. In addition to his contributions to the research activities of the Department Bill was a highly respected teacher and served the Department as Undergraduate Program Director for several years.

Bill was very active in various capacities at Bethany Baptist Church in Lansing, and was also deeply involved in work aimed at maintaining the environment in his Meridian Township community. Bill is survived by his wife, Barbara, whom he married in 1957, their children, Elizabeth Kay Deal and William C. Deal, III, grandchildren Matthew William and Jacqueline Nicole

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Deal, and by many other family members, including his parents, Minnie Belle and William C. Deal, Sr., and four brothers and four sisters. (Biochemistry, 2003, p. 13)

Decker, Karl, Sabbatical at MSU, 1965/66

A memorable episode - sabbatical at Michigan State University. In 1965/66, Ed Tolbert from East Lansing, Michigan, spent a sabbatical year in Freiburg to study in Helmut Holzer´s laboratory the thiamine-dependent metabolism of glycolic acid in algae. This had some profound consequences on my family and myself. While Ed and his wife, my wife and I were travelling by car through Austria, Czechoslovakia and Poland, Ed asked me if I would consider spending a year at Michigan State University. It struck me immediately as a great idea - but how to organize it on both sides of the Atlantic? Ed learned that a colleague in the Biochemistry Department of MSU, Willis Avery Wood, better known to many as Woody, had a guest professorship available. He arranged for a meeting with Woody in Freiburg that ended in full mutual agreement. Helmut Holzer and the University gave their blessing and the government of Baden-Württemberg granted an unpaid leave for one year. It was agreed that I would start work in Woody´s laboratory on the enzyme 2-keto-3-deoxy-6-phosphogluconate aldolase from *Pseudomonas putida* in January 1967. After some hectic weeks of preparation, the entire

Figure 8.4: A photograph of Professor Willis Wood's research group in the Spring 1967. (l to r) Front Row: Willis Wood, Jean Dupree, Ken Rabinowitz, Don Beitz, Bob Neiderman, Wijaya Altakar, Les Beran, Mark Roseman, Jeanette Piperno, Patty Vignola Prokopp, (Back Row: Harvey Mohrenweiser, Karl Decker, Don Schneider, Hans Moeller, Dennis Shada, Howard Brockman, and Don Robertson. (Biochemistry 2003 pp. 24-25)..

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Decker family boarded the plane one day after Christmas. In New York City we picked up our VW-Variant that had been travelling by boat. We spent a few interesting days in this exciting city and took to the street on New Year´s day. We were informed shortly before our departure that an unfurnished house had been rented for us. Thus, we planned our travel so as to give us some time after arrival to buy the most urgently needed furniture and equipment. When we finally stepped into this house that was located in Okemos, a delightful suburb of East Lansing, we were moved to tears. Within the short time before our arrival the Faculty had organized a collection within their staff and provided us with a fully furnished and equipped household including a well-stuffed refrigerator! Where else would you find such a hospitality and helpfulness? The naive optimism in our planning of the sabbatical had not failed us. The beginning was a good omen for the rest of our American year that was to be a happy and successful experience throughout.

I had asked Woody if I could bring a young coworker with me to join in the project. Woody´s generosity - of which we were to experience many more examples - not only agreed with my request but also promised to pay for him. In these days, a young biochemistry student from the University of Tuebingen, Hanns Möhler, inquired about a doctorate under my supervision. At the end of our first encounter and as he was highly recommended to me, I asked him if he wanted to work with me in East Lansing. It did not take him long to agree to the American adventure. He arrived a few months after me in East Lansing. It is fully in line with the character of this year that our cooperation also turned out to be a great success.

The enzyme 2-keto-3-deoxy-6-phosphogluconate aldolase had been purified and crystallized in Woody´s laboratory about that time. Hanns and I were to take a closer look at this remarkable enzyme. We assigned one of the sulfhydryl groups to the reaction center and did a lot of kinetic studies before we tackled the structure of the protein itself. We were able to unfold the enzyme completely and to renature it in high yield. The reconstituted enzyme was identical to the native protein in all enzymological and physical aspects. Analysis of the substructure led us to conclude that the enzyme is made up of three subunits. Since this would have been the first example of an odd-numbered allosterically regulated enzyme we met with much scepticism, even from Woody. He was not willing to publish our findings prior to confirmation by our “successor” in the project,

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Roy Hammerstedt. Several years later, the three-subunit structure has been confirmed by X-ray crystallography. The initial disappointment about Woody´s reluctance was soon superseeded by the satisfaction of being vindicated. Today, I wished that more laboratory heads would exercise such meticulous restraint towards premature publishing; much frustration and trouble could be avoided.

The year in East Lansing was a great and rewarding experience. Not only because of the highly satisfactory scientific yield and stimulation, but also in view of the many personal impressions: the overwhelming hospitality of Woody and Alice Jane, of Ed and Eleanor Tolbert and of many other colleagues and neighbors; the friendly relationship with Hanns and the many students and postdoctoral fellows in Woody´s laboratory; all the beautiful and interesting things that we encountered during various travels; it was all topped by the happy and healthy arrival of our fourth child. Her first name, Sheila, should remind us always of this friendly country and of many people that we learned to love. Also all later visits to the USA were connected with new and lasting impression of this fascinating country. The huge scientific potential and the dynamic lifestyle revealed itself to me in congresses and lecture tours. Valuable contacts and lasting friendships with individual colleagues resulted from these exchanges; the connection to the scientific community of this country were strengthened by the award of a Honorary Membership of the American Society of Biological Chemists in 1985. Karl Decker (Memories, 2010)

Degenhardt, Ted L.—BS ’75
Dentist, Troy, MI. It is hard to believe that it has been 25 years since graduation. I live in Troy, where I grew up. I have, with my wife, Colleen, a beautiful family of five children, all of whom are avid Spartan fans. My family along with my dental practice, also in Troy, keep me very fulfilled and busy all year long. (Biochemistry, 2000)

Denison, Michael - Biochemistry Faculty (1988-1992).
I was an Assistant Professor at MSU for only 4 years, but I have some great memories of my time in the Biochemistry Department. We had an outstanding group of 6 new Assistant Profs that had been hired in 1987-1988 (Zach Burton, Rawle Hollingsworth, Tom Diets, Lee Kroos, Steve Triezenberg and myself) and we organized and were involved in some of the more entertaining events that I can remember in the department (not that science and teaching weren’t fun). Seeing a need for someone

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to organize events for students and postdocs (and the fun faculty), Steve Triezenberg and I organized 5th Floor Productions (although we never got credit for this as an actual departmental committee assignment…not that we didn't try). We organized two annual Autoclave and Autorad Art Festivals which were very successful and the award winning entries were displayed in the showcase on the first floor of the Department for a couple of weeks. I can't begin to tell you how great many of the entries were or what some faculty thought about the "creative" use of the departmental autoclaves and film developer - but it was great fun! We also held a departmental T-shirt contest and several hundred shirts were printed with one of the three winning entries (I think I still have one of them in my T-shirt collection).

My most memorable event occurred shortly after Jack Priess stepped down as department Chair, leaving a vacancy that would soon be filled by John Wilson. However, seeing a fleeting window of opportunity to take control of the department before the next regime was installed, all of the 6 non-tenured assistant profs organized an armed assault and hostile take-over of the department Chair's office. Complete with ski masks and water guns (some even automatic), we took the office quickly and efficiently. Barbed wire fences were set up across the hall (OK, it was string with lab tape barbs… but it looked scary!) and toy soldier machine gun nests were established at all doorways. The take-over was filmed by a member of the office staff and Tom (who looked amazingly like Fidel Castro in his uniform and hat) presented our extensive list of demands (which included, surprisingly enough, immediate tenure for all non-tenured assistant professors in the department). While the list of demands was never met and most faculty never knew what happened (although we did see many ducking under the barbed wire fence in the hall and peering into the Chair's office), we did enjoy having lunch delivered to the office and after it appeared that nothing would change, we quietly surrendered the office and disappeared back into our labs. Michael Denison (Memories, 2010)

Desrosiers, Ronald C.—PhD '75
Professor of Microbiology & Molecular Genetics, Harvard Medical School, Southborough, MA; Chairman, Division of Microbiology, New England Regional Primate Research Center (Biochemistry 2000). Ron Desrosiers sent us a nice note in 2001 expressing his satisfaction with the previous issue of this departmental magazine. Ron has had a distinguished career since his days at MSU, and

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his achievements were recognized with the Boezi Award that he received in 1989. Ron is currently Professor of Microbiology and Molecular Genetics at Harvard Medical School and Director of the New England Regional Primate Research Center. He can be contacted at Harvard Medical School, New England Regional Primate Research Center, One Pine Hill Drive, Box 9102, Southborough, MA 01772-9102, or by email at ronald_desrosiers @ hms.harvard.edu. (Biochemistry 2001) Ron earned his PhD with Professor Fritz Rottman, and has subsequently had a distinguished career: he is Director of the New England Primate Research Center (http://www.hms.harvard.edu/nerprc) and Professor of Microbiology and Molecular Genetics at Harvard Medical School (http://micro.med.harvard.edu/faculty/desrosiers.html). His research activities are focused on mechanisms of AIDS pathogenesis and AIDS vaccine development. He has two grown children. He says he welcomes e-mails from old friends as long as it is not to gloat over University of Minnesota's defeating the University of New Hampshire for the national hockey championship. Condolences go to New Hampshire native Ron and other New Hampshirites since they lost not only the hockey game, but also, in early May of 2003, their state landmark, the "Old Man of the Mountain," when the strains became too great and the granite profile of the "old man" came sliding down. Profile Mountain (http://www.mutha.com/oldmanmt.html). (Biochemistry, 2003)

Deupree, Jean D.—PhD '70
Associate Professor, Department of Pharmacology, University of Nebraska Health Center, Omaha, NE. I have become a neuropharmacologist and am very interested in adrenergic receptors, G-proteins, and signal transduction pathways. I am currently trying to set up a tutorial on the web to teach people how to do receptor binding studies. When I am not in the lab or on the computer I am involved in teaching pharmacology to medical, pharmacy, and physician assistant students. I am amazed at how much technology has changed since I was a graduate student. (Biochemistry, 2000)

Dewitt, David A. BS '91
I am really glad for the opportunity to share memories and impact of the biochemistry department at MSU. It was good to remember the impact the people in the department had on my early years in science.

My introduction to what scientific research was like came as a freshman in 1987. I thought it would be a

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good idea to "work my way up" so I sought a job as a lab dishwasher. I worked in the lab of Dr. Charles Sweeley. I worked there during my freshman year and I guess I did a good job because I ended up working for several other labs part time as well. I was most surprised by the international postdocs in Sweeley's lab. A few times when I was rinsing the dishes with distilled water, I forgot to turn it off before I left. When that happened, the next day there would be notes everywhere saying that "Distilled water is out". I must not have been the only one to do that because the notes would be there on occasions when I didn't leave it running. At the time, I didn't realize what a prominent scientist Dr. Sweeley was. Long after I graduated, I found his name listed in the text of a biochemistry book I was using.

During my junior year (1989-90) I took the biochemistry courses (451, 452, 453 and the labs 404 and 405). Although the professors I had never knew it, they had significant influence on me. I started going to Martin Luther Chapel and was very surprised to see my biochemistry professor, Dr. Suelter there. This was the first time I remember seeing a science professor at church. It was a great encouragement to me.

BCH 404 was the most challenging course ever. There was so much work involved. After some all-nighters working on lab reports, I almost changed my major to something else, but my advisor, Dr. Anderson, encouraged me to stick with it. Towards the end of that term, I remember one day watching Dr. Paul Kindel interacting with the students and explaining how to do some of the techniques. He obviously enjoyed what he was doing. Observing that interaction that day was the reason that I decided to go to graduate school. He wasn't the best professor that I had, but the passion and love for his job that he had inspired me to do the same.

After BCH 404, BCH 405 was easy. It still had its challenges. Once I went to Dr. Kaguni's office hours. He had given us a handout and rather than go through it myself, I decided to bring it to his office and have him explain it to me. I gave him the handout and said that I didn't understand it. Dr. Kaguni asked if I had gone through it. I said that I looked at it but didn't really get it. Dr. Kaguni, noticing the pristine staple in the corner, commented that I obviously had not gone through it very well because it looked like a brand new handout—no marks, no wrinkles, no folds. He said that as a student he never would have gone to ask a professor to explain

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what he had not first made a diligent effort to understand himself. I thought I was so busted.

But then, Dr. Kaguni did the unthinkable. He walked me through the handout and explained it all to me. The grace and mercy that he showed me was remarkable. Instead of treating me like the poor student that I was and kicking me out of his office, he forgave my indiscretion and taught me two things that day. He taught me whatever was on that handout—which I don't even remember. The most important lesson that day was the way that he simultaneously held my feet to the fire in accountability and the grace that he showed in also explaining the handout to me. Dr. Kaguni's actions that day have had ripple effects as I have done exactly the same thing to a number of my own students; hold them accountable but administer grace.

These professors never knew the influence that they had in my life. The impact that an advisor has on graduate students is obvious and the time investment is significant. It is easy to underestimate the impact a professor has on an undergraduate student.

After graduating from MSU with a B.S. in biochemistry, I went to Case Western Reserve University to complete a Ph.D. in neurosciences. The focus of my research was developing cellular models of Alzheimer's disease. After that, I took a faculty position at Liberty University in Lynchburg, Virginia. I have been fortunate to have published a good number of journal articles and even received an R-15 grant from the NIH. R-15 grants are awarded for involving undergraduates in a research project. My interest in focusing on undergraduate education is a direct result of my experiences at Michigan State.

While at Liberty University, I had the opportunity to put together a biochemistry and molecular biology major. This, of course, was modeled after the curriculum at MSU. In fact, when selecting the course numbers, I picked 451 and 452 as a legacy from MSU.

Currently, I am professor of biology and chair of the department of biology & chemistry at Liberty University. On occasion, I have wondered what my old professor would think if they could see me now. I don't think any of them would have remembered me—I was not an outstanding student and my grades tended to be mediocre at best. I am where I am because of their influence and I hope to have a similar impact on the lives of my students.
David A. DeWitt, Ph.D., Chair, Department of Biology

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& Chemistry, Liberty University, (434) 582-2209, www.liberty.edu (Memories, 2010)

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. (Biochemistry, 2002)

Dorsam, Glenn—BS '90
Postdoctoral Scholar, Department of Immunology, University of California, San Francisco. (Biochemistry, 2000).

Fang, Shi-min - Ph.D. '95
Now living in China, Shi-min is known as a scientific whistleblower, calling attention to cases of potential scientific and academic fraud in China. Recently, Shi-min was attacked and injured in apparent retribution for his activities. Shi-min has recovered from his injuries, although the intent of the attackers appeared to be to kill Shi-min. Recently, there have been arrests of four people implicated in the attacks on Shi-min and also another Chinese journalist, Fang Xuanchang. A prominent Chinese urologist, Xiao Chuanguo has reportedly confessed to inciting the attacks.

Shi-min has written about 17 books on popular science in Chinese. He is a celebrity in China and a major force for improvement of standards for Chinese science. In China, he is very well known and influential.

Shi-min is a very famous graduate of MSU biochemistry. I think his story should be told in our history. Zach Burton (Memories, 2010)

Fairley, James L. – Biochemistry Faculty (1961-1987)
In Memoriam: Professor Emeritus James L. Fairley passed away on Oct. 23, 2002. Jim first joined the MSU faculty in 1952 as a member of the Department of Chemistry. A few years later he and other pioneering faculty members staffed the newly formed Department of Biochemistry, and he retained his affiliation with this Department until his retirement. Jim's research interests were primarily

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focused on enzymes involved in nucleotide and nucleic acid metabolism. He served as major professor for several of the graduate students that were the initial degree recipients from this Department. In addition, he served as Associate Chair of the Department for several years, and contributed in important ways to development of the Department's teaching and research programs. Jim was well known for his love of the outdoors, with hunting, fishing, and golfing being high on his list of leisure activities.

Jim originated from warmer climes, being born in Palo Alto, CA. in 1920. His early years and formal education were also in California, where he received his undergraduate degree from San Jose State University and. after service as a meteorologist in the Army Air Corps during World War II, earned his PhD from Stanford University. It was at Stanford where Jim met his future wife, Dee, who preceded him in death in 2001. Jim and Dee are survived by their children, daughter Laurel, of Fresno, CA, and son Joel, of Ogden, UT. (Biochemistry, 2003, p. 13)

Fauth, Greg - BS '1969

I was at MSU from 1965-1969 and earned a BS in Biochemistry from MSU during that time. My advisor during that time was Dr. Loren Bieber, who guided me through my program and kept me on track to graduate in four years. I have two experiences from MSU Biochem that stick in my mind that I will share.

After graduating from MSU, I entered the College of Dentistry at the University of Illinois. Biochemistry was a course given to all first year dental students. I was so well prepared for this course by my time at MSU that I was one of the first students to finish the final examination for that course and one of the few to get an A. A few years later, I was back on campus and decided to stop in a say "Hi and Thanks" to Dr. Bieber and was absolutely shocked that he remembered me! I think these experiences are good examples of not only the great education I received from State, but also the caring side of the school that takes some interest in the student as a person as well.
I finished dental school at the U of I in 1973. In 1974, I opened a general dental practice in Aurora, IL, and also took a faculty position at the U of I College of Dentistry. In 1980, I decided to specialize in Periodontology. I went back to the U of I from 1980-1982 as a full time student and received a Certificate in Periodontology in 1982. I then returned to Aurora and started a new practice limited to Periodontics with services in dental implants. My practice is now 28 years old. In 1988 I sat for and passed

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the examination to become certified as a Diplomate of the American Board of Periodontology. I am a past President of the Aurora Dental Society, the Fox River Valley Dental Society and the Midwest Society of Periodontology and currently sit as an elected Trustee from District 4 on the American Academy of Periodontology Board of Trustees. I am a Life Member of the MSU Alumni Association and a member of the President's Club. Having played in both the MSU Spartan Marching Band and Spartan Brass all four years at Michigan State, I am also a proud member of the MSU Alumni Band and just last weekend played in my 40th consecutive band.

Michigan State University has been and continues to be a huge part of my life and my family's as well. My father preceded me at MSU and my three younger sisters also graduated from MSU. Two of my sisters teach in Michigan and the third is a retired family practice physician and now serves in the Maine legislature. (Memories, 2010)

Felgner, Philip L . BS '72, MS '75, PhD '78
After an exceptional career in the biotechnology industry (Biochemistry 2003, pp. 26-27), Phil Felgner recently accepted a faculty position in the Center for Virus Research, University of California-Irvine. Phil's wife, Hin, is a pharmaceutical formulation scientist with Sicor, a pharmaceutical company also located in Irvine. Their oldest son, Jeff, just finished his first year at UC-Riverside, majoring in biosciences. Younger son, Scott will be starting at the University of Colorado in Fall 2003, majoring in aerospace engineering. Phil is originally from Frankenmuth, MI, and says that his mother, at age 92, is "still kicking around Frankenmuth." However, Phil seems quite happy with the Southern California lifestyle, including the extended golfing opportunities available in that climate. He can be contacted by e-mail to pfelgner@uci.edu. (Biochemistry, 2003)

Fetter, John PhD '95
I did my doctoral research under Shelagh Ferguson-Miller studying cytochrome c oxidase. I remember a few longdays doing proton-pumping assays, but it was worth it to learn some interesting details about the enzyme. I also enjoyed the joint lab meetings that we had with Jerry Babcock who sadly has since passed away. After completing my Ph.D. in 1995, I did an academic postdoc studying ferritin. Then I learned to do drug discovery research in a postdoc at SmithKline Beecham. After that, I worked at two biotechs doing cancer drug discovery.

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Working at early stage biotechs offered some excitement, but the companies were not the most stable since they did not have products on the market. Next I moved to Sigma-Aldrich in R&D where I have been for the last four years. I am currently an Associate Fellow and spend much of my time evaluating new technologies that we are considering developing. It is a very enjoyable position since I am constantly learning. My focus now tends to be in cell biology, including biosensors in cell lines, and induced pluripotent stem cells. (Memories, 2010)

Filner, Philip - Biochemistry Faculty (1968-1980).
By far, my strongest memory is of the MSU student named Diana Kay Ice, who worked as a part-time clerk in the stockroom of the Plant Research Lab. We married on campus in the chapel. Our three sons, Daniel, David and Ethan were born at hospitals in Lansing. Daniel is 40, lives in Wellington, New Zealand, with his lady love Sarah, and works as a contract programmer of computer games, mostly for a company near San Francisco Bay. David is 36, lives in San Antonio, Texas with his wife Courtney, and works as Vice President for Operations of the San Antonio Symphony. Ethan is 33, lives in San Francisco with his wife Elisabeth and their children Sebastian and Matilda, and works as the violist of the Cypress String Quartet. Diana and I separated amicably in 1993 when I moved to Maryland. She has a career in California as an ESL teacher, and still lives in the house in Danville, CA where the boys grew up. We divorced in 2007. We remain on friendly terms.

My second-strongest memories are of the people who passed through my lab. The new faces and minds which came each year were like an elixir of youth. How could I be getting older surrounded by a never-ending supply of young grad students, post-docs and technicians? Through them, the world came to the Plant Research Lab. Below is a partial list of grad students and post-dics who worked in my lab. Note that some earned Ph.D.'s in botany rather than biochemistry. Each was co-supervised by a PRL faculty member with a joint appointment in what was then the Department of Botany. However, their thesis research in very case was quite biochemical in character.

Kjeld Engvild: grad student from Denmark, got homesick after 1 year, then had a successful research career at the Danish Atomic Energy facility in Roskilde, Denmark

Yair Heimer: grad student from Israel, earned his Ph. D. in Biochemistry, had posts at the Israel Atomic Energy facility in Demona, then became a Professor at Beer Sheva University, recently retired.

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Judy Cherniack: grad student, American, earned Ph. D. in Biochemistry, became Treasurer of W. Lafayette, Indiana

Phil Trinity: grad student, American, earned Ph. D. in biochemistry, went to work for Scott Seed Co.

Tom Skokut: grad student, American, earned Ph. D. in botany, went to work for Monsanto

Ziva Reuveny: grad student from Israel, earned Ph. D. in biochemistry, post-doc with Boris Magasanik, then marriage and motherhood.

Narendra Yadav, grad student from India, earned a Ph. D. in botany, post-doc with Mary Dell Chilton, then went to work for Dupont

Hanna Kelcker: post-doc from Poland, was married to an American, do not know her subsequent professional positions

Ann-Marie Lescure, post-doc from France on leave, returned to job at CNRS in France

Jim Hart: post-doc from Scotland, became Professor at University of Aberdeen

John Wray: post-doc from England, became Professor at St. Andrews University

Nick Amrhein, post-doc from Germany, became Professor at Ruhr University, Bochum, then at Eidgenossische Technische Hochschule in Switzerland (Switzerland's MIT), recently retired.

Ray Bressan, post-doc, American, became Professor of Horticulture, Purdue University

David Rhodes, post-doc from England, became Professor of Horticulture, Purdue University

Avtar Handa, post-doc from India, became Professor of Horticulture, Purdue University

Robert Rubin, post-doc, American, became Professor, University of Miami School of Medicine

Harmut Quader, post-doc from Germany, has published work done at numerous institutions

Tomoyuki Yamaya, post-doc from Japan, has held faculty positions at Japanese universities

Jiro Sekiya, post-doc from Japan, has held faculty positions at Japanese universities

Yue Shaoxien, scholar from China (rehabilitated survivor of the cultural revolution), on faculty of Agricultural University in Beijing.

Heinz Rennenberg, post-doc from Germany, did research at Fraunhofer Institute, then became Professor at University of Freiburg.

Hector Flores, post-doc from Peru, became Professor at Penn State.

As you can see from this list, most of my grad students and post-docs have had noteworthy professional careers as scientists and academicians. Some have been quite

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prolific. In aggregate I would not be surprised if their publications totaled a couple of thousand papers.

Perhaps the achievement with the greatest impact by someone in this group was Nick Amrhein's discovery, in his own lab after returning to Germany, that the broad-spectrum herbicide Roundup (i.e. glyphosate) acts by inhibiting the enzyme EPSP synthase, and that the enzyme of mutant bacteria selected for resistance to glyphosate, produced a glyphosate-insensitive version of the enzyme. Exploiting that discovery, Monsanto transferred a gene for EPSP synthase resistant to glyphosate into corn, soybeans and other crop plants, thereby enabling farmers to control weeds in these crops with glyphosate. This technology has enabled Monsanto to become dominant in the corn and soybean seed businesses. (Memories, 2010)

Fischer, William - BS '70

After graduation from MSU, William Fischer went on for a PhD in Biochemistry and Biophysics from Oregon State University, awarded in 1974. Subsequently, he was employed as a Senior Chemist at CIBA-Geigy. In 1980, he made the move from lab bench to computer room when he was appointed to a newly created position as Biochemistry Department System Manager. He left CIBA-Geigy in 1986 to become Senior Manager of Laboratory Automation Systems at Glaxo, Inc., which is headquartered in Triangle Park, NC. In 1992, he started his own company, Validex, Inc., that specializes in laboratory automation for regulated industries. He says he enjoys the benefits of a superb client list as well as a great staff that he can depend on to provide exceptional service to those clients. Dr. Fischer notes that running a company requires constant travel "which is not without its rewards." At the time of his e-mail in June, he was about to leave for a three week trip to Russia, his fifth visit since 1988. While in Russia, he planned to meet with faculty in the Biochemistry Department at the University of Moscow, "the original U of M." He had also recently returned from a week in Prague, Czech Republic. Dr. Fischer says his children have left home, providing discretionary time for activities of his own choosing, most of it spent in his woodshop or cruising the rivers of Europe. He continues to reside in Durham, NC, and can be contacted by email to wcfischer@mindspring.com. (Biochemistry, 2003)

Dorsam, Glen – BS '90

Postdoctoral Scholar, Department of Immunology, University of California, San Francisco, CA. I received my Ph.D. in May 1998. I am currently doing a postdoc

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at the University of California-San Francisco with Dr. Ed Goetzl. I was recently married to Sheri Tinnell from Farmville, VA. For fun I am studying chess and martial arts. (Biochemistry, 2000)

English, David G.—BS '91
Dining Manager, Princeton University, Princeton, NJ. I graduated from MSU in '91, with the goal of becoming a biophysicist in the pharmaceutical industry. Since then I've worked as a biophysicist, a molecular biologist, a dinner cook, a camp food service director, and a hospital dietetic intern. Earlier this year, I lectured on "Biotechnology and Food" for nutrition students at Benedictine College, Illinois. Within the next month I expect to complete certification as a Registered Dietitian. I am presently employed at Princeton University, as a dining manager feeding nearly 850 students. Over the next year I'd like to develop a series of classes which combine nutrition information and outdoor recreation, as a model for healthy living. Over the next ten years I'd like to establish my own wilderness health spa. Obviously these are not the same goals I had in '91, fresh out of college. I'm curious to hear about the activities of my former classmates. (Biochemistry, 2000)

Emaus, Ron—BS '75; PhD '82
Senior Systems Developer, Parke-Davis, Ann Arbor, MI. Mostly I've programmed computers and developed systems; no surprise there. I've worked at the Environmental Institute of Michigan, the University of Michigan, and now Parke-Davis in Bioinformatics. I'm very excited by this new opportunity. I have two children who live in Okemos, MI with their mother. I live in Ann Arbor and visit East Lansing every week. My hobbies include native gardening, watershed council volunteer, and running. I gave up soccer - too physical for my aging frame, I wonder if Dr. Bieber still smokes duck, and salmon and ferments bubbly plum wine/champagne? (Biochemistry, 2000)

Everdeen, Dan S.—BS '86
Biochemist III, Pharmacia & Upjohn, Kalamazoo, MI. Following my graduation from M.S.U. I spent 5 ½ years at Regeneron Pharmaceutical where my focus was on recombinant production, mostly neurotrophic factors/ receptors. From there I spent 2 ½ years at Boehringer Ingelheim Pharmaceuticals in immunology research - CD40/CD40 ligand binding and signal transduction. For the last 2 years I have been at Pharmacia & Upjohn in genomic research - identifying new ion channels in the CNS. (Biochemistry, 2000)

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Fauth, Gregory, L.—BS '69
Periodontist, D.D.S., P.C., Aurora, IL (Biochemistry, 2000)

Federspiel, Mark J.—PhD '87
Senior Associate Consultant, Mayo Foundation, Rochester, MN. Following graduation I took a position with the USDA in East Lansing, MI as a Research Associate until 1989. I then accepted a position as Scientist Associate at the National Cancer Institute, Frederick, MD until 1995. Since 1995 I have been with the Mayo Clinic in the Molecular Medicine Program as an Assistant Professor. My research is focused on molecular virology. We have one child, Michael Federspiel born 7/27/92. (Biochemistry, 2000)

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. (Biochemistry, 2002)

Foley, Kevin P.—BS '86
Staff Scientist, ZymoGenetics, Inc., Seattle, WA (Biochemistry, 2000)

Foxall, Susan—BS '83
Marketing Manager, Davis Instruments, Hayward, CA (Biochemistry, 2000)

Fruchey, Isaac R.—BS '98
Graduate Student, University of Minnesota, Minneapolis, MN (Biochemistry, 2000)

Fruner, Darcy L. BS, '00
Since her recent graduation, Darcy has been a Laboratory Professional with Pharmacia & Upjohn in Kalamazoo. She can be contacted at 3215 Stonebridge Court, Apt. 7, Portage, MI 49024, or by e-mail at frunerda@msu.edu. (Biochemistry, 2001)

Garcia-Perez, Arlyn—PhD '84
Section Chief, National Institutes of Health, Bethesda, MD (Biochemistry, 2000)

Gehm, Barry D. - PhD '88
Barry Gehm wrote to tell us that in August, 2003, he

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would be starting a new position as Assistant Professor of Biochemistry in the Science Division at Lyon College, 2300 Highland Road, Batesville, AK 72501. Barry can be contacted by e-mail to barry.gehm@gt.org. (Biochemistry, 2003)

Ghiardi, Greg J.—BS'97
Student, University of Chicago, Pritzker School of Medicine, Chicago, IL (Biochemistry, 2000)

Ginger, Gregory L.—BS '80
Area Manager, Kewaunee Scientific Corp., IL (Biochemistry, 2000)

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 138th St., Edmond, OK 73013. (Biochemistry, 2002)

Goodman, Gary E.—BS '70
Physician, Swedish Hospital Institute, Seattle, WA. Received M.D. degree and an M.S. in Pharmacology at the University of Illinois in 1974. In 1981 I went to the University of Arizona for a Medical Oncology Fellowship. I have been funded through NCI research grants since 1985 in the field of cancer prevention working with retinoids and carotinoids. (Biochemistry, 2000)

Grayson, Dennis - BS '75
I was a MSU biochemistry major from 1971 to 1975. While primarily interested in medical school at the time, I ended up enrolling in graduate school after obtaining the B.S. The program at MSU was intense and exceptionally demanding as the bulk of what was taught was more about metabolism, pathways and some nucleic acids stuff. This was, at least in part, because the field was still in its earlier stages. What I didn't like about the curriculum was that we didn't take any biochemistry courses until our senior year. The course load was largely basic chemistry, organic and finally physical chemistry. It also seemed more about memorization than learning - at least for exams. I also remember being somewhat distanced from the Department since it was more difficult to get to know professors. I took one quarter of research with Dr. Barker in my senior year. I remember not doing well but really enjoying what I was doing. I managed to finish and graduate with honors. Two years later I entered the graduate program at Wayne State University School of Medicine. In spite of

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not having been in school for over a year, I had the sense that my degree from MSU was viewed with considerable esteem. I was afforded a fellowship my first year and never looked back. I went on to do post-doctoral work at Rockefeller University and am now Professor of Molecular Neuroscience at the University of Illinois Chicago. (Memories, 2010)

Granett, Sandra—PhD '72
Davis, CA. I have two daughters and one son. Since graduation , I worked at Yale University, University of Maine and University of California-Davis in various areas of research. After living abroad from 1986-1987, I "retired" from Biochemistry, followed other interests and transformed myself into a piano teacher. I now run a busy piano studio from my home. (Biochemistry, 2000)

Graham, Jon F.—BS '74
Chief, Neurosurgery Service, Kaiser Permanente, Honolulu, HI (Biochemistry, 2000)

Gregory, Linda C.—PhD '89
Rochester, MN. From 1989-1992 I was a Clinical Chemistry Fellow at the University of Maryland Medical System. I then accepted a position of Assistant Professor at the University of Maryland Medical School until 1995. We have one child, Michael Federspiel born 7/27/92. Currently I am a full time Mom and free-lance writer. (Biochemistry, 2000)

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 36th, Lincoln, NE 68522. (Biochemistry, 2002)

Gustine, David—PhD '69
USDA-ARS, PSWMRL, US Pasture Lab Bldg., University Park, PA. Current research: Population genetics and demographic of white clover grazed dairy pastures; beneficial natural secondary products of pasture species. Enjoy Penn State - Michigan State sport events, because my team always wins! (Biochemistry 2000) Greetings from a 1969 graduate of the department. My memories of the years 1963-1969 at BMB and MSU are happy ones. My first recollection of my time there is when my wife Diane and I met with you concerning my application to the Biochemistry graduate program. I left that interview knowing that I wanted to pursue graduate work at MSU because I found that you shared my

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enthusiasm for biochemistry and learning how living cells sustain life.

I arrived in September, 1963 and soon after chose Paul Kindel as my advisor and mentor. I don't remember if I chose him or was assigned to him, but he was my advisor throughout my graduate program. We were housed for less than a year in Ag Hall until everyone in the department moved into the new Biochemistry building in 1964. Other students in the Kindel lab while I was there included David Hart, Barry Rhinehart, and Ron Watson. My first class in biochemistry was taught by R. Gaurth Hansen who amazed me with his comprehension of the subject. He also permanently implanted in my mind a memorable quote: "Any biochemist worth his salt knows the chemical structure of ATP." Unfortunately, I would have to look it up to get it right today.

During those years Diane and I made many friendships that have been maintained over the years since then. Some were fellow students in the Biochemistry department, some were couples we met through our life in married housing at MSU, and some were through fellow workers that Diane met in the X-Ray department at Sparrow Hospital where she worked during our years in East Lansing. The opportunity for me as a graduate student in the department was the seminal time period in my life that opened up the many subsequent opportunities that defined my career in research. Dave Gustine (Memories, 2010)

Halberg, Richard B.—PhD '93
Postdoctoral Fellow, Department of Oncology, University of Wisconsin, Madison, WI. My research is focused on identifying the genes controlling homeostasis in the intestinal epithelium and is funded by grants from ACS and NIH. (Biochemistry, 2000)

Hannah-White, Cynthia M.—BS '84
Law Clark, New York Supreme Court, Cortland, NY. I attended Cornell Law School from 1989-1992; graduated Magna Cum Laude in 1992. I was admitted to practice before U.S. Patent & Trademark Office in 1991 and admitted to New York Bar in January 1993. Since 1992 I have served as law clerk to Hon. Paul J. Yesawich, Jr., New York State Supreme Court, Appellate Division. I married Guy White in 1986 and have a son, Quinn Ashby Hannah-White, born July 1996. (Biochemistry, 2000)

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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). (Biochemistry, 2002)

Harper, Kristine D.—BS '75; MD '80
Research Physician, Eli Lilly, Indianapolis, IN. News since graduation: Well 23 years worth of stuff has happened. Let's see, after graduation I worked in Quality Control at a major company in Michigan. I returned to MSU and pursued a degree in Chemical Engineering, but was admitted to medical school prior to obtaining that degree. I received my MD in 1980. I did an Internal Medicine residency training at Beaumont Hospital in Royal Oak, Michigan. I did a fellowship in Endocrinology at University of Pennsylvania - primarily doing basic research in skeletal biology and vitamin D metabolism. I completed this in 1987. I joined the University of Rochester (NY) faculty (department of Medicine) in 1988. In 1990 I joined the Duke University Department of Medicine faculty where I was the Medical

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Director of the Duke Bone and Metabolic Diseases Clinic. My job description was enormous and included a busy patient practice, clinic research in skeletal fragility and predictors of fracture risk and the use of newer agents to manage osteoporosis. I also had a busy teaching schedule. In 1994, given the myriad responsibilities of running a free standing clinic within the confines of an academic institution with Health Care Reform all around, I went back to school (while still working 60-70 hours a week) and obtained my MBA with Health Services Management at Duke University's Fuqua School of Business. For two years I set an alarm clock to sleep 3 hours a night. This was far more grueling than call during internship and residency. Given my need to continue to learn and grow, I left Duke in 1998 and came to Lilly to work as a research physician in women's health and specifically on a compound which I had studied extensively, raloxifene HCl. I am still just getting my feet wet in my new role. I do indeed miss academia and to that end have secured a teaching position at the Indiana University School of Medicine in the Endocrine Division. Well, that's all for now. (Biochemistry, 2000)

Hansen, Roger Guarth – Biochemistry Faculty (1961-1968) In Memoriam:

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

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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 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 foodstuffs.

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. (Biochemistry, 2002, p. 11)

Harris, Midori A.—BS '90
Scientific Curator, Saccharomyces Genome Database, Department of Genetics, Stanford University School of Medicine, Stanford, CA. After receiving my B.S. from M.S.U., I pursued a Ph.D. from Cornell University. (Biochemistry, 2000)

Hart, Dave -PhD '69
The stories bring back fond memories-and amazingly correct according to my memory. Certainly the

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interactions within the Grad Students at that time were special and many of us still stay in contact because of those relationships. Times appear to be very different these days regarding Grad Students.

I will give some thoughts to additional stories, but in the mean time, building on the smelt story-we had a big "smelt fry" and Woody bought the kegs. I also remember some of the "foreign born" grad students were not keen on eating smelt that were not gutted, so we had to clean some of them for that crowd. The tradition lasted a few years, but likely died out after a while.

I also remember when the University apple orchards were to be demolished for new buildings and we washed a lot of reagent bottles, collected apple cider and stored it in the basement 4 degree rooms until moving some of them to a 37 degree room to induce fermentation (applied biochemistry is what we called it).

Hope all is well with everyone and life is good. Not sure I am cut out for living in a rainy climate-it has rained most of the time we have been here thus far. However, it is on to Australia for Feb/Mar so that should be better!! Mary says I should consider retiring at some point-but I would certainly miss all of my international, national and local collaborations and interactions. Dave Hart, hartd@ucalgary.ca (Memories, 2010)

Haselow, William C.—BS '79
Medical Director, Infinity Healthcare, Inc., Mequon, WI. (Biochemistry, 2000)

Hausinger, Robert - Biochemistry Faculty (1984-)
I arrived at MSU in 1984 after doing graduate work with Jim Howard at the University of Minnesota, where I studied the complex metalloprotein nitrogenase, followed by postdoctoral studies with Chris Walsh at M.I.T., working on a deazaflavin cofactor and nickel-containing enzymes involved in methanogenesis. Here, I've continued to focus on various aspects of metallo- and flavo-enzyme catalysis. I've been extremely fortunate in having an excellent group of graduate and undergraduate students along with outstanding postdoctoral scientists in my laboratory (the current lab members are seen at http://www.bch.msu.edu/faculty/hausinger/HausingerLabPage.htm and former associates are listed at a link at the bottom of that page).
A few of the >25 Research Associates associated with the Hausinger laboratory:

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Tina Müller (7/2004-present) started her work in the lab by defining the basis of enantiospecificity of two herbicide-degrading Fe(II)/α-ketoglutarate dependent dioxygenases (specific for *R*- and *S*-phenoxypropionic acid) she had purified as a graduate student in Switzerland. Tina went on to study TauD, XanA, CsiD, and human and mouse homologues of the *E. coli* enzyme AlkB. These proteins are Fe(II)/α-ketoglutarate dependent dioxygenases that act on taurine, xanthine, a still unknown substrate, and alkylated DNA. Tina identified a novel activity associated with the human AlkB homologue 1, hABH1, which involves specific cleavage of DNA at abasic sites. She is working with a mouse *ABH1* knockout to identify the role of this lyase activity.

Piotr Grzyska (11/2003-2/2010) is a talented instrumentalist who, in collaboration with Denis Proshlyakov, developed new tools for investigation of Fe(II)/α-ketoglutarate dependent dioxygenases. In particular, he carried out cryogenic continuous-flow Raman spectroscopy studies that identified two new reaction intermediates in TauD and he demonstrated the feasibility of exploiting difference UV spectroscopy to monitor the binding of substrate or metal ions to the apoprotein. Piotr recently obtained his green card and is actively seeking a position in the Chicago area where his wife works.

Matthew Ryle (10/1998-7/2003) initiated our studies with TauD, which has become the paradigm of Fe(II)/α-ketoglutarate dependent dioxygenases. Matt's work identified the tyrosyl radical-dependent aberrant self-hydroxylation reactions carried out by the protein. In addition, he characterized the early steps in the catalytic cycle. Matt is now a scientist at IDEXX in Portland, ME, but he comes back to Michigan each year during truffle season.

Aileen Soriano (10/1997-6/2000) demonstrated the GTP-dependent activation of urease and achieved fully active protein by adding bicarbonate, nickel ions, and UreE to a complex of urease apoprotein plus UreD, UreF, and UreG. She is now a scientist at Merck pharmaceuticals.
Gerard Colpas (5/1996-6/2000) was a talented inorganic chemist who greatly advanced our understanding of metal ion binding to UreE. After leaving MSU, Gerry created his own biotechnology company in the Boston area. Tragically, Gerry died of stomach cancer in 2008.
Kazuya Yamaguchi (7/1996-9/1997) biochemically and spectroscopically characterized several metal-substituted

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ureases. One metal ion he did not examine at the time was Fe(II), but he carried out some studies on that form of the protein after returning to Japan. With our recent demonstration of a naturally occurring Fe(II)-dependent urease in *Helicobacter mustelae*, Kazu's unpublished work has taken on added significance and we may soon be coauthors again. Kazu is an Associate Professor at Osaka University, Japan.

P. Richard Martin (1991-1992) introduced to the Hausinger lab the use of site-directed mutagenesis studies to characterize urease. Rick now lives in South Korea as Professor at the University of Maryland University College Asia.

Yves Markowicz (1989-1990) was the first Research Associate in the Hausinger laboratory. His efforts were instrumental in demonstrating the role of accessory proteins in urease activation. Yves is now an Associate Professor at the Université Joseph Fourier in Grenoble, France. (Memories, 2010)

Hess, John PhD '67

I arrived on campus in the summer of 1963. It was a Sunday and I had no clue where to go. I stopped by the old "Biochemistry Building" (now a parking lot) that was across the street from Kedzie Chemistry Lab. There I accidentally ran into an energetic Ed Tolbert with whom I corresponded and would work with over the next three years. He graciously oriented me and took me to the Brodie dormitory complex where I stayed until the Owen Graduate Dormitory opened for the first time that fall. I was amazed at all of the construction on campus. At that time the steel understructure of the current Biochemistry building was emerging on what was the southern perimeter of campus. Safety codes were less strict in those days, so I enjoyed prowling around the construction site, enjoying learning about how a laboratory building unfolded.

I have always been interested in photosynthesis and chose the department at MSU because Ed Tolbert had been a member of the Calvin laboratory at Berkley while refining the carbon metabolism of photosynthesis. Glycolic acid became a focus of my work and required a lot of "metabolite profiling" as we call it today. Then the technique relied not on mass spec analysis but on two-dimensional chromatography using large sheets of paper. Tolbert had designed very large chromatography chambers adjacent to his lab, which were well ventilated

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to minimize the horrible stench of pyridine and butyric acids that established the mobile phases for this amazing chromatography. Detection of metabolites occurred by exploring the dried chromatograms with a form of Geiger tube identifying radioactive compounds following photosynthesis using suspensions of algae or leaves in the presence of $^{14}CO_2$. Plant materials were grown in the walk-in growth chambers installed in the basement of the new building.

During my first year, seminar presentations in the old building relied on chalk boards or hanging newsprint, with hand written information. I recall being enthralled to report conclusive data from the Netherlands certifying the, then controversial, concept for two photosystems in photosynthetic organisms. For publication all graphs were hand drawn and, if there were funds, taken to the professional drafting team to submit them with typed materials for publication. Obtaining slides was another time consuming process requiring much leadtime prior to presenting information at a national meeting.

At this time of discovery, we used glass pipettes using mouth suction and for the less daring, pipette bulbs. Enzyme assays were tedious and demanding with an ice bucket full of reagents in test tubes and pipettes calibrated to 0.01 ml sitting in the test tubes. Timed reactions were monitored with stop watch while recording changes in Absorbancy readings with the Gilford Spctrophotometer or pressure changes using the Warburg manometric technique.

It was a privilege to work in the then new Biochemistry building. Laboratories with common work areas encouraged interactions with fellow students and post docs. I recall wonderful trips to national meetings with these colleagues, particularly the FASEB meetings held each year in Atlantic City, which had classic old hotels along its grand, casino-less boardwalk. Even then the displays of vendors provided much to wow graduate students and stimulate new ways of thinking about approaching research.

I met my wife, Ann, at MSU. As an undergraduate chemistry major, she pursued her research interests in physical chemistry with Dr. Dye. Beaumont Tower provided a memorable place to secure our engagement on a beautiful August afternoon in 1965.

Following a year of post-doctoral work with Andrew Benson at the Scripps Institution in La Jolla, California, I took a faculty position in the Department of Biochemistry

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and Nutrition at VPI which is now known as Virginia Tech. My research moved from glycolic acid to glutathione and the intermediary metabolism that supports thiol and antioxidant biochemistry. Teaching plant metabolism remained my first love throughout my career. I later served as the Head of the Department and then as Associate Dean and Director for Academic Programs in the College of Agriculture and Life Sciences. After almost 40 years of academic life at Virginia Tech, I retired to enjoy family, church, and students with whom I work through Literacy Volunteers. (Memories, 2010)

Heyser, Jim—MS '68
Environmental Scientist, ICF Kaiser Engineers, New Hampshire. In 1975 received an MA in communications and then obtained a Ph.D. in 1979 in Botany from Colorado State University under the guidance of Prof. Murray Nubour. From 1982-1990, I worked at Los Alamos National Laboratory in the Life Sciences Division and in 1991 began work as an environmental scientist at ICF Kaiser Engineers, an environmental engineering firm. (Biochemistry, 2000)

Hickman, Janet G.—BS '67
Physician, Dermatology Consultants, Inc., Lynchburg, VA. I received my MD from Harvard Medical School and did residencies in Internal Medicine and Dermatology at Duke University. I've been in the private practice of dermatology in Lynchburg, VA for 19 years. I am Associate - Medical Director and Clinical Investigator with the Education and Research Foundation, Lynchburg, VA. Robert and I have three sons ages 15, 19 and 23. (Biochemistry, 2000)

Hicks, Wayne· PhD '02
Wayne is currently a postdoc with Dr. Michael Olivier at the Medical College of Wisconsin in Milwaukee, where he is part of a large collaborative effort between industry and academe for development of new technologies and methodologies for proteomics. Wayne can be contacted by mail to the Medical College of Wisconsin, HMGC/HRC 5th Floor, 8701 Watertown Plank Road, Milwaukee, WI 53226-0509. (Biochemistry, 2003)

Hill, Scott D.—BS '82
Associate Pastor, First Presbyterian Church of Ithaca, Ithaca, NY. I've spent three years teaching English and science in Arab countries - Egypt and Morocco plus extended travels in Israel/Palestine. Graduated from San Francisco Theological Seminary in 1990. Recently traveled to Ethiopia, Egypt, and Israel/Palestine to build church relations. After six years as Associate Pastor here,

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recently spent three months sabbatical in Middle East and Pittsburgh. (Biochemistry 2000)

Hill, Stacie L.—BS '92
Embryologist, Michigan Reproductive & IVF Center of Spectrum Health, Grand Rapids, MI. I've worked at Spectrum Health (formerly Butterworth Hospital) in Grand Rapids in the Reproductive Medicine Lab. (Biochemistry, 2000)

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. (Biochemistry, 2002)

Hinds, Sherrie A.—BS '98
Chemist, Holland, MI. Working as a chemist at a pharmaceutical company in Holland and will be married on June 12, 1999. (Biochemistry, 2000)

Hiser, Carrie—PhD '91
Research Associate, Department of Biochemistry, Michigan State University, East Lansing, MI. (Biochemistry, 2000)

Ho, Tuan-Hua David—PhD '76
Professor, Department of Biology, Washington University, St. Louis, MO. I am still in the field of plant biochemistry/molecular biology after >20 years. Currently working on plant responses to environmental stresses and hormone signal transduction and gene regulation. My wife, Berlin H. Ho (Ph.D. 1975) was a student of Dr. N.E. Tolbert, but now is in computer science working at a French company. (Biochemistry, 2000)

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Hoard, Heidi M. BS (Lyman Briggs) '96:
Heidi is currently completing her Ph.D. work at the Mayo Clinic in Rochester, MN. Her thesis work is focused on the interactions of electron transferring flavoprotein with dimethylglycine dehydrogenase, sarcosine dehydrogenase, and the acylCoA dehydrogenases, and involves the use of both mass spectrometry as well as traditional enzymological approaches. She states that her education and research experience at MSU have helped her be an independent, successful graduate student. Heidi also notes that she has been involved with the Upward Bound program, helping high school students enrolled in the program improve their math and science skills. The Minnesota winters have also been occasion for her to learn to enjoy snowshoeing, cross~country skiing and quilting. Heidi states: "I haven't mastered the Minnesotan accent yet and don't get the Norwegian jokes, but I've managed to avoid Lutefisk and enjoy Minnesota hot dish." Heidi can be contacted at 1006 N. Broadway, Apt. 3, Rochester, MN 55906, or by e-mail at hoard.heidi@mayo.edu. (Biochemistry, 2001)

Hoffmann-Benning, Susanne - Biochemistry Faculty (2009-)
The first time I heard about MSU was in 1986, when I was a student in Freiburg, Germany and just started an independent study project in the Laboratory of Prof. Rainer Hertel (a former MSU faculty). His student told me very excitedly that he was going to do plant research at this place I had never heard about: Michigan State University in East Lansing. Two years later, I followed him to pursue my Ph.D. in the Genetics Program/ PRL, all with the intention to return to Germany. However, upon our return, we realized how much Michigan had grown on us, how much we missed MSU, and how "Americanized" we had become. We missed the collegial atmosphere: whether you had a question or needed advice or a protocol or a piece of equipment – the doors were always open, people shared. There was an abundance of plant scientists and with them an unlimited resource of knowledge and endless discussion. And, so, in 1998 we returned to MSU. At first I was a postdoctoral associate in Jan Zeevaart's laboratory in the PRL. The project I worked on, was a joint project with Doug Gage, then the director of the Mass Spectrometry Facility. As a result I started spending more and more time in the basement of the Biochemistry building. I also was invited to summer picnics, Christmas parties, Boezi award dinners. These didn't feel like work dinners, they were fun: people were relaxed and joking around and seemed to get along well with each other.

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The support for students, even undergraduate students, was incredible. I wanted to be part of it. So, when Doug left, I became co-manager of the facility, two years later, research assistant professor, and just this year tenure-track faculty. The encouragement and support of many of my colleagues during this process was amazing. There is none of the discrimination I faced in Germany as a female scientist and a mother. The opportunities I have here were unthinkable "back home". Which is why biochemistry/ MSU/East Lansing/Michigan have become my home. I get to do what I love; I teach and advise undergraduate students; I attend seminars, that may have nothing to do with what I work on yet are almost always fascinating; I have my own lab, with a wonderful technician, my first graduate student, and five wonderful, promising undergraduates. And I am enjoying every minute of my stay. (Memories, 2010)

Hollenbeck, Cynthia A.—PhD '96
Cardiovascular Clinical Scientist, Parke-Davis, Ann Arbor, MI. The year following completion of my doctoral degree I taught the biochemistry class for the ABLE program at MSU's College of Human Medicine. I was also a tennis professional at the Michigan Athletic Club in East Lansing, MI. I am now working at Parke-Davis in the Clinical Cardiovascular Department as a Clinical Scientist. I am the study manager for one of the Lipitor (atorvastatin) clinical trials addressing patients with accelerated coronary heart disease. Specifically, looking at myocardial ischemia reduction using atorvastatin in patients with unstable angina or non-Q wave myocardial infarction. I still find time to teach tennis at the Michigan Athletic Club as an avocational activity and reside in Okemos, MI. (Biochemistry, 2000)

Holleman, William H. PhD '66
When I began my graduate studies at MSU in 1962, the Biochemistry department did not have a definable home. The faculty laboratories were scattered around the campus and were of varying quality and usefulness. My graduate advisor, Dr. William Deal, was located on the 2nd floor of the very old and dated Food Science Building. Walking into the dark laboratory at night was always exciting as one was able to watch the cockroaches scurrying across the floor when the lights were turned on, an interesting experience for me as I had never seen such an insect before arriving at MSU.

Fortunately, these facilities were to be short lived, as a new building, solely dedicated to the Biochemistry

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Department, was being constructed on the south campus. Everyone eagerly anticipated our move in the latter part of 1964 or early 1965. However, Dr. Deal had a problem! Our laboratory revolved around a very large and heavy instrument known as the Beckman Model E analytical ultracentrifuge. This very expensive and delicate instrument was too big to fit through a door or into a staircase. The only way out of the building was to use a large crane and lift it through an open window. The window was not large enough to accommodate both the ultracentrifuge and the derrick of the crane so the maintenance people built a ramp on the window ledge and we somehow were able to winch, push and shove the instrument into the cold winter air. It was a precarious situation and all of us from the lab hoped the crane operator knew what he was doing. Fortunately, he did, and the machine was successfully moved to the new Biochemistry building where it served as the mainstay for several Ph.D. dissertations.

The new laboratories were magnificent and were the best designed laboratories I have ever worked in. When I had responsibility for designing new laboratories at my workplace in the pharmaceutical industry (Abbott Laboratories), I used MSU's Biochemistry labs as a model for our new facilities especially the inclusion of a cold room in each laboratory and the proximity of work desks to the laboratory bench. This building, still new in my mind, is now 44 years old and I hope it is cockroach free. We moved in December 1964 and January 1965.

One of the most enduring memories that anyone over the age of 60 has is the answer to the following question. "Where were you on Friday, November 22, 1963 when President John Kennedy was assassinated"? Since I remember that day as if it were last year, I know exactly where I was. I had returned from a class and was at my desk in Dr. Deal's lab located on the 2nd floor of the Food Science Building. Al Phillips, who worked in the lab across the hall, yelled at us to turn on our radio, actually Marlene Steinmetz/Kayne's radio, because President Kennedy had been shot. Although the use of the radio was prohibited in the lab when Dr. Deal was present, this edict was quickly overruled as we were transfixed by the events occurring in Dallas. An hour and a half later the suspected assassin, Lee Harvey Oswald was arrested as the individual who had been sighted shooting from a nearby building called the Texas School Book Depository. As television was not a common utility in the Biochemistry laboratories, we remained glued to the radio for the rest of the afternoon, although some went home to watch the events on their black and white TV. As a

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followup Oswald was murdered in a jailhouse hallway two days later by Jack Ruby. Wm. H. Holleman, Ph.D. Retired (Memories 2010)

Holmes, Robert J.—BS '74
I'm a MD Cardiothoracic Surgeon in Pontiac. A few years ago I joined the President's Club and helped initiate with Dean Leroi, Susan Lilly of Natural Science Fund Development, and Chairman Bill Smith of Biochemistry an endowed scholarship to benefit Biochemistry undergraduates. I would like to see more Biochemistry Alumni become acquainted with and to consider contributing to it. My main hobbies are distance running and Spartan football. (Biochemistry, 2000)

Hope, Constance L.—BS '88
In 1991 I received an M.S. in biochemistry from Wayne State University. In 1998 I received an M.D. from the College of Human Medicine at Michigan State University. (Biochemistry, 2000)

Howard, Drummond Phillenore BS '63
I'm amused that one of my clearest memories of those days in Mr. Duncan's lab is his feeding me large doses of citric acid right from the bottle on the shelf when I came down with a cold!

As a freshman I was doing nutrition studies on rats. The rats were housed on the top floor Kedzie Chemical Laboratory. I had a special fondness for the man who took care of the animals but I don't see his name on the roster and I don't remember what it was (Leo Klever). I remember collecting blood in capillary tubes from behind their eyes but I can't remember what we did with the blood. I also washed the glassware.

When I was ready to graduate and continue for a PhD in biochemistry, I asked Dr. Hansen where he would suggest I go. He suggested both Chapel Hill, NC and the University of Utah in Salt Lake City (he was Mormon). I decided that it would be fun to go to school in the

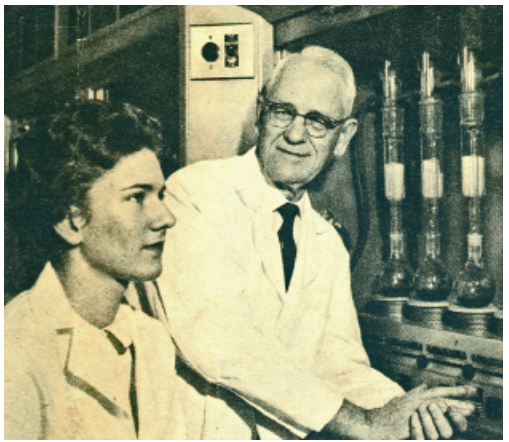

Figure 8.5: Phillenore Drummond Howard in the Agricultural Laboratory of Dr. Clifford Duncan working under a NSF grant to analyze hay samples for fat solubles. (Howard, 1961)

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west, so that's where I spent my first year of graduate school. From there I moved with my major professor to Washington University in St. Louis where I earned my PhD and met my husband. It's interesting to me how decisions made early on set the course of our lives. I spent a lot of time in Kedzie. I remember being on campus when there was an explosion there. I don't recall if anyone was hurt or killed. Phillenore (Drummond) Howard (Memories, 2010)

Hummel, Ben D.—PhD '98
Scientist, Pharmacia and Upjohn, Kalamazoo, MI (Biochemistry, 2000)

Hunsley, James R.—MS '66; PhD '70
Assistant Professor, Department of Chemistry, SIU Edwardsville, Edwardsville, IL Currently involved in synthesis of materials for boron neutron capture therapy of tumors. (Biochemistry, 2000)

Husic, H. David—PhD '82
Associate Professor and Head of Chemistry, Department of Chemistry, Lafayette College, Easton, PA. Since the Ph.D. (with Suelter) and postdoc (with Tolbert) at MSU, have been a member of the faculty in the Chemistry Department at Lafayette College where I teach the biochemistry courses in the department. I continue to carry out research on inorganic carbon acquisition and carbonic anhydrase in *Chlamydomonas reinhardtii* (see Web page for details (http//www.lafayette.edu/chem/staff/husic.html)). My wife Diane (Ph.D. Biochemistry at MSU - 1986, now Professor of Chemistry at East Stroudsburg University) and I have two young children (Corey Christopher (born 2/95) and Joren David (born 5/98) and live on a farm in the Pocono Mountains with our horse, 2 goats, 3 dogs, 3 cats and 2 rabbits. (Biochemistry, 2000)

Husic, Diane White - PhD '86
My first exposure to the department was in spring 1981 when I visited campus for the first time for an interview for the graduate program. The day before, I had an interview at the "rival school down the road", and frankly, it was a rather negative experience. So I was pretty nervous and expecting another tough time. Nothing could be farther from the truth. Instead of being grilled about my credentials, the faculty and graduate students went out of their way to tell me about what MSU had to offer *me*. Instead of trying to find meals on my own on a strange campus, I was treated with wonderful hospitality, including a dinner party at a faculty member's home

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where I had the chance to talk to a number of students in a more casual setting. When I was accepted at both institutions, it was an easy decision to make in terms of which one to attend to work on my Ph.D.

I had become particularly interested in plant biochemistry – an area that Michigan State had a great reputation for (and has only gotten better since). As an undergraduate, I had read about some of both Ed Tolbert and Hans Kende's contributions to plant physiology and was really excited that both were at MSU. My first year, I did rotations in the labs of Tolbert and Sweeley, and spent a lot of time in the mass spec facility. Course work was significantly more challenging than what I had experienced as an undergraduate – especially when it came to reading primary literature (something I had not really done before and now require of all the students I teach so that they have a smoother transition should they decide to go to graduate school).

Figure 8.6: Photograph of group, called the Whiz Kids, working in the Mass Spectrometer Facility in 1981/82. (l to r, back row) Millie Martin, Jim Vrbanac, Emmet Braselton, Diane White Husic, Dave Pinkston. (Front row) Lee Westover and Vickie McPharlin. Courtesy of Diane White Husic.

Thinking back on the times, it is amazing to think of how far we have come in terms of technological advances. The computers in the mass spec facility still had to be booted up with a series of switches and the "floppies" where huge discs – probably about 16" in diameter! "Personal computers" were far from what we think of today (glorified typewriters, really) and I remember debates about whether or not to allow computer print-out pages (good old dot-matrix printers) suffice for pages in our final thesis. In the mass spec facility, we were separating small organic molecules and gases, but we speculated about whether you would ever be able to run large molecules like proteins through an MS to get structural data. (Who knew then that MALDI's would be developed?) The department acquired an automatic X-ray film developer and I clearly remember doing duplicate experiments where Ed had us develop one set of films in the old chemical tanks and one set in the developer to see if there was a difference in quality! And when I think back

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to those large paper chromatography tanks and gallons of nasty solvents – I shutter to think of what I breathed in. And yes, we did protein purification the old fashion way with slow running columns and fraction collectors. Procedures could take days or weeks. Just imagine the productivity we could have had if we had access to all the high-throughput technology available today. (But then, of course, we wouldn't have the long waits which were perfect for going over to the pool to swim laps in the summer or for getting MSU ice cream!)

There are two things in particular that I realize now were quite characteristic of the department and very influential on my career. First, the biochemistry department was extremely cordial and fun. I was never hesitant to go to someone with questions or to ask to use a specialized piece of equipment. People always went out of their way to help. And there were social events, intramural sports teams, etc. Given that I was extremely shy and lacking a bit of self confidence when I started graduate school, this environment was just what I needed to develop as a scientist and as an individual. I have subsequently learned that this sense of cooperation and friendly, supportive atmosphere does not exist in all institutions or academic departments! As a department chair now, a major goal of mine is to have the department be one that is supportive and welcoming to faculty and students – including those only taking a science course because it is required for graduation. Second, there was always strong encouragement to work across disciplines and to interact with students, post-docs and faculty in other departments. Having the chemistry and plant science facilities so close to biochemistry was a plus and, as a graduate student I took courses in those departments

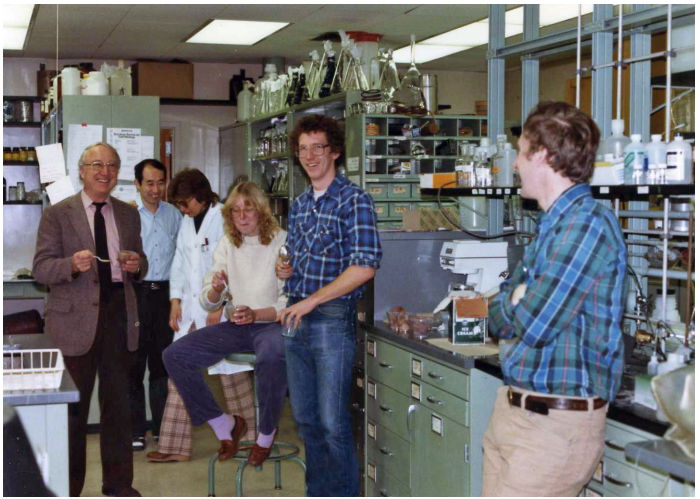

Figure 8.7: Photograph of group studying in Professor Ed Tolbert's laboratory in 1984-85. (L to r) Ed Tolbert, Mitsuru Nakamura, Linda McKenzie, Diane White Husic, Dave Husic, Jim Moroney. Courtesy of Diane White Husic.

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and attended seminars. This interdisciplinarity has strongly influenced how I teach and do research. MSU was ahead of the curve on this one since the really important questions in science demand working collaboratively with scientists across different disciplines. For a number of reasons, I chose to work in Ed Tolbert's lab for my thesis project. There are so many things I could say about Ed; oh, the stories one could tell! I still miss him tremendously. It was not uncommon to have foreign visiting scientists in the lab and so I had my first exposure to the world beyond the upper Midwest. Ed was always finding a way to get us to conferences where the attendance was very international, and sometimes, those meetings were in great places (Sweden, Germany, etc.) I owe my love of international travel to Ed who himself was a well-seasoned traveler who had art in his home from around the globe. Although I dreaded it at the time, Ed always tried to teach us to not only be scientists, but to also be good in social settings and to learn how to network. I remember a gathering at his house where he had us come early to learn how to hold drinks and a plate of food while carrying on a conversation. We actually had to practice before the guests arrived! He would teach us appropriate customs when interacting with people from other countries and tried to get us to appreciate classical music and martinis! I still don't like martinis, but boy do I now know the value of those networking lessons. When attending conferences in California, we got tours of his alma mater, Berkeley, visited vineyards (he had spent time as a wine chemist) and yes, learned how to pick good wines and drink them properly! And who can forget those lab outings to "El Ez" for Mexican food or the trips to Ed's cottage on Torch Lake near Traverse City. I have fond memories of Ed waterskiing, sailing with the other graduate students, and climbing the sand dunes with our guest scientists from Japan.

Ed was always one for trying to connect experiments and data to "the big picture". I can't tell you how many times I rolled my eyes thinking that he was really stretching things a bit in his speculations. But again with age comes wisdom and I realize now that he was giving us important lessons in grantmanship and in learning to communicate with the public – by having us always think about the *significance* of our work. I now watch my students roll their eyes at me as I have them draw connections and consider the ethical and social consequences of science and technology in the classroom and consider the big picture implications of their research projects.

When Ed was getting ready to retire, he wanted to have an international symposium and yes, it had to be about a "big picture issue". He brought together plant scientists,

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biogeochemists, oceanographers, ag scientists, foresters and others to talk about carbon fluxes and sinks (global carbon cycles), the impact of rising CO_2 levels, etc. This was in the early 1990's – long before the terms greenhouse gases and climate change were household words. Recently, I found a used copy of the book that was published from this symposium online and ordered it. While there are clearly "Tolbertisms" in the text, I am quite amazed to see how much ahead of the times these discussions were. Much of the material in the book is quite relevant even today. But I guess I shouldn't be surprised. Again, it was the MSU Biochemistry model of network, camaraderie, interdisciplinarity, and thinking about the big questions.

It should not be surprising that today I find myself attending the United Nations negotiations on climate change, serving on the state Climate Change Adaptation Working Group, using my plant science background to help restore a Superfund site, and frequently traveling internationally to consider issues such as sustainable development, food security, and global lessons in redefining prosperity. This shy kid from Marquette gained a lot from MSU's biochemistry department and there aren't words that can adequately explain how much I appreciate what I learned there. I smile when I think about how Ed Tolbert always tried to relate his research to the "big picture". I don't know if he ever expected his biochemistry grad students to end up as conservation leaders!

As an alum of the department, you may be interested in this press release that came out this morning.The Lehigh Gap (http://lgnc.org/conservation) Nature Center that is mentioned in the press release is where I do much of my research now – related to plant stress responses to heavy metal contamination and restoration (very ecological). There is an article about this work at this link that I co-authored. http://www.dcnr.state.pa.us/wrcp/wildnotes/spring10/index.html

I think I mentioned previously that I went to the U.N. climate meetings in Copenhagen last December (and will be at them in Cancun this year). Since then, I have been asked to serve on the state Climate Change Adaptation working group for natural resources as a plant expert! It is funny how our paths lead in interesting directions. But I love applying science to these big issues (clearly Ed had an influence) and to public policy.

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Perhaps one of the most important "side lessons" I learned from Ed was the value of linking international connections via science. He always had visitors from around the world and opened doors for us to travel to meetings abroad. We just had Nobel Laureate Peter Agre on campus this weekend and he talked about "science as a path to peace" and is quite active in AAAS's initiative in Science Diplomacy. I find that educating students about global issues is extremely important to me and, in fact, a key component of my current sabbatical. Besides taking a delegation of students to COP15 (again this year), I just returned from Ecuador, exploring opportunities for students to participate in projects in the rural Andean highlands related to environmental and health education and organic biointensive (and hopefully environmentally friendly agriculture). A part of this is also related to the new course I am developing on "Redefining Prosperity: Moving Toward a Culture of Sustainability" for which I have started a blog http://anewprosperity.blogspot.com/. I will also be leading a class to Costa Rica this coming May –not for the traditional ecology-focused course, but on sustainability, and a search for why this is the happiest country in the world. My new work with Audubon (linked to phenology and migrations) also has a global perspective as we are dealing with what are our responsibilities in this state, our country, when we are home to species for part of a year and how does that connect us to other countries and cultures. I am hoping to be able to get to MSU for the 50th celebration next spring. Diane W. Husic, Ph.D., Audubon Together Green Fellow, Immediate Past-President, Council on Undergraduate Research, Chair and Professor, Department of Biological Sciences, Moravian College, Bethlehem, PA 18018, dhusic@moravian.edu 610-625-7100 (Memories, 2010)

Hyman, Joel—BS '95
Graduate Student, Yale University, New Haven, CT. Attending graduate school at Yale University. (Biochemistry, 2000)

Jackanicz, Theodore M.—PhD '65
Senior Scientist, Population Council, New York, NY; E-mail: TJACKANICZ@popcouncil.org. I work in an international contraceptive development program. Two of my contraceptive vaginal ring projects (1. norethindrone acetate + ethinyl estradiol. 2. progesterone) progressed to the point that Phase 3 clinical testing and marketing have been assumed by industry, and these devices will be on the market in the next few years. A third project with a new progestin, NESTORONE (R) plus ethinyl estradiol is well on the way to Phase 3 clinical testing. (Biochemistry, 2000)

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Jagger, Pat - Office Staff (Jan 1963-Aug 1971).
A trip down Memory Lane -- I remember climbing the wide, stone steps of the imposing old Dairy Science Bldg, at the end of Farm Lane – slippery with snow and ice. Inside wasn't much more inviting: dark, cold, smelly. My interview with Garth Hansen and Irwin Benne for a secretarial position wasn't encouraging. They had misgivings about hiring a divorcee with a 9-month-old baby. A model of the new Biochemistry Bldg was in the center of Dr. Hansen's office. Their enthusiasm for the future of the department was contagious and I knew I wanted to be part of it. Lena Mae Flory, Dept. Secretary, took me under her wing and we remained close friends the rest of her life.

Using a Dictaphone and dictionary I soon learned to pronounce and spell this "foreign" language of biomedical science that Woody dictated for journals and grants. John Speck was across the street in the old Chemistry building (even worse smelling). Dr. Tolbert was in charge of the building project and all the details. The excitement was contagious: Ground breaking… Moving in… Construction continuing on the upper floors… NOISE! The new, young faculty started arriving, setting-up their labs. Everyone was enthusiastic!

Does anyone remember the fiasco the first year in the building of the "Mystery of undelivered mail"? Seems the contractors installed the mail shoot upside down; mail kept accumulating till people started complaining that they'd paid their bills, putting them in the mail slot located between the elevators. These were the days before word processors and computers. I remember the stress associated with typing the abstracts for the FASEB meetings. They had to be absolutely perfect – no typos or erasures allowed.

My daughter, Trudy, loved trips to the basement where Vaughn Snook had skulls, snakes and spiders on the Stockroom counter. Leo Klever, the Animal Caretaker, bred St. Bernards and we looked forward to the new puppies each year. Dr. Benne took Trudy to Small Animals Day at the Ag barns in the Spring. I became Dept. Bookkeeper, working many late nights at the end of the fiscal year to balance the budget.

There were many get-togethers: Spring Picnics evolved into the Fall smelt fry with new grads, the weekend keggers at Jag's before/during the football games; Pizza parties at Randalls in Spartan Village; Aust's Williamston farm with maple syrup bubbling over the open fire and

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poured over corn muffins; Ice skating and snowmobiling with Jim Maine and Jack Holland, and their families. Passing the pre-lims was always a reason to celebrate.

The Christmas parties were hilarious. Mark Bieber was the perfect Santa. Rick Jagger and I announced our engagement at the Biochem Christmas Party, Dec. 1969. The whole department came to our wedding! Remember Phil Mendershausen in tails, jeans and Goodyear-tread sandels?

Trudy Jagger is now a teacher in Denver, CO with tarantulas and snakes in her classroom. She was awarded the Mile High Teacher of the Year recently. I went on to get my degree in Fine Art and then Master of Art, even teaching Art Ed at MSU for a year. My wonderful husband, Rick, built the PJ Gallery & Studio for me overlooking the West Elk Mountains in Gunnison, CO. Life is Good! (Memories, 2010)

Jagger, Richard E.—PhD '71
Professor of Chemistry, Western State College, Gunnison, CO (BMB Brochure 2000). Several things come to mind when I think back to the mid-60's graduate School days at MSU, but they all centered around the camaraderie we had as a department, students, faculty and staff.

First , the smelt fry gatherings we had at the beginning of the school year, when the new grad students arrived on campus. After catching (actually netting) the fish up on Lake Huron, and cleaning a thousand fish, we battered and fried them up as a treat for the department each Fall. The best smelt fry was east of Okemos where I met two very special young ladies, Pat who became my wife and Trudy my daughter.

Second, the Christmas parties. These turned out to be great events where we all let our hair down and roasted both students and faculty.

Third, the wonderful off campus student-faculty interactions such as the deer hunting trips north with Steve Aust, Loren Bieber, and John Wilson (the "new" faculty), Dave Hart, Doug Randall, and my labmate Larry Muschek. Also, the bird hunting and fishing trips with Jim Fairley and Muschek. Certainly can't leave out the numerous grad student field trips on Wednesdays and weekends to Revere's, Montey's and Dagwoods. I still keep regular contact with the Randalls and Muscheks. Also, following the home and away MSU football games, students and faculty joined my roommates, Doug Hansen, Ken Payne, Barry Reinhart, Mark Bieber and me for afternoon keggers at our apartment on Janice Lee Dr.

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Were you one of the folks that came to 522 BCH on Friday afternoons when Larry Muschek and I were barbering to earn beer money?

Lastly, I cannot forget a lifelong friendship with my mentor and advisor James Fairley and his wife Dee. I arrived at MSU in the Summer of 1965 as a NSF undergraduate research participant and worked in Jim's lab. Five years later, I left with a PhD and a family. While working in Jim's lab, he often said that with my friendly demeanor, I would make a good college teacher, something that would be my career for over 30 years. He was, without a doubt, an excellent role model for me. Jim was even instrumental in helping obtain my first teaching job at Defiance College in northwest Ohio. I was to teach Biochemistry, Organic Chemistry and some Biology. I was somewhat apprehensive with the latter two – but simply remembered Fairley's words. "With our training, Biochemists can do anything".

Two weeks after retiring in 2005, I joined a longtime friend and helped sail his 34ft Tartan sailboat across the Atlantic Ocean from Ft Lauderdale to Marseilles, France via Bermuda, the Azores, Gibraltar, and Barcelona. In winter of 2006, We sailed back across the "pond" from Gibraltar to Nassau via the Canaries and the US Virgin Islands in the Caribbean. Over 8,000 miles of salt water – enough for a lifetime. Richard Jagger, Professor Emeritus, 2005, Western State College, Gunnison, CO. (Memories, 2010)

Jardieu, Paula - MS '80 (PhD, Microbiology, '82)
After several years working at Genentech in San Francisco, Paula has taken a new position with Prevalere Life Sciences, Inc., 1 Halsey Road, Whitesboro, NY 13492. (Biochemistry, 2003)

Johnson, Jim C.—MS '68; PhD '71
Professor, Department of Microbiology/Virology, University of Osteopathic Medicine Health Sciences, Des Moines, IA. Currently my research focus is (1) HPV expression in transfected, differentiating keratinocytes and (2) cold temperature function of testudine melanomacrophages. Awards: I was honored by UOMHS by being named "University Distinguished Research" during the centennial celebrations of my school. (Biochemistry, 2000)

Joswick, James J.—BS '91
Student, The Southern Baptist Theological Seminary.

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Served as a lieutenant in the Army Corps of Engineers from 1991-1995. I am currently studying for a Master of Divinity at The Southern Baptist Theological Seminary since 1995. I expect to graduate May 1999. (Biochemistry, 2000)

Jump, Donald B. - Biochemistry Faculty (1992-2007).
I started at MSU as an assistant professor in the Department of Physiology in 1985. I was provided lab space and modest start up funds. Over time, the lab grew in personnel, extramural support and external recognition. As a tenured associate professor in 1992, I was jointly appointed in the biochemistry and molecular biology dept. Since my Ph.D. degree was in biochemistry, this appointment made sense. In 1995 I was promoted to full professor in both physiology and BMB.
I was very fortunate to have a number of top notch graduate students from biochemistry [Bing Ren (Ph.D. 1997) & Jinghua Xu (Ph.D. 2006)] physiology Gerald Lepar, Ph.D. 1990; Ormond MacDougald: Ph.D.1992; Jingyang Lin Ph.D. 1996 (major advisor after Krier's death); Richard Kustasz, Ph.D. 1996 (major advisor after Jack Krier's death); Ainan Xu, M. S. 1997; Yun Wang, physiology, Ph.D. 2007, and animal science Michelle Mater, Ph.D. 1998. In addition I had some outstanding postdoctoral fellows and visiting scientist in the lab including Annette Thelen, 3/92 to 9/00; David Pan, 1/96 to 12/99; Archana Gangopadhyay 1/01 to 9/01; Julia Busik 1/2002 to 2004; Daniela Botolin, June 2004 - 2007; Oliver Demeure, March 2005-March 2006; Bill Helferich, Department of Animal Science, MSU, 1988; Henry Bayley, Chair, Department of Nutritional Sciences, University of Guelph 1991-1992.

I left MSU in 2007 to take a position at Oregon State University. I will always be grateful to MSU for the opportunity to develop a career in science. Donald B. Jump, Ph.D. (Memories, 2010)

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

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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. (Biochemistry, 2002)

Kadrofske, Mark· PhD '99
Mark was a graduate student with Professor John Wang and enrolled in the joint MD-PhD program at MSU. Mark is currently a Fellow in Neurology at Case Western Reserve University in Cleveland, OH. Mark and his wife, Gwynne, have two sons, Elliot (age 5) and Samuel (age 2). He can be contacted by e-mail to mkadrofske@metrohealth.org or by phone (216) 778-5909 (W), (216) 381-3986 (H). (Biochemistry, 2003)

Kaehler, Marian - PhD '78
Marian is on sabbatical for the year at Luther College in Decorah, Iowa, where she teaches genetics, molecular biology, and radiation biology. (Biochemistry, 2009)

Kayne, Fred J.—PhD '66
Associate Professor, MCP-Hahnemann School of Medicine, Philadelphia, PA (Biochemistry 2000) Fred continues to do lab consulting in clinical chemistry and help with teaching in the pathology residency program at Hahnemann Hospital which is affiliated with Drexel University. (Biochemistry, 2009)

Kayne, Marlene Steinmetz - PhD '66
There are several events that stick in my mind as I relive the days at MSU. Here are a few:

Our wedding
Don't know for certain if we were the first couple to meet and get married from the Biochemistry Department but I certainly remember the wedding with so many students and profs in attendance. Can anyone actually determine how many couples in the Biochem Dept. have met and gotten married over the years?
The Tornado and J.C. Speck

I remember one day in the Spring attending a lecture by J.C.Speck. It was in one of the classrooms in the new building where the back wall is all windows. As the lecture progressed the skies darkened and the wind started to blow. Things started to go from bad to worse outside and Dr. Speck did not speed up one word of the lecture. When things started flying by the windows we started

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to inch our way out of our seats in anticipation of running into the hallway away from the window. J.C. Speck never missed a beat. Finally the clock reached the appropriate time, Dr. Speck spoke his last phrase and everyone made a quick dash for the door.

Hard landing on the Floor

We were attending a weekly seminar in one of the small classroom where the chairs were not fixed to the floor and were arranged so that there was a center aisle. Bill took a seat in the third row right by the center aisle. Fred and I were sitting a few rows behind him. Don't remember who the guest speaker was but Bill, being a perpetually tired graduate student as we all were, proceeded to fall asleep. As he fell to sleep, he quietly but progressively started to slip out of the chair. We in the back watched the inevitable happen. He slid off the chair and hit the floor ending up in the center aisle looking up at the speaker. The seminar speaker did not even pause in his presentation although the rest of us were quietly laughing and the faculty looked slightly embarrassed.

Figure 8.8: Marlene Steinmetz Kayne observing analytical ultracentrifuge experiment in May 1965. UA 16.18. Michigan State University Archives and Historical Collections.

Robert W. Holley

The two seminar speakers I remember the most were Feodor Lynen and Bob Holley. Holley was already exhibiting the effects of Parkinson's Disease. I will never forget the lecture from the point of view of the magnificence of his work in determining the structure of the first tRNA and his courage in fighting the effects of this terrible disease. As far as I can recall the seminar ended with a standing ovation.

A John Boezi Lecture

Another highlight I remember was attending a John Boezi lecture – any lecture. He had the gift of being able to take the most complex investigative studies and create a picture in your mind that placed all the pieces of the puzzle in their proper place and gave the student an image that was easily stored and retrieved. His joy in

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just relating the information to the students was obvious. Throughout my teaching career, whenever I prepare a lecture, I remember the John Boezi lectures.

Punch Cards
Bill Deal had a computer program that analyzed the data from the schlierin patterns generated in the ultracentrifuge. The computer program was on punch cards contained in a cardboard box. After measuring the patterns, we would place the data on punch cards, add them to the end of the program and carry the box over to the computer center. During the winter months I had visions as I walked across campus of slipping on the ice and scattering punch cards all over the landscape. Fortunately it never happened. (Memories, 2010)

Keller, Brian D.—BS '70
Marine Ecologist, The Nature Conservancy, Florida Marine Research Inst, Marathon, FL (Biochemistry, 2000)

Kindel, Paul - Biochemistry Faculty (1963-2000)
One of the enjoyable features of my work in the department was teaching Biochemistry 471, the undergraduate major's lab course. The material, the organization of the course, my fellow instructors and the students made for an enlightening, informative, and unique course. The course continues to be taught in its original format to this day, with some change in content. Biochemistry 401 and 452 were also enjoyable to teach. (Memories, 2010)

Kingsbury, Linda—BS '89
Postdoc, Department of Molecular & Cell Biology, University of California - Berkeley, CA. I received a Ph.D. from the Department of Molecular & Cell Biology, University of California - Berkeley in 1996. (Biochemistry, 2000)

Koenig, Mark A.—BS '74
Physician, Children's Community Care, Pittsburgh, PA. Attended Medical School at The University of Michigan from 1974-1978. My internship and residency was spent at the Children's Hospital of Pittsburgh from 1978-1981. I then went on to private practice in pediatrics from 1981-1996. In 1996 I joined the Children's Community Care which is a primary care network affiliated with Children's Hospital of Pittsburgh as a pediatrician. (Biochemistry, 2000)

Kornosky, Jennifer - BS '02
Jennifer completed her degree as a Biochemistry major in Lyman Briggs School. She is now employed at Los

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Alamos National Laboratory, Los Alamos, NM, where she is involved in research on the effects of global warming on desert soil crusts. Jennifer can be contacted by e-mail to kornosky@lanl.gov. (Biochemistry, 2003)

Krishnaswamy, Rajashree—MS '66
Senior Scientific Associate, Biocon India Ltd. Bangalore. (Biochemistry, 2000)

Kroeker, Warren PhD '74
I did my doctoral work in the lab of Dr. James Fairley (Rm 209?) from 1969-1974. Jim was an excellent mentor and provided constant encouragement and insight into the new emerging field of molecular biology. But our discussions about science and life in general provided an extra dimension that I still appreciate to this day. I remember him describing his postdoc days at Stanford where he did ground breaking work on the newly discovered classes of RNA. He described ion exchange columns which went up the spiral staircases of the Stanford building several floors and collecting fractions in a rubber band-propelled fraction collector with test tubes submerged in water. We also found time to play golf at the MSU course and share personal experiences and future plans.

Barbara and I also have fond memories of the many social activities centered around the Biochem department: Smelt dipping and smelt cookouts at the Okemos park, Chritmas parties, basketball intramural games, after-game football parties at fellow graduate apartments, canoe trips in Michigan rivers etc.

Favorite courses I remember include: Dr. Boezi's general biochem; Dr. Suelter's protein chemistry; Dr. Sweeley's mass spec; Mr. Holland's digital and analog devices in Biochem; and several electives I took on human physiology through the medical school. Warren Kroeker, 1969-1974, (Memories, 2010).

Kroos, Lee - Biochemistry Faculty (1988-)
When I came to MSU in 1988, I was fortunate to recruit two graduate students, Rich Halberg and Sijie Lu, and enjoyed working in the lab with them on gene regulation during *Bacillus subtilis* sporulation. I got a FIRST Award from NIH, so we were off and running. Two more graduate students, Monica Semancik (now Gloudemans) and Makda Fisseha, joined the lab the next year and began working on gene regulation during *Myxococcus xanthus* development. Their preliminary work was the basis for a successful R01 application to NIH. A steady stream of

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undergraduates added to the mix. At lab social hour on Fridays, we enjoyed discussions about science, sports, politics, etc. I began teaching in BCH 453 (now BMB 462) in 1990 and have continued teaching undergraduates about gene expression ever since.

Around 1993, a second wave of graduate students began (Bin Zhang, Hiroshi Ichikawa, and Tong Hao) and in 1995 the first wave of postdocs arrived (Michelle Anderson, Janine Brandner, and Dvora Biran). We continued to explore gene regulation in the *B. subtilis* mother cell, renewing the NIH grant as an R01. Progress was slower on C-signal-dependent gene regulation during *M. xanthus* development, thanks to this organism's slow growth and long development. Lab alumni that worked on *M. xanthus* will remember returning to the lab at all hours to collect samples every six hours for two or three days. Their dedication paid off in papers and eventually the project was funded by NSF. I took a one-semester sabbatical in 1997 and enjoyed working on yeast proteases with Bob Fuller at the University of Michigan. That year I also switched from teaching methods of nucleic acids analysis in BMB 829 to teaching microbial genetics in MMG 833, which I continue to enjoy.

Postdocs Greg Velicer and Nicco Yu joined the lab in late 1997 and began opening some new lines of investigation. Greg initiated experimental evolution studies with *M. xanthus* in collaboration with Rich Lenski. Nicco obtained evidence that a *B. subtilis* sigma factor precursor is cleaved and activated by an intramembrane-cleaving protease. These proteases were just being discovered in organisms from bacteria to humans. Nicco's discovery helped get the *B. subtilis* grant renewed. Together with continued NSF funding for *M. xanthus* and MSU funding through the Gene Expression in Development and Disease (GEDD) Focus Group, new graduate students (Heather Prince, Debbie Yoder, John Perpich, Paul Himes) and postdocs (Ruanbao Zhou, Poorna Viswanathan, D. Srinivasan) joined the group. Highlights from this period include Ruanbao's work on the *B. subtilis* protease inhibitor BofA and Poorna's work on combinatorial regulation in *M. xanthus*, both published in *PNAS*. During this time I began overseeing the instrument shop and early phases of the building renovation under Bill Smith and then served as Associate Chair under Shelagh Ferguson-Miller from 2003 to 2008.

Since 2004, with support from NIH, NSF, and GEDD, additional graduate students (Lijuan Wang, Sheenu

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Mittal) and postdocs (Daisuke Imamura, Bin Chen, Mark Robinson, Ramya Rajagopalan) have all made important contributions. Some highlights were Daisuke's collaboration with Michael Feig to model a novel type of signal-transducing aspartic protease from *B. subtilis* and demonstrate similarity to HIV protease, Sheenu's discovery that two key transcription factors bind cooperatively to promoter regions of *M. xanthus* C-signal-dependent genes, Bin's work with Paul Himes in collaboration with Honggao Yan and Aizhuo Liu to determine the structure of a *B. subtilis* transcription factor that appears to bind DNA in a novel way, and Ruanbao's work with BRTP student Christina Cusumano in collaboration with Michael Garavito to purify the *B. subtilis* intramembrane-cleaving protease, cleave the sigma factor precursor *in vitro*, and show the reaction depends on zinc and ATP. I'm grateful for the opportunity to mentor the graduate students and postdocs mentioned above, as well as over 40 undergraduates on research projects in the lab. Many of these students also washed glassware, made solutions, and did numerous jobs to keep the lab running smoothly. I'm grateful to all my faculty colleagues for creating a collegial and stimulating scientific environment. I have fond memories of trading elbows with Zach Burton, Tom Deits, and the graduate students on the basketball courts. I'm grateful to all of the support staff in the offices, the facilities, and the classrooms, whose work is crucial to the success of the faculty.

Figure 8.9: Lee Kroos's research group party in December 2006: (l to r, back row) Sheenu Mittal, Daisuke Imamura, Heidi Kroos, Mary Kroos, Jun-seok Lee, Ruanbao Zhou, Gitano (Middle) Shireesh Srivastava, Lee Kroos, Lijuan Wang holding Evan, (Front) Miho Imamura holding Haruto, Poorna Viswanathan, Christina Cusumano. Courtesy of Lee Kroos.

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I'm grateful to those who have served in leadership roles in our department and in the GEDD. Most of all, I'm grateful to my wife Mary and the three children we have raised together. Our oldest son Mark is a touring acoustic guitarist, our younger son David is a sophomore in computer science at Michigan Tech University, and our daughter Heidi is a junior at Okemos High School. I will always be grateful for the people I have known at MSU and the good times we have had together. I'm proud of the work we have accomplished and I look forward to more exciting opportunities. (Memories, 2010)

Kubinec, Mark G. -BS, '87
After completing his degree at MSU, Mark went on to graduate work and received a Ph.D. Chemistry from the University of California, Berkeley. He can be contacted at 6039 Park, Richmond, CA 94805. (Biochemistry, 2001)

Kuipers, Paul J.—BS '73; MS '82
Senior Associate Scientist, Immunopathology Dept., Parke-Davis/Warner Lambert, Ann Arbor, MI. After leaving in 1982 I went to the University of Florida where I worked on metallothionein with Bob Cousins. I moved to Ann Arbor in 1984 and after a brief time at the U of M Hospital in the Internal Medicine Department, I moved to Parke-Davis where I joined the pre-clinical drug discovery group in the Immunopathology Department. I have worked with human neutrophils and biochemical aspects of inflammation. I discovered a compound that is doing very well in phase II clinical trials. I divorced Kate and am now married to Diane Erickson who is a ceramic artist and runs a business out of our home studio. My daughter Laura is 12 years old and is a superb student at Emerson School. She looks forward to attending M.S.U. I think about the Department a lot. It is one of the best anywhere! I miss everybody. Go Green! (Biochemistry, 2000)

Kwan, Julie Kuenzel
Thank you for the opportunity to think back on my college years! When your message arrived, I was in the midst of preparing a five-year contract proposal for our office, and I just found the message again. I hope that this response is not too late.

Having been involved with university life for the past 40-plus years, I marvel with how fortunate I was to have been a part of MSU's Honors College. Three issues stand out. First, I had excellent faculty advisement. I've seen so many students during my academic life who have not had that advisement, and I realize how lucky I was. (Dr.

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Suelter, you were my advisor!) Second, as part of Honors College, I was able to major in Biochemistry and still take private cello lessons. Where else could I have done that? Third, the undergraduate research fellowship, in your laboratory, was an incredible opportunity to experience the research process and to understand the lives of research scientists. My first in-depth exposure to libraries was the biochem departmental library – with no librarian to get in our way; having spent my career in academic science libraries, we now have the almost all-electronic library where the scientist can link to material independently and efficiently just as we did back then, only easier.
There were amusing moments as well – remembering your post-doc Mike Harris swim across the lake at the summer party, your lab's lamb roast — absolutely delicious, spending the night in the university infirmary after a clumsy lab accident, Hunsley's antics, Marlene and Fred's wedding, kindly Dr. Benne who worked so patiently with the undergrad trainees, and the wonderful fresh ice cream at the campus shop if there was any spending money to be had. Dorm life kept me connected to people in non-science disciplines. I still believe that single sex dorms were the best (how else could you have three dates in one day and not have them find out about each other?) I lived in Phillips Hall, right across from the Math building – there were always math TAs in the grill during the day who were ready and willing to provide math tutoring if the need arose. We did our best to "do good" – I was in Tower Guard, where we read to blind students. I still fondly remember a blind student named Willie – I would take him through registration, and we always tried to beat the average time it took for a sighted student to get his classes (and we always did it!). There is nothing like MSU football. I still remember Sherm Lewis running 85 yards for a TD my freshman year and seeing Bubba Smith in the bar when I was a senior (how could he be so BIG?). I should acknowledge that I'm a Trojan fan these days – except of course when they play MSU. But frankly, hot California weather doesn't cut it in comparison to a cool fall day for the big game. That was special!, Julie Kuenzel Kwan, National Network of Libraries of Medicine, Pacific Southwest Region, UCLA Louise M. Darling Biomedical Library, jkkwan@library.ucla.edu (Memories, 2010)

Lacika, John M.—BS
Physician, Regional Diagnostic Radiology, Saint Cloud, MN. I left science for medicine. (Biochemistry, 2000)

Lapenson, David - PhD '83
David is working as a computer specialist in Winthrop, Mass. (Biochemistry, 2009)

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Larue, John N.—PhD '69
Chemistry Teacher, Cherry Creek High School, Englewood, CO. I received the ACS Edward W.D. Huffman Award as the Outstanding Chemistry Teacher in the state of Colorado for 1998 (Biochemistry 2000). John retired after 28 years of teaching advanced placement chemistry at Cherry Creek High School in Englewood, CO. He said that teaching the brightest kids in a suburban high school of 3600 students was a great job, and he considered himself fortunate to have ended up in that position. In 1998, John was selected as the American Chemical Society Outstanding Chemistry Teacher in Colorado. John pointed out that it took 28 years for it to happen, but finally he had a student who was an offspring of a former student. "Certainly it was time to retire." Beginning in 1986, John had used his summers off to construct a log home in Townsend, MT, and now John and Roxann, his wife of forty years, are enjoying that home after his retirement in 2001. John's days are filled with lots of fishing, hunting, and woodworking. He adds that their older son is a registered fly fishing guide on the Missouri River - sounds like a good guy to know for any fishermen headed that way. John can be contacted by mail to 50 Antelope Road, Townsend, MT 59644, by phone (406) 266-3985, or bye-mail to (what else?) bigskyjohn@earthlink.net. (Biochemistry 2004) I have memories of challenging classes and long hours of research. There were personalities that did not always mesh and also kindly and caring professors. I also remember some high jinx along the way as I studied for a Ph.D. between 1964-1969. In the beginning I worried that the biggest obstacle to the degree was the course work. Of course, that is not the case. One's research becomes paramount. I remember going to sleep at night thinking of what experiment I would do the following day and of waking in the morning excitedly anticipating the results from the amino acid analyzer that had run during the night. I do not believe I have ever lived as intensely since. My major professor was Dr. John C. Speck, Jr. I know I was a difficult graduate student for him. We both survived the experience and we have stayed in touch over the years. I would like to mention Dr. Bieber, Dr. Sell, Dr. Luecke, Dr. Wood, and Dr. Lilliveck as men that I respected and whom I count myself lucky to have known. Don Rynbrandt, George Stone and Don Schneider were good friends and we still are. Some late hours were passed in Dagwood's tavern in their company. Also present were Jack Holland and Pat Fox. I tried to teach Jack the finer points of basketball as he played himself into shape. My wife and I travelled to Ireland in 2005 where Pat and

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Olive Fox welcomed us into their home for a lovely evening. Pat is, I believe, Professor Emeritus at the University of Cork in Cork, Ireland. I fondly remember Leo Klever who took care of the animals. Especially I remember Vaughn Snook and myself helping him breed two of his St. Bernard's. How did they ever get it done without human intervention? Mark R. was a student studying with Dr. Wood. His personality begged to be taken down a peg. One evening myself and an unnamed coconspirator jacked his car up and blocked the rear axle just high enough so that it appeared that the rear tires were actually on the ground. Naturally when one tries to move the car the rear tires simply spin and the only recourse is to remove the blocks from under the axle. I am not sure that Mark R. took this in very good humor because he never mentioned the occurrence to anyone. I count myself very fortunate to have studied in the Dept. of Biochemistry at M.S.U. and I am also grateful to NIH for providing me with the pre-doctoral fellowship that made this possible.

I thought I had a picture of Leo, Jack and myself having coffee in his lab but I could not find it. Perhaps some of what I have written is not quite what you were looking for but these are the memories that popped into mind. Best wishes, John LaRue (Memories, 2010)

Leavitt, Susan - Office Staff (1981-1996)

You asked me to try to describe a typical day in the Undergraduate office. Each day was different because you would never know who would walk in. Students would come in seeking information about the BCH major, or perhaps fill out a job application or to make an appointment or to process a major change. I greeted students waiting to see the pre-med advisor and answered questions. Faculty members might drop by to see if we had any student applications or to initiate a form to change a grade or simply to pop in to say hello & enjoy a treat. Each day I would check to see if we had any BCH student appointments for that day and if so make sure the file was in order as well as making sure the files for the pre-med advisor's were ready. Answering & responding to phone calls, making appointments for the Director & Pre-med advisor, planning Undergraduate club meetings/preparing monthly newsletter, and handle daily correspondence. These were some of the routine chores. Majority of my time was spent on whatever project was in the works at that time like assisting in the development of Co-op, and NSF High School Teacher Summer programs.
Regarding my experience with computers.
I don't really recall much about when we converted to computers in the Chairman's office. I assume the floor secretaries probably got them first and eventually I would

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have received one too in the Chairman's office. I wasn't typing up grants-more like Affirmative Action forms with a selectric typewritter. I think we were all trained using the Lanier word processing system once we all had computers.

I guess I can relate a little about my experience using the SIS (Student Information System). At the beginning, the SIS system was very limited with what the departments could access. We could view & print out our class lists, view BCH students records and make over rides. The Dean's offices had a higher clearance level and were able to use the SIS system to view all university student records & department class lists and probably much more. Over rides to BCH classes were handled at the department level. Students would come in and I would give them a form to be signed off by the instructor and return to me for processing. I also could view any of our BCH student's record if they were coded BCH majors in the SIS system. I could also print out an inactive BCH student record if we didn't have their student folder anymore. Another instance using SIS would be if a student changed his major to BCH but the folder was missing information, I could print out the student's transcript.

I think I was involved with the SIS system for only a few years before I moved out, but when the SIS system was being introduced to the departments it was not too difficult transition for me. Susan Leavitt (Memories, 2010)

Lee, Lucy - PhD '67

My journey to Michigan State University began in the fall of 1963. The Department of Biochemistry at that time was located in the Food Science building between Farm Lane and Circle Drive next to the Natural Science Building. I had already earned a Masters in cell biology at the University of Maryland. Hoping to be admitted to the graduate program, I talked to Dr. Gaurth Hansen, chairperson of the department. He required me to take Introduction to Biochemistry, which he taught, and to make an "A" in the course. I did so, received the "A" and was then accepted into the department in January of 1964. I was interested in molecular biology and Dr. Hansen suggested I major in Carbohydrate metabolism, which was his own major field of interest. At that time, the only Molecular Biology professor was Dr. John Boezi, but Dr. Hanson thought that since I had been a housewife for many years, I might not be able to meet Dr. Boezi's requirements. Nevertheless, I was accepted by Dr. Boezi as his graduate student. Indeed, Dr. Boezi was

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demanding but he was a wonderful, kind, patient mentor for his graduate students. He would not accept either English or Chinese as my foreign language. I had to take German and French as my two language requirements. The preliminary examinations for the doctorate degree were very difficult and I studied with a group of graduate students at the department, among whom was Bob Armstrong, the first graduate student of Dr. Boezi.

I received my Ph.D. degree in 1967. My dissertation was on "Isolation and Molecular Characterization of a Bacteriophage." This area of study was the foundation for my career at USDA Avian Disease and Oncology Laboratory (ADOL) in East Lansing. In 1968, when herpes virus was discovered to be the etiology of Marek's disease in Chickens, ADOL opened a position to hire a molecular biologist to study this chicken herpesvirus. Dr. Boezi was called by ADOL to find a person to fill this position. At the time, I was in University of Chicago Biophysics department as a postdoctorate fellow. I was hired and have been at ADOL for 42 years studying Marek's disease herpes virus-induced cancer in chickens. I was the first to sequence Marek's disease virus genome and isolated and identified the MDV genes involved in immune protection. I then was able to develop a number of important monoclonal antibodies and identified three different serotypes of MDV. These monoclonal antibodies are used by vaccine companies in monitoring their vaccines and by researchers in the field of MDV to study functions of various genes. A student in my laboratory was the first to identify MDV that carried an oncogene Meq and later I collaborated with an ADOL scientist in knocking out the oncogene. The Meq deleted virus did not induce tumors, which indicated that Meq gene was involved in MD pathogenesis. I recently found that the Meq knockout virus can protect chickens against Marek's disease and the efficacy of its protection exceeds the best conventional vaccine in use today. I am grateful that Michigan State University Biochemistry department prepared me with the knowledge and perseverance I need to carry out research in molecular biology for my career in Science. Lucy Lee (Memories 2010)

Levin, Amanda (Barrett) - BS '98
Amanda is a pediatric ICU fellow at Children's Memorial Hospital, Northwestern University, in Chicago. (Biochemistry, 2009)

Lewis, Douglas S.—PhD '78
Associate Professor, Department of Food Science &

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Human Nutrition, Iowa State University, Ames, IA. Currently working on the developmental regulation of lipid metabolism and potential link to aduet chronic disease. Have received several teaching awards (Biochemistry 2000). Doug Lewis received his PhD with a 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 7a-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 and the other a sophomore biomedical engineering major). two in high school and, last but not least, one in 4th 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). (Biochemistry, 2002)

Lewis, Geoffrey T.—BS '87
Technical Sales Representative, Ensco, Inc., Charleston, SC. Following graduation I took a position as an Analytical Chemist with Solvay Pharmaceuticals in Atlanta, GA from June 1988 to November 1990. I then moved to the position of Compliance Coordinator for Solvay Pharmaceuticals until August 1993 at which point I moved to Law and Co. Environmental Lab as the Business Development Manager until March 1996. In March 1996 I began my current position as a Technical Sales Representative for Ensco Environmental Disposal, Charleston, SC. (Biochemistry, 2000)

Lichtstein, Daniel M.—BS '70
Associate Professor of Medicine, University of Miami, School of Medicine, Miami, FL. Danny and Shirley

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Lichtstein, both M.S.U. graduates (1970) have been married 28 years. Their youngest child, Micki, is now a junior at M.S.U. I am presently an Associate Professor of Medicine at the University of Miami School of Medicine, and Director of Ambulatory Education there. My first book, "Preparation for Medical Practice, Made Ridiculously Simple" was published in 1998. (Biochemistry 2000) After completion of his undergraduate degree at MSU, Danny went on for an MD degree. Danny's wife, Shirley, is also an MSU grad (BA, Education, '70). They have two children, a son (BS, Univ. of Michigan, '95) and a daughter (BS, MSU, '99). Danny can be contacted by e-mail to dlichtstein@med.miami.edu. (Biochemistry, 2003)

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). (Biochemistry 2002) After graduation from MSU, Denise earned her MD from the University of Michigan Medical School in 1994. She did a residency in Pediatrics at the Children's Memorial Hospital (residency program of Northwestern University) and is now in general pediatric practice in Glenview, IL. Denise said she is currently living in Evanston, IL, married, and "with one gorgeous little girl, Maureen." Denise would welcome hearing from old friends by e-mail to dmlippitt@yahoo.com or phone (847) 729·6445. (Biochemistry, 2003)

Litchfield, William J.—PhD '76

Global Analytical Methods Manager, E.I. du Pont de Nemours & Company, Wilmington, DE. News to share (written in the third person): After graduating in 1976, Bill took a brief postdoc at the Johnson Foundation in Philadelphia before joining the DuPont Company in Wilmington, DE. Over the past 21 years with DuPont, he has enjoyed a number of different positions and projects ranging from developing clinical diagnostic tests and immunoassays for medical and agricultural uses to supervising various groups involved in research, product development and quality assurance. Currently, Bill is responsible for coordinating the development and use

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of analytical methods across eighteen plant sites in the US, Europe and Asia, as well as implementing a LIMS system to be used world-wide. His research interests include trace level analysis by immunoassay, HPLC and MS. Bill lives in Newark, Delaware with wife Marilyn and two sons, David a junior in high school and Brian a sophomore at the U.S. Naval Academy. He says "It's good to see familiar names and faces on the MSU Biochem Department Web Page. My best wishes to all." (Biochemistry, 2000)

Figure 8.10: (l to r) Donna Christeller, John Christeller (PhD "74), George Lorimer and Bill Laing (New Zealand). Courtesy of George Lorimer.

Liu, Edwin H.—PhD '71
Environmental Scientist, Environmental Protection Agency, Washington D.C. (Biochemistry, 2000)

Long, William P.—BS '94
Graduate Student, Pennsylvania State University, State College, PA. I received an M.S. in Biochemistry at the Pennsylvania State University in 1996 and am currently continuing work on my doctorate degree. (Biochemistry, 2000)

Lorimer, George - PhD '72. Great to hear from you again. I'm currently on a mini-sabbatical in New Zealand where I have taken the opportunity to meet up with another MSU Biochem alumnus and former resident of the Tolbert Laboratory, John Christeller (John.Christeller@plantandfood.co.nz). George Lorimer, Professor of Biochemistry, University of Maryland, College Park, Maryland 20742 (Memories, 2010)

Machalek, Alisa Zapp - BS '89
Alisa is a Science Writer at the National Institutes of Health (NIH). After graduating from MSU, Alisa earned an MS in Biochemistry from the University of Wisconsin, Madison, and then a Science Writing Certificate from the

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University of California, Santa Cruz. A recent profile on Alisa, produced by the NIH Office of Science Education, may be found at http://science. education.nih.gov / LifeWorks.nsf/ Interviews/ Alisa+Machalek Alisa worried that, from the pictures found at that web site, "all my friends are going to think that I've put on a lot of weight. In reality, I'm 5.5 months pregnant in those pictures (due date, August I, 2003)." The new baby will join the young son that Alisa and her husband already have. In addition to spending time with her family, Alisa enjoys swimming, hiking, mountain biking, gardening, cooking, and playing the oboe in chamber music groups. Alisa can be contacted by email to machalea@nigms.nih.gov or snail mail to: Alisa Zapp Machalek, NIH/NIGMS, 45 Center Dr., Room 3AN.32, Bethesda, MD 20892-6200. (Biochemistry, 2003)

Maine, Jim, Electronics Shop (1968-1993)
I have many wonderful memories of my affiliation with the Department of Biochemistry during my tenure from 1968 to 1993. Two come to mind.

Once after a centrifuge ceased to operate in Professor Wood's laboratory and after someone in the laboratory deduced that a fuse had blown, one of the graduate students was asked to go to the electronic shop to get a fuse. After I was alerted to this situation, a student from the laboratory came to see me. I said, sure I have a fuse and went to a cabinet to get a power fuse that was nearly 2 inches in diameter and about a foot long. The student then returned to the laboratory with the fuse and soon learned that he was duped. Everyone but the student had a good laugh.

Another memory that comes to mind was not as funny but involved a graduate student in Professor Tolbert's laboratory who was asked to fumigate a growth chamber in the basement. I soon became aware of a problem when I was going down the basement hallway and noticed a lot of smoke billowing out from under the door to the room housing the plant growth chambers. Since I was always told not to open the door to a room that might have a fire, I immediately called the fire department that alerted the building occupants to clear the building. After the fire department arrived, they donned special gear that allowed them to breath in a smoky environment and proceeded to the basement. Soon they came out of the basement carrying an aluminum plate which had been used to hold a fumigant that had been lit with a match to generate the fumigating smoke. It turned out that the student had lit the whole jar of fumigant rather then just a small amount.

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After the smoke had cleared sufficiently everyone could return to their laboratory or office. Jim Maine, Science Instrument Facility Supervisor. (Memories, 2010)

Maino II, John C.—BS '75
Medical Director, Foote Memorial Hospital, University of Michigan Health System, Department of Surgery, Section of Emergency Medicine, Jackson, MI (Biochemistry, 2000)

Malhotra, Vishal BS '04
My name is Vishal Malhotra and I am a third year Biochemistry Major here at Michigan State University. The reason why I got influenced into the biochemistry major is because since high school I had taken course work that attracted me towards the science fields. Biochemistry is a great undergraduate curriculum that prepares you for anything you might go into. I specifically want to go to medical school and aspire to become a pediatrician. I felt the biochemistry program here at MSU give you the most preparation for that track, as well as laboratory experience, which is essential to any further graduate/professional school requirements. The biochemistry club has given me an opportunity to network with fellow friends and students involved in the same field as I am. It provides a relaxed atmosphere and time to relax away from classes. I feel all these benefits give me an advantage picking biochemistry as my undergraduate major. Not only is it challenging, but it is the most rewarding I feel. Vishal Malhotra (Biochemistry, 2002)

Matanhire, David N.—BS '86
Medical Research Officer in the Ministry of Health, Blair Research Laboratory, Ministry of Health & Child Welfare, Causeway, Harare, Zimbabwe. Since graduation I have been doing research in Public Health in schistosomiasis at the National Centre for Health Research. I have a Masters in Public Health (MPH) which I completed in 1994. I plan to undertake Ph.D. studies in public health when opportunities permit very soon. (Biochemistry, 2000)

Mayo, Joseph W.—PhD '68
Private Practice - Pediatrics, Columbia, MO. I did a Postdoc from 1968-1970 followed by a position at Case Western Reserve University as an Assistant Professor of Biochemistry from 1970-1972. I then returned to medical school and received an M.D. degree in 1976 from Case Western Reserve University. My internship and residency were done at the University of Montana from 1976-

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1979. In 1979 I took a position as Assistant Professor of Child Health until 1985. Since 1985 I have been in private practice - pediatrics. Personal regards to Dr. Dick Anderson. (Biochemistry, 2000)

McCoy (Titlow), Andrea—BS ’95
Research Assistant, Texas Health Science Center, San Antonio, TX. After graduation I left for the University of Carolina’s program in Medicinal Chemistry. After a year in the program I took a position in the Biochemistry/ Biophysics Department. In February 1998, I married Tom McCoy, Lieutenant, US Navy. Shortly after, we were moved to San Antonio which brings me to the present. (BMB Brochure 2000). After graduation, Andrea spent a year in the graduate program in medicinal chemistry at the University of North Carolina Chapel Hi1l then switched to the Department of Biochemistry and Biophysics where she worked on the effects of the HA-fusion peptide on membrane fusion. After marriage in 1998, she moved to the Texas Health Science Center in San Antonio where she worked on mechanisms of bacterial resistance to antimicrobial peptides. Currently, Andrea is in the Molecular and Cell Biology graduate program at the Uniformed Services University of the Health Sciences in Bethesda, MD; her research interests are in the area of bacterial pathogenesis. Andrea can be contacted at her home address, which is 6546 Creek Run Drive, Centreville, VA 20121, or by e~mail at ajmccoy8@ hotmail.com. (Biochemistry, 2001)

McCroskey, Mark C.—BS ’82
Senior Research Biochemist, Pharmacia & Upjohn, Protein Science, Kalamazoo, MI. Member of Board of Directors of MSU CNS Alumni Association. (Biochemistry, 2000)

McGroarty, Estelle, Biochemistry Faculty (1981-)
When the Department of Biophysics was discontinued in 1981, I was appointed as an Associate Professor in Biochemistry. My initial lab, room 302, housed 3 BPY graduate students, Rick Coughlin, Denise Mazorow, and Arnie Peterson and a postdoc, Ganghzou Xu. Additional BCH graduate students were recruited over the next several years, including Warren Rocque, Mildred Rivera and Jill Todd, and this expanded group moved to a first floor lab, room 107 during the 1990-91 academic year. The group was quite productive turning out 30 publications over an 11 year period (1981–1992) in some of the top journals in biochemistry and microbiology.

My initial teaching assignment in the Biochemistry Department was the 5 credit course, BCH 200. Also,

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Shelagh Ferguson-Miller and I also co-taught a select topics course on membrane structure in 1984. Then in 1986, Paul Kindel and I were asked to work with Dick Luecke to take over the general biochemistry laboratory class, BCH 404, since Dick was retiring. Dick had primary responsibility for the course in 1986, while Paul and I helped out. The next year Paul and I began to modify the course. Then in 1988 the course was split into two courses – BCH 404 (now BMB 471) and BCH 405 (now BMB 472). Clarence Suelter took on the task of developing BCH 405, and Paul and I developed a completely revised BCH 404. At that time, both lab classes were 2 credit courses in the quarter system. We developed a new approach for BCH 404 which included three major projects set up as "research" experiments; the students were taught how to set up their own protocols for completing the experiments given only general directions. We also had to teach the TAs how to guide the students in setting up the experiments and not to give specific and detailed instructions. The first year the course was taught with this new approach, it was rather overwhelming for the students (and the TAs) – a lot of work for a small amount of credit. At the end of the course in 1988, the students banded together and purchased a set of T shirts for the class that read "We survived BCH 404." The course was modified to a 3 credit course because of the work load and then expanded somewhat in 1993 when first offered as a semester long laboratory class. The course has been "tweaked" in recent years but includes the same basic set of experiments from when the course was first designed. Over the years, BMB undergraduate alumni have indicated that, although this was one of the hardest classes they ever had, it was one of the very best – the course that taught them the most.

In 1990, I was asked to take on the role of BCH Undergraduate Program Director. This was at a time when the University was preparing to switch from the quarter to the semester calendar (in the summer of 1992), Change the undergraduate general education requirements – developing the Integrated Studies in General Science courses (ISP and ISB), the Integrated Studies in Arts and Humanities courses (IAH), Integrated Studies in Social Sciences courses (ISS), and new writing requirements, including Tier II writing in the discipline, instituted course enrollment on line and by phone. Set up the student information system – SIS.

These changes required that every course in the department and on campus be revised, and the requirements for the undergraduate (and graduate) majors be

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revamped. I took on the challenge and worked with the departmental faculty to revise the BCH courses and curriculum. During this time I participated in academic governance as the new graduation requirements were considered and approved. I served on the College of Natural Science Tier II writing Committee, on Academic Council, and on the Advisory Committee to the Director of Integrative Studies. I helped define how students would complete their degree requirements with "transition courses" during the transition of the academic calendar. During my service as Undergraduate Director I was successful in securing an NSF Research Experiences for Undergraduates (REU) grant and served as the PI for three years. The grant was renewed, and Laurie Kaguni assumed leadership of the REU program in 1994 when I stepped down as Undergraduate Program Director to serve as Associate Dean for Student and Academic Affairs in the College of Natural Science. Estelle McGroarity (Memories, 2010)

McIntosh, Lee – Biochemistry Faculty (1981-2004)
In Memoriam: Lee McIntosh, age 54, beloved son, father, brother and friend, lived tenaciously and died with courage on June 28, 2004, in Lansing, MI. He loved his family, the land he farmed, and the scientific research that he pursued with colleagues. He was devoted to his son, Angus, whom he believed to be a precious gift, and he cherished the support and love from his family and friends."

These words are taken from a tribute (http://www.prl.msu.edu/mcintosh.shtml) to Lee written by his sister, Jean McIntosh. After many years of battling chronic lymphocytic leukemia, Lee succumbed to this disease. Together with his family members, many of Lee's friends and colleagues attended a memorial celebration of Lee's life that was held in the MSU Horticultural Gardens on July 2. Comments made at this occasion attested to Lee's many contributions as a scientist, his devotion to his son, Angus, his remarkable intellect and sense of humor, and his qualities as a warm and loyal friend. There is no doubt that Lee McIntosh will be deeply missed here at MSU - his science was superb, and one could not wish for a finer person to call colleague and friend.

Lee joined the faculty at MSU as an Assistant Professor in 1981 after receiving his PhD (1977) in Botany from the University of Washington, followed by postdoctoral work at Harvard University. He was jointly appointed in the MSU-DOE Plant Research Laboratory and the Department of Biochemistry (now Biochemistry and Molecular Biology), and also was a faculty member

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in the interdepartmental Genetics Program. He was promoted to Associate Professor in 1986, and to Full Professor in 1990. Together with Barry Chelm (another faculty colleague now deceased), who joined the MSU faculty at about this same time, Lee brought a new dimension to plant biochemistry research on campus, namely, the application of the concepts and methodology of "molecular biology" to the plant sciences. As he described it on his faculty web page (http://www.prl. msu.edu/mcintosh.shtml). Lee's research interests were in the "molecular biology of energy transduction" in plants. He and his coworkers studied the genes, and the corresponding proteins, that were involved in energy producing processes in plant mitochondria and chloroplasts. He also was known internationally for his work on the so-called "alternate oxidase," an electron transport system unique to plant mitochondria in which electron transport is not coupled to ATP synthesis (ATP is the chemical form in which energy provided by electron transport is "captured" for use in driving energy requiring processes in the cell); rather, the energy is released in the form of heat. Lee and his students focused on understanding the molecular basis and physiological role for the "alternate oxidase" activity in plants.

Lee was highly regarded by the scientific community, and very active in service to the profession. At the time of his death, he served on the editorial boards of the journals Planta and Protein Expression and Purification and was guest editor for Plant Molecular Biology. He had served on panels reviewing research proposals submitted to several funding agencies, including NIH, NSF, USDA, and DOE, and on the International Steering Committee for the Human Frontiers in Science Program. He was an organizer for several major symposia and international meetings in the area of plant biochemistry and molecular biology. His outstanding contributions were recognized with MSU's Distinguished Faculty Award in 2002.
For those who may wish to honor Lee's memory with a donation, the family has suggested that these may be made to the Chronic Lymphocytic Leukemia Foundation, 1415 Louisiana, Suite 3625, Houston, TX 77002 (http://www.cIlfoundation.org/). (Biochemistry, 2004, pp. 10-11)

McKenna, Timothy M. BS '73:
Tim also received his DO degree from MSU in 1976. He is board certified in general surgery and is in a general surgery practice in the Lansing area. He currently serves as Vice-Chair of the Department of Surgery for Sparrow

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Health Systems and can be contacted by mail to 1209 Windale Place, East Lansing, MI 48823. (Biochemistry, 2001)

Mehlhorn, Gary L.—BS '70
Ophthalmologist, Eye Surgeons of Springfield, Inc., Springfield, MO. Since graduation I first attended Medical School at the University of Tennessee and received an M.D. degree in 1973. From 1975-1978 I was a Flight Surgeon in the U.S. Navy. I then did an ophthalmology residency at the University of Tennessee from 1978-1981. I continued my interest with a Fellowship at the Vitreo-Retinal Foundation in Memphis from 1981-1982. Presently I am an Ophthalmologist — specializing in vitreo-retinal surgery. (Biochemistry, 2000)

Melcher, Ulrich K.—PhD '70
Professor of Biochemistry & Molecular Biology, Oklahoma State University, Stillwater, OK. Primary interest: Virus Evolution. Organized first discussion of the subject at the annual meeting of the American Phytopathological Society. I also direct the Oklahoma State University Recombinant DNA/Protein Resource Facility. On a family note, we expect a Ph.D. for a third generation biochemist as daughter, Sonya, is about to finish at the University of Wisconsin, Madison. (BMB Brochure 2000). In May of 1999, Ulrich was named as the first incumbent of the Robert J. Sirny Professorship in Agricultural Biochemistry at Oklahoma State University. Ulrich's research interests are focused on plant viruses and their molecular evolution. Ulrich can be contacted at the Department of Biochemistry and Molecular Biology, 246 NRC, Oklahoma State University, Stillwater, OK 74078, or by e-mail at umelcher@biochem.okstate.edu. (Biochemistry, 2001)

Melkerson-Watson, Lyla J.—PhD '91
Research Associate II, Department of Pediatrics, University of Michigan Medical Center, Ann Arbor, MI (Biochemistry, 2000)

Menson, Robert C.—PhD '76
Principal, Menson & Associates, Inc., Newport, RI (Biochemistry, 2000)

Merski, Matthew . BS '99
Matt is currently enrolled in the PhD program in the Department of Biophysics, Johns Hopkins University, in Baltimore. (BMB Brochure 2002). Matt graduated from MSU with degrees in both Biochemistry and Philosophy.

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He is currently a graduate assistant at Johns Hopkins University in Baltimore, where he is working on a PhD in Biophysics. He can be contacted by e-mail to mtmI@jhunix.hcf.jh.edu. (Biochemistry, 2003)

Michaelis, Charles S.—BS '89
President, Rocky Fork Formulas, Inc., Westerville, OH. From 1989-1990 I served as Lab Manager for the Department of Horticulture, Viticulture & Enology at M.S.U. and published an article "The Content of Phenolic Acid and Aldehyde Flavor Components of White Oak as Affected by Site and Species. American Journal of Enology & Viticulture, vol. 43, no. 4, 1992. In 1990 took a position as Lab Technician, QA Department, Wyeth-Ayeist Labs, Inc., Mason, MI until 1993. From 1993-1995 moved to Thermal Processing Technologist (Associate) in Nutritional Development Department at Wyeth-Ayeist Labs, Inc. In 1995 -1996 - Head Thermal Processing Scientist in Nutritional Product and Process Development Department at Wyeth-Ayeist Labs, Inc. I then moved to Ross Laboratories as Project Leader of Sterilization Technology in Columbus, OH. Since 1997 to present, President of Rocky Fork Formulas, Inc. in Westerville, OH. (Biochemistry, 2000)

Mikols, Mark R.—BS '91
Medical Student, Michigan State University. Finishing my M.A. in IPHH from M.S.U. in December 1998 and will complete my D.O. (osteopathic medicine) degree in June 2001. (Biochemistry, 2000)

Miley, William H.—BS '75
Senior Process Specialty Engineer, Fluor Daniel Engineering, Inc. (Biochemistry, 2000)

Miller, Stewart F.—BS '70
President, Ocean Pathology, P.A., Toms River, NJ. Since graduation I became a physician specialized in pathology and have spent the last 20 years practicing diagnostic human pathology in the community hospital setting. Of all the many aspects of my daily work, I enjoy the continuous learning process the most. (Biochemistry, 2000)

Minor, Dennis BS '10
I graduated from Lockport High School, of Lockport, NY, in 2006. I found myself at Michigan State mainly because of my love for the school and its beautiful scenery. I entered into the program partly because I had a general liking towards biology and chemistry. I have

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aquired many fond memories over my four year stay in East Lansing. In general, I'll never forget the friendships I created in the department. It is the people I've interacted with that have helped me get to where I am today. Dennis Miner (Memories, 2010)

Mitchell, Earl PhD '66

Thank you for the invitation to respond with some of my experiences at MSU when I was a graduate student. I was a graduate student in Chemistry and after completing my M.S degree with Dr. Robert Schuetz in 1963, I became a graduate student with Ed Tolbert. I was in chemistry with an office in the Kedzie Hall (The Chemistry Building) when the biochemists in chemistry and the agricultural chemists were combined to form the Department of Biochemistry with Gaurth Hansen as the new department head.

I was going to take a job with DuPont but decided to move to biochemistry and earn a PhD. Tolbert had a grant from the ACS (Fraush Grant) to study the chemistry of seed germination and he needed a student with a chemistry background. He had hired a chemistry graduate student who synthesized several compounds in which one was the Chloro-choline chloride (CCC) that was patented and later used commercially to preserve plants in transit. I was the only student of Ed. Tolbert that did not work on any aspect of Photosynthesis. I never grew algae or isolated chloroplast from spinach and do a glycolate experiment. Therefore, Tolbert had a difficult time in remembering my name.

I had one of the best research experiences that any graduate student could have. I was independent and learned to do a lot of my own work while the rest of the lab had technical help with a lab tech to do some of the basic preparation work and to keep supplies handy. Dr. Tolbert had little interest in the specific project but was very supportive in allowing me to develop the research. He hired post doc Anwar Khan who was the plant physiologist and he taught me a lot about bioassays but I was the isolation, and purification chemist that extracted the materials seeking the chemical entity that was the germination inhibitor. When Anwar Kahn left it became my project. Tolbert still rarely knew my name. The ultimate was his introduction at my final seminar to the department as Earl Miller. It was a standing joke with all of the graduate students but never a problem with me. I discovered that his calling me Earl Miller was his association to a graduate student with him at

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Wisconsin that resembled me. It was our secret, which I never told anyone. I was very grateful for his support and encouragement throughout my tenure as a graduate student. When I completed my degree, he kept me on for three months as a Post Doc to complete the manuscript and to follow up on some more synthesis.

We had an excellent camaraderie among the graduate students and one of the things I learned was this relationship helped all of us to aid each other. We would share articles that we might have read that were associated with another student's research. We helped each other if there was a need to use a special technique or to use a specialized piece of equipment. I continued this with my own graduate students. It was known by graduate student that I was going to ask them about the research in laboratories outside your own and specifically what some of their colleagues were doing.

One of my interesting experiences was attending the Federation Meetings. In those days they were only held in Chicago and Atlantic City. As Graduate Students we would go together and get a room for four and sleep six. This one year we (Keith Schlender, John Hess and Bruce (McDonald) decided to drive to Atlantic City. Don Anderson of the Andersons of Maumee , Ohio. left his 1956 Cadillac for us to drive and pick him up in Maumee. Don told us there was enough gas to drive from East Lansing to Maumee but we ran out of gas 30 miles from Maumee. We stopped on the highway a long way from a gas station but there was a farm with a Sunoco tank. We approached the farm and asked if he could help us with a couple gallons of gas because we were students. We obtained two gallons of gas from a farmer who charged us three dollars (Gasoline prices were 30 cents/gallon at the time). He mumbled that 'they always run out of gas here so I always help them out. A buck fifty a gallon - what a deal!

We went on to Atlantic City but made a wrong turn while going through Philadelphia and ended up in one of the worst parts of town. As Don was driving through, he remarked about the neighbor hood and how tough it looked. I jokingly said that I was going to yell out the window and say I was a prisoner and they had my mommy in the trunk. There was a complete and serious silence that went through the car as I noticed the white knuckles on the driver's hands. Then I realized that they were really scared. I assured them that being with me made it safe. I never let them know that I was scared too. The experiences at the Federation meeting were quite an eye-opener. We heard some of the best papers in the

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world, ate at Zabberers, went to the best strip shows and attended the Calbiochem Annual Consumers Convention - all the food and beer you could consume. We also made every possible reception we could find. Boy, this is the life. We were meeting these famous scientists who were like us at the free trough. I managed to survive with less than $75 spending for the week. The university gave us $100 to help pay for expenses.

Later as a faculty member we took students and allowed them to be in our rooms that was paid for through our reimbursement and we all (Faculty) agreed to a pay or one student dinner. It was a great experience.
I am now retired with some different interests. I have had a good career culminating in some recognition. <http://osu.okstate.edu/news/halloffaminductees_huffer_mitchell.htm> I have always appreciated my education and training at MSU. Earl D. Mitchell, Jr. PhD, Professor Emeritus, <earldmjr@sbcglobal.net> <earldmjr@gmail.com> <http://osu.okstate.edu/news/halloffaminductees_huffer_mitchell.htm> (Memories, 2010)

Morris, Allan J. – Biochemistry Faculty (1963-1988)
In Memoriam: 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.

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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 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. (Biochemistry, 2002, p. 12)

Mort, Andrew J.—PhD '78
Regents Professor, Department of Biochemistry and Molecular Biology, Oklahoma State University, Stillwater, OK. Joined Oklahoma State University in 1981 and tenured in 1985. In 1989 I became Professor and Regents Professor in 1996. We work on structure of pectin in plant cell walls, and enzymes degrading pectin. (Biochemistry, 2000)

Moutsatsos, Ioannis -- 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 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

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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. (Biochemistry, 2002)

Mulkins, Mary A.—BS '74
Research Scientist, Roche Bioscience, Palo Alto, CA. I received a Ph.D. in oncology from the University of Wisconsin, Madison. I then did a postdoc at Stanford Medical School in pathology. Since 1984 I have been at Roche Bioscience in pharmaceutical research. (Biochemistry, 2000)

Myers, Terry L.—BS '63
Associate Dean for Clinical Affairs, Texas Tech University Health Sciences Center, Amarillo, TX. In 1969, I earned a Ph.D. in molecular biophysics from Florida State and then an M.D. in 1973 from the University of Virginia. I am board certified in clinical genetics. (BMB Brochure 2000) When I went to MSU in 1960 as a sophomore I was assigned to Sydney Fox as a research assistant by the Honors College. I never discussed it but I think he had been at odds with the zoology department and claimed discrimination because he was Jewish and they had settled things by transferring him to what was then the department of agricultural chemistry with a lab in the basement of the old dairy across the street from the chemistry building. Since the Honors College at that time did not require any majors/minors or anything other than total hours taken your degree was basically determined by what department your advisor was in. I left in 1962 as again in those days pre-med was three years and then transferred back my first year of medical school's credits to complete my BS degree which was simply mailed to me with no other explanation as to an "in....." designation. I have always avoided listing having a BS in agricultural chemistry as I didn't think my patients would understand! I presume the department changed its title (and my degree designation?) during my year in medical school.

I do however have a Ph.D. in molecular biophysics from Florida State University which I took under Herb Taylor in 1969. It was really a degree in genetics that

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normally would have been in zoology except again we were identified with a free standing Institute for Molecular Biophysics.

I completed medical school at the University of Virginia and immediately joined the faculties of Creighton University and the University of Nebraska medical schools in Omaha as an associate professor of pediatrics where I established a clinical genetics program. A brief CV looks like this:

Creighton University - associate professor of pediatrics
East Tennessee State University - associate professor to
professor of pediatrics and obstetrics and gynecology
interim chairman department of family medicine
interim chairman department of pediatrics
Texas Tech University (Lubbock) - professor of pediatrics
and obstetrics and gynecology
Texas Tech University (Amarillo) - chairman department
of pediatrics
interim chairman department of internal medicine
associate dean for clinical affairs and medical director

I don't know anyone else who has ever been the chair of three different disciplines in medical school! I am now retired and tomorrow will visit the territory of Aland which will be the 191st country on my list of visited countries. Terry L. Myers, M.D., Ph.D. (Memories, 2010)

Neudahl, Gary—MS '82

Technical Services Manager, Costec, Inc., Palatine, IL. From graduation through mid-April 1995 I worked at Alberto Culver Company as a research chemist, senior research chemist and group leader of toiletries product development for the U.S. and Canada. Since then at Costec, Inc., as a technical services manager, acting in education, formulation development and communications capacities. I recently had a review published in Drug & Cosmetic Industry. I have been married for 20 years with children ages 12, 10, 7, 4 and 1. (BMB Brochure 2000). "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 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

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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). (Biochemistry, 2002)

Neumann, John A.—BS
Quality Assurance Manager, Sun Chemical, Frankfort, IN. Presently Quality Assurance Manager for two divisional manufacturing locations. Patented low shear rheometer. Senior member American Society for Quality. Completing work towards Ph.D. - developing instrumentation calibration mechanisms. (Biochemistry, 2000)

Neville, Sandy O.—BS'77
Senior Programmer/Analyst, Amway Corporation, Ada, MI. After graduation I joined the Peace Crops from 1977-1979. I then worked with Amway as a chemist from 1979-1983 moving to Wayne State University as a chemist from 1983-1984 and as a chemist at Everpure from 1984-1986. In 1986 I worked with Gerber Life Insurance as a programmer until I rejoined Amway as a programmer in 1991. (Biochemistry, 2000)

Nordin, Jack PhD '61
I believe the location is Captain Starns Restaurant in Atlantic City, probably in April 1959 or 1960 (See Figure). Dr. Hansen had driven the 5 of us students to the Federation Meetings from MSU. I had my first-ever meal of steamed clams there, an entrée choice promoted by Hansen. I became an instant devotee and have ordered them whenever I get the opportunity. Because Roger, Don, Dave, myself and Bert Forrest, (not pictured) migrated together from the University of Illinois, a strong bond existed between the "founding brothers" of MSU Biochemistry which lasted throughout our terms in graduate school. Don Carlson was a great "kidder" and always took the opportunity to tease Dr. Hansen about the wonders of night life in Atlantic City and suggested that he should join with us on our late night carousing. Hansen, who was rooming with us that year, always replied that he would pass on the opportunity but that all of us should be sure to come back to the room thru the autoclave?.

The photograph of Roger Bretthauer leading a discussion was probably used as a publicity brochure of some type but fairly represents the setting for the daily noon research/lunch meetings which, in the earliest days,

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featured an informal presentation of a recent article of interest to our research group (the only one for the first year or so). As more faculty arrived to inhabit labs here in the old Food Sciences Building, folks from other labs joined in.

Roger developed a rapid, quantitative, spectro-photometric assay for distinguishing galactosemics from normal and heterozygotes for the affected gene. The assay, which used lysed erythrocytes, provided clinicians with the first useful method for diagnosis (and screening) of suspected (infant) galactosemics. A very important contribution to the field.

When Professor Hansen was invited to become the Department Head of Biochemistry, he was offered space, which had been refurbished within existing rooms of the building, which we shared with Food Science. When we students arrived to unpack the lab equipment and chemicals from very crowded space we shared at Illinois, we were pleased to have much more operating room.

Figure 8.11: Professor Guarth Hansen research group meeting in a restaurant, probably Captain Starns Restaurant, in Atlantic City, NJ during a Federation Meeting in April 1959 or 1960. (l to r) Jack Nordin, Roger Bretthauer, Jerry Mayes, Dave Wilken, Don Carlson, and Professor Hansen. Courtesy of Roger Bretthauer and Jack Nordin.

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In regard to naming the new Department, and although Guarth inherited a few faculty members from the Ag Biochem group, he insisted that it carry the name Department of Biochemistry. It was also to remain separate from the Biochemistry division of the Chemistry Department. (Did we have two deans? Arts and Sciences; Agriculture?). During my time at MSU, Guarth Hansen, Ed Tolbert, Woody, and perhaps others, developed plans for the new building which they hoped to use to persuade NIH to help bankroll. As I recall the plans were enthusiastically received at NIH because the building had such a high proportion of utilizable space, compared to many other buildings constructed about the same time.

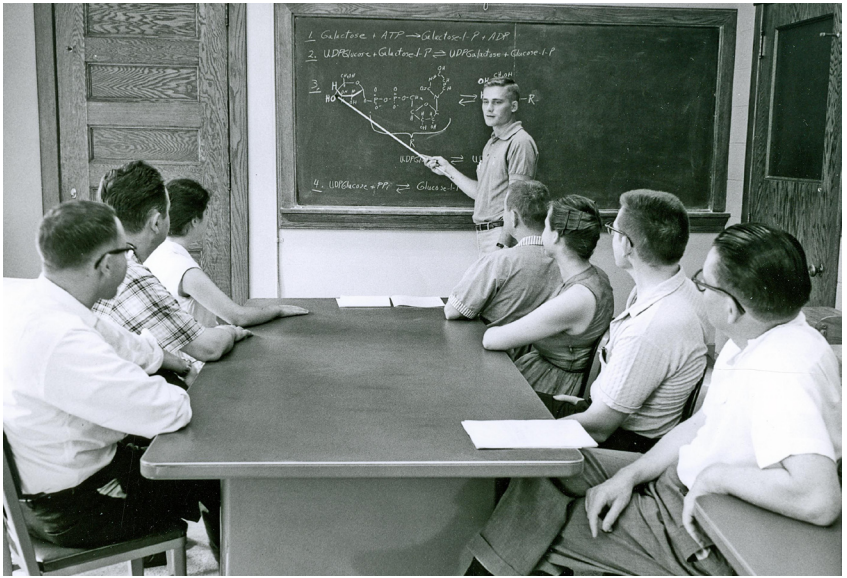

Figure 8.12: A view of Roger Bretthauer leading a research discussion in a conference in the Dairy Science Building before the Biochemistry Building was built. (l to r) Richard L. Anderson, unknown, Diane DeNio, Roger Bretthauer, Jack Nordin, Marcquita H. Samli, Ransom L. Baldwin and Professor Guarth Hansen in 1960-61. UA 16.18. Michigan State University Archives and Historical Collections..

Guarth Hansen worked hard at getting our fledgling department recognized early on. He developed a strong relationship with John Hannah, the president, I believe, of MSU at the time and convinced him of the importance of our field in the future of medicine, industry and agriculture, hence the need to invest resources in our department and bring MSU up to the level of U of M. While I was there I also remember that we participated in a one-day business/technology expo in Detroit, organized I think, by G Mennen Williams the governor. Several of us set up equipment and manned a booth giving demonstrations and showcasing the latest instruments etc. The reception from attendees was very positive and helped introduce our

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department to the larger business/science community in the state.

One lasting memory of my MSU days is the profound change Guarth Hansen made in my life. In addition to being an outstanding scientist, he was a superlative mentor and teacher who set very high standards and also greatly broadened my intellectual and cultural awareness. He always made a great effort to see to it that we were given opportunities to meet other scientists, attend meetings and seminars off campus and generally become involved in our profession outside the lab.

You folks in the nuclear family of faculty founders did an outstanding job of building a great department, of which we first students have always been very proud. Congratulations.

Good luck with your publication, and if I can help with specific questions you may have regarding the period 1958-1961 at MSU, please contact me, Jack Nordin (Memories, 2010)

Norris, Joanna (Hanks) PhD, '82
Joanna is currently Associate Professor and Health Professions Advisor at the University of Rhode Island. She can be contacted at Department of Biological Sciences, Ranger Hall, University of Rhode Island, Kingston, RI 02881, or by e~mail at jnorris@urLedu. (Biochemistry, 2001)

Ober, K. Patrick—BS '70
Professor of Internal Medicine, Wake Forest University School of Medicine, Section on Endocrinology & Metabolism, Winston-Salem, NC (BMB Brochure 2000) Graduated from MSU with B.S. in Biochemistry/Honors College in 1970. Graduated from University of Florida College of Medicine in 1974. Completed residency and fellowship at Wake Forest University School of Medicine, and have been on faculty since 1979. Currently Professor of Internal Medicine [Endocrinology and Metabolism] and Associate Dean for Education. Author of *Mark Twain and Medicine: Any Mummery Will Cure* [University of Missouri Press, 2003]. Listed in "Best Doctors in America."

In May 2010, inducted into the College of Physicians of Philadelphia, America's oldest medical professional organization [it was founded in 1787 by Dr. Benjamin Rush, signer of the Declaration of Independence]. The induction ceremony took place in the room where, 89

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years earlier to the exact day, Marie Curie spoke to the fellows of the college about her experiments with radiation, and predicted [correctly!] that radiation would come to play a large role in the future of medicine. K. Patrick Ober, MD (Memories, 2010)

O'Rourke, Timothy J.—BS '71
Physician, Cancer & Hematology Centers of Western Michigan, Grand Rapids, MI (Biochemistry, 2000)

Patterson, James M.—MS '78
Medical Recruiter, Ventura, CA. Spent 5 years in R and D at Scripps Clinic and Bio Rad Labs; 9 years in sales and marketing at Eli Lilly and Baxter; 6 years in medical recruiting for senior management in biotech and pharmaceutical companies. I have been married for 22 years. I have two daughters, one at the University of California, San Diego and the other a senior in high school. (Biochemistry, 2000)

Payne, Kenneth J.—PhD '69
President, Ken Payne and Company, North Stonington, CT. From 1969-1971 I was an NIH Postdoctoral Fellow at Duke University, Department of Microbiology & Immunology. In 1971-1982-I worked for Pfizer, Inc., beginning as a staff scientist; 1974-1977 Associate then Assistant Director, Licensing and Development; 1977-1978 Analyst then Manager, Product Marketing Research; 1978-1982 Product Manager, Roerig Division. In 1982-1984 I worked for Lavey/Wolff/Swift as an Accountant Supervisor. Since 1984 I have had my own business which provides consultation service to the pharmaceutical industry concerning the development of scientific information for internal use or presentation to the medical community. Clinical trials, analysis and publication. I have two children Kimm and Michael and two grandchildren, Jessica and Sarah. (Biochemistry, 2000)

Pepperl, David J. BS '88
Hello! Very nice to hear from you. I was in the BCH program, and graduated in 1988. I worked in Dave McConnell's lab for some time during my undergraduate time, which helped me get into grad school. I worked briefly as a technician in Steve Triezenberg's lab up on the 5th floor. I heard that he had moved on to new position a few years ago.

After MSU, I went into Pharmacology/Toxicology at the University of Arizona (Tucson), where I received my PhD in 1994. Ultimately, I did continue to have an interest in BCH, cell and molecular biology and in vitro techniques. Most of my graduate work (with adrenergic

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receptors) involved cell and molecular biology, and my thesis work focused on functional expression and pharmacology of alpha-2 adrenergic receptor subtypes using a transient gene expression system. I returned to Michigan from 1994 to 1998, where I did some post-doctoral work in industry (Upjohn and Parke-Davis), where I again focused on signaling, pharmacology and molecular biology of G-protein coupled receptors (mostly dopamine receptors).

I became involved in the drug development process in 1998, working with small biotechnology companies to assist with their pharmacology and toxicology studies in support of FDA submissions. It's VERY different from basic research in biochemistry, and primarily a desk job, but I do get out to laboratories to perform audits and inspections and meet with biotech companies (my clients).

I'm currently working with a small biotechnology regulatory consulting group, called Biologics Consulting Group. We help clients with their product development and get their products into the clinical by working with the FDA and designing, developing and reviewing their study data that goes into FDA submissions. It's very interesting and we get to see some very unique products, mainly antibodies, vaccines, cell and gene therapies and viral vectors. (see link below). I mostly work from home here in Maryland (Gaithersburg, MD), where I reside with my wife Stefanie and three children. My contact info is below, and I'm very pleased to hear from you. Thanks!, Best Regards, David J. Pepperl, Ph.D., Sr. Consultant Biologics Consulting Group, Inc., 1317 King St., Alexandria, VA 22314 (301) 987-5627, dpepperl@bcg-usa.com

Dr. Pepperl joined the BCG team in January of 2004. As a toxicologist and preclinical development manager, David has managed numerous development projects ranging from small peptides, small molecules, monoclonal antibodies, cell and gene therapy products, adenoviral therapies, bacterial based oncology therapies and hormonal therapies. At BCG, David will provide services including development and review of preclinical product development programs, strategic planning of program implementation capabilities, review and preparation of nonclinical study reports and regulatory submissions, and GLP auditing and study monitoring services for both emerging and established biopharmaceutical companies. Prior to joining BCG, David served as toxicologist and

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Manager of Preclinical Development at TherImmune where he drafted preclinical development strategies, authored nonclinical sections of regulatory submissions and managed preclinical development programs for clients. In this capacity, he designed and managed nonclinical pharmacology and toxicology studies, performed GLP and scientific audits and reviewed study data on behalf of clients. http://www.bcg-usa.com/cvfiles/html/pepperl.html (Memories, 2010)

Peterson, Donna—MS '67
Senior Scientist, Minnesota Technical Assistance Program, Minneapolis, MN. For last 13 years worked at MNTAP, a nonregulatory program at the University of Minnesota assisting businesses in Minnesota with environmental compliance and waste reduction. Recently was part of the team that won an award for The Great Printers Project, an innovative collaborative project promoting improved environmental program within the industry. (BMB Brochure 2000) 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. (Biochemistry, 2002)

Donna sent us a note in 2003 saying that she continues her work in the Minnesota Technical Assistance Program at the University of Minnesota, a program that provides assistance to companies dealing with various environmental issues. Donna has also been involved in numerous activities with international students and finds that very rewarding. Her husband, Dick, is Professor of Physics at Bethel College in St. Paul. MN. Donna's home address is 2436 N. Pascal. Roseville, MN 55113, phone is (651) 633-0923, and e-mail is peter080@umn.edu. Donna says that she would welcome hearing from former friends and colleagues. (Biochemistry, 2003)

Petto Scott T.—BS '73
Paint Department Process Engineer, General Motors Lansing Car Assembly, Lansing, MI (Biochemistry, 2000)

Pike, Lee M. - MS '71, PhD '74
After completing his PhD with Professor Fritz Rottman,

Lee did postdoctoral work at Hahneman Medical College in Philadelphia, and subsequently at the Baylor College of Medicine in Houston. In 1976, he joined the Biological Sciences faculty at East Tennessee State University and has remained there since. Lee says that he has had a good career at ETSU, teaching biochemistry and biology, and he also works with students in the biological sciences MS graduate program as well as those in the biochemistry graduate program in the medical school. Lee looks forward to retirement a few years hence, and says that he and his wife will probably move closer to their children and grandchildren, who live in Kokomo, IN, and Cincinnati, OH. However, Lee also says that he is "spoiled with respect to winters, so we will not go too far north." Lee can be contacted byemail to pikel@etsu.edu. (Biochemistry, 2003)

Pittler, Steve PhD '89

It has been a long time since I was a graduate student (class of 1989). How have you been? What are you doing since retirement other than helping with alumni matters? My fondest memories of MSU were my time in John Wilson's lab working on rat brain hexokinase. It was during this time that I got interested in science and began pursuing a full time career as a scientist. At the time (and I'm sure there are now too) there were many great scientists at MSU certainly including John and you and there were many aspiring scientists that went on to great things like Paul Polakis for example.

I graduated from MSU in March 1989 but I did my last year of study at Baylor College of Medicine when Ron Davis took a position in Cell Biology. I got my PhD in Ron's lab based on my studies on bovine type VI cGMP phosphodiesterase. I also worked with Dave McConnell. After I graduated I did postdoctoral studies in Vision Molecular Genetics in the Department of Ophthalmology at Baylor with Wolfgang Baehr and after two years I was promoted to a Research Instructor, a position I stayed in for one year and then I accepted a position as Assistant Professor of Biochemistry & Molecular Biology at the University of South Alabama in Mobile, Alabama. I was also the Director of the Center for Eye Research and rose to the rank of Associate Professor. In 1995, I won the Cogan award for my research on the identification of the cause of eye disease in an animal model of hereditary retina degeneration. This award is an international award of the Association for Research in Vision and Ophthalmology that recognizes a young researcher under the age of 40 with substantial promise for the future. In 1999, I moved to the University of Alabama at Birmingham, Department of Vision

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Sciences where I am now a tenured Professor of Vision Sciences, Ophthalmology and Biochemistry & Molecular Genetics. I have maintained funding from the National Eye Institute and several private foundations and am currently the director of a NIH P30 Vision Science Core grant. Additionally, I have taught graduate, medical, dental and optometry students biochemistry, molecular and cell biology, and genetics both at the general level and of the visual system. I am married to Marie Porche, a bookkeeper and Mary Kay consultant and we have a 14 year old daughter, Danielle. Steve Pittler (Memories 2010)

Mahawili-Poole, Sarah J.
Process Engineer, Micro C. Technologies, Inc., Grand Rapids, MI (Biochemistry, 2000)

Prohaska, Joseph R.—PhD '74
Professor Department of Biochemistry & Molecular Biology, University of Minnesota, Duluth, MN. Following my Ph.D. degree I did a postdoc at the University of Wisconsin in Nutritional Biochemistry. From there I accepted a position at the University of Minnesota where I am currently. I am also Director of the Chemical Toxicology Research Center and an Associate Editor for the Journal of Nutrition. (BMB Brochure 2000). Joe's PhD work with Professor Bill Wells was focused on the effects of dietary copper deficiency, and he has continued to work in this area during his subsequent academic career at the University of Minnesota, Duluth, where he currently is Professor of Biochemistry and Molecular Biology (http://umn.edu/home/jprohask). In research supported by both NIH and USDA, Joe is investigating the impact of copper deficiency on development of the central nervous system, elucidating the mechanism by which copper deficiency leads to cardiac hypertrophy, and evaluating the potential for measuring the activity of a copper dependent enzyme as a way to assess copper status in humans. Joe can be contacted by e-mail to jprohask@d.umn.edu. (Biochemistry, 2003)

Putnam, Mark R.—BS '76
Owner, Computer Accounting Software Services, Caro, MI (Biochemistry, 2000)

Quillevere, Anne - PhD '92
Anne is a technical writer for the acoustics and vibration company 01dB-Metravib. (Biochemistry, 2009)

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Randall, Doug PhD '70

I have a couple of things that might be worth recounting from my days at MSU (fall of '65-June '70)

The first actually concerns a conversation you and I had during my first semester at MSU. As you may recall entering came in without particular assignment to a lab/mentor. It was late in first semester and you and I were walking down the hallway discussing which lab I would choose and I indicated it was likely to be Tolbert's lab. Your comment to me was "why? Photosynthesis has been solved and Calvin has received the Nobel prize for it". It was less than a month later that C4-photosynthesis story broke and interest in plant research underwent a surge. It was fun to be in on the ground floor on photorespiration, plant peroxisomes, etc. for this led to my discovery of the first plant enzyme to undergo reversible phosphorylation as a means of regulating respiratory substrate oxidation during photosynthesis and photorespiration in C3 plants. My career has certainly been fun and rewarding in plants biochemistry. Some times young turks ignore their elders and succeed—sometimes they fail. I was able to build a campus program here at MU that is now ranked 15th in the WORLD (http://www.timeshighereducation.co.uk/story.asp?storyCode=41117). Most of all I received a outstanding training at MSU and in Tolbert's lab. You all did well!

You'll also receive many stories about the nights in the Biochem building there. The grad students in the '60s enjoyed a lot of camaraderie and nights were some times a bit wild. There were lots of "squirt bottle fights" and one night Dave Hart, Joe Mayo, myself and a few others were having a squirt fight hiding in and out of lab doorways and alcoves. It had gotten pretty loud and apparently attracted the attention of Chairman Garth Hansen from the floor below. Needless to say we "got him" as he came around the corner of the recessed lab entry. He was good natured about it, but suggested that we stop. It continued in the future nights, but we were careful to check who was in the building. This was back in the days when grad students spent most nights in the lab working AND having a bit of fun. Then we would go to Dagwoods to replenish out dehydrated and famished bodies!

Probably the event/story that had the biggest impact on the department in the mid-60s was the smelt feasts/parties we had in the road side park east of Okemos—East Lansing was "dry" in those days. It started as a smelt fishing trip

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led by Rick Jagger up to the "singing bridge" near Tawas. I think it is the Au Gras river that enters Lake Huron there and in the spring the smelt come in from the Lake to spawn in the river and you can net them. It was April and most of the faculty and 4/5th year students and postdocs were gone to FASEB/ASBMB meeting somewhere, so it was a good time to escape for some fun. Jagger led the group including myself, my wife Shirley (and 2-3yr old son), Steve Dahms, Dave Hart, Stan Blatti, visiting professor Dick Hageman and his wife Liz and a few others I don't recall now. The idea is to keep checking the river with the nets and waiting until the run starts. It finally did not long after midnight and we netted close to 250 lbs in the of smelt (smelt are 5-7 inch long by ~3/4 inch diameter) over the next hour, so this is a lot of fish! We hauled these back to East Lansing—what to do with them, right?? The freezer in the basement of Biochemistry building had a lot of various biological "samples" –steelhead, salmon,etc, so why not a "few smelt"? We had probably about 15-20 5 gallon pails full of smelt we bagged up in the plant growth room (there was a large work table in there). We first put them in the cold room and then the next day (most people were still gone to FASEB/ASBMB meeting) we under took the job of cleaning the smelt—beheading and washing and freezing. We filled many shelves of the freezer with bags of smelt. These in turn became the center piece of several department picnic/parties over the next couple of years. The smelt were dipped in beer batter and deep fried and everyone brought lots of food and beverage. We always felt it built a significant collegiality between students, faculty, staff and families.

Figure 8.13: Doug Randall and his wife, Shirley. Courtesy of Doug Randall.

I also recall some basic biochemistry experiments practice in a few labs that led to acceptable fermentation products, and as always a few failures that proved that acetic acid is easy to make from fruited biomass.

Some folks from the mid '60s will recall that my wife, Shirley typed many, many thesis/dissertations on a typewriter—not a computer during our time there. This

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meant carbon copies or mimeo masters and finally single copies that could be photocopied of all things. (good old days????) Shirley also was the principal artist for drawing the graphs and figures for publications too. She still has the Leroy lettering set and all the French curves, etc she used. Take a look at biochem department pubs from that time and they were as good as we do with computers these days.
We are looking forward to attending the celebration. I have attached a photo of Shirley and I from a recent trip to the Artic (it's a glacier in the background). If I am off in my tails I hope Rick and Dave will set things right. Douglas D. Randall, MSU Biochem PhD, '70, Professor and Thomas Jefferson Fellow, University of Missouri (Memories, 2010)

Reed, Travis - BS '05
Travis is currently pursuing a small animal internship in Canada at the University of Guelph, Ontario Veterinary College. (Biochemistry, 2009)

Revzin, Arnold, Biochemistry Faculty (1974-1999)
A week or so after I came to MSU in November, 1975, Bob Barker assigned me and Bill Smith (who had arrived about 8 months before) to write skits for the Christmas party. I asked Bill whether the graduate students had done anything during the year that we could incorporate, but his response was "Nothing, really." I heard many things about the exploits of students and postdocs in Woody's lab in the 1970s, but I don't recall much happening when I was on the faculty. However, the Biochemistry Department gave me the resources and opportunity to succeed. Others will have to judge the value of that investment, but it is something for which I have always been grateful. Arnold Revzin (Memories, 2010)

Reynolds, Judith L.—BS '72
Homewood, IL. Married and taught high school science for 9 years. Retired on birth of twins, 2nd and 3rd children. I have been a stay at home Mom since then. Plan to go back to work when the last two go to college in two years. (Biochemistry, 2000)

Rezeau, Laurel L.—BS '67
Developmental Technical Editor, Apple Computer, Palo Alto, CA. I have not worked in biochemistry for many years (since 1974). I was a full time crafts person for a few years, then got into technical editing. I still do crafts part-time - Ukranian eggs, macramé ear rings, greeting cards. (Biochemistry, 2000)

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Riccelli, Peter V.—BS
Senior Scientist, Tm Technologies, Inc., Woburn, MA. I received a Ph.D. degree in 1997 from the University of Illinois at Chicago under the mentorship of Dr. Albert S. Benight (Biochemistry and Biophysics of DNA). Afterwards I moved to the Boston area for research in industry for a company founded by Dr. Benight and co-workers. (Biochemistry, 2000)

Ritter, David P.
Attending Anesthesiologist, West Boca Medical Center, FL. Received an M.D. degree from Wayne State University in 1981. I finished anesthesiology residency in 1984 at the University of Miami Jackson Memorial Hospital. I am currently an attending anesthesiologist since 1985 at West Boca Medical Center and Delray Medical Center. (Biochemistry, 2000)

Rogers, Clare E. BS '81
Clare has been working in research since her graduation in '81, first at the Michigan Cancer Foundation in Detroit, and subsequently in the Departments of Internal Medicine and of Chemical Engineering at UM in Ann Arbor. She is currently a research specialist in the Howard Hughes Medical Institute at UM. She received an MS in Bioengineering from UM in 1990. For the past 14 years her specialty has been in operation of flow cytometry instrumentation, first as manager of the core flow cytometry facility at UM and now for the Howard Hughes Medical Institute. Clare tells us that she married in 1983 and currently has two school-age daughters. Clare can be contacted at the Howard Hughes Medical Center, 1150 W. Medical Center Drive, Ann Arbor, MI 48109. (Biochemistry, 2001)

Rokita (Paquette) Jessica—BS '96
Osteopathic Medical Student, College of Osteopathic Medicine, Michigan State University, East Lansing, MI. I am attending medical school in the College of Osteopathic Medicine here at M.S.U. I recently married Scott Rokita on August 22, 1998. (Biochemistry, 2000)

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). (Biochemistry, 2002)

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Ronzio, Robert, Biochemistry Faculty (1969-1977)
First, I cannot imagine a more welcoming and supportive environment for a young faculty member, than the one I found upon joining the Department in 1969. It is one I attempted to emulate later in my career.

Starting at MSU: The department had arranged temporary lodging for the family at a farmhouse, in order to give us time to locate a suitable home. Upon our arrival, we were greeted by kids selling local produce from their wagons (fun) and a bedroom filled with wasps (not fun). The house had been vacant a number of months.

At the reception for new faculty members on the following day, an acting MSU president quipped: "Congratulations. You have come to the ideal university – one without a president, and without students!"

Early on, the department got us seats to the annual MSU-Michigan football game. We were not very impressed by Duffy's Spartans, though they won the game. Little did we know that victory was to be their last over the Wolverines for years.

Lasting impressions: Challenging, interesting and satisfying – these are emotions that come up when I recall my tenure with the Department. I need to acknowledge exemplary work by Ms. Vina Yang and Ms. Sharon Mohrlok, who helped form a valuable research team.

Growth at MSU during the '60s and '70s provided an exhilarating teaching and learning environment. As an educator in retirement, my aim is to convey some of that excitement about science and learning to disadvantaged elementary age kids. Over the years I have worked with thousands of children. The roots of this endeavor derive from the Department of Biochemistry. Bob Ronzio (Memories, 2010).

Rosenbaum, Lisa Lencher BS '78
It is wonderful to hear from you, Dr. Suelter! I think fondly of my days at MSU – they were the best! My time at MSU was great – the best part was definitely working in your laboratory and with Debra Thompson. I have fond memories of having celebrations with punch laced with laboratory ethanol.

I remember the day we collected pig muscle. How we labeled many, many packages with: **7/7/77** - I have told that story many times over. I also recall using the 'sharpie' pens in your lab for the first time.

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In addition, I was able to use the lab skills that I was taught (mostly by Deb) for many years while I was working as a biochemist. I still tell stories about how I was counting liquid drops by hand while isolating enzyme. Performing the "ouchterlony" test (love saying the word) and one of my earliest mistakes that I made in the laboratory (which I never told anyone until years later!). The story – I had two rabbits that I was working with – one was my control, the other the test. I only named the rabbits "big" and "small". Obviously – they grew up! When I returned after the summer to my two rabbits for the final stages of my projects – well – they were both big! Fortunately, the animal handlers had labeled the cages correctly and I was able to determine who was who – and the experiment was a success.

Other highlights while at MSU were Dr. Dye singing a song on Halloween turning a solution from orange to black. Also of Dr. Dye writing so quickly with the giant chalk on the 'green boards' – we could hardly keep up! I am currently taking a Hybrid Technology class and using my PCHEM in the class!

I remember the first snow storm – my senior year – first time MSU was closed for snow. I cross-country skied into the lab. I wasn't the only one who showed up that day!

I recall a biochemistry "help" session that you ran in the spring where you stopped and watched a scantily clad coed come in and sit down to attend the session. She then realized she was in the wrong classroom – you then stopped again to watch her walk out. You did not miss a beat! Well, it was the late '70's!

Information to catch you up: I attended University of South Carolina for a year – quite the experience – very different from MSU. Came back home, worked at Wayne State University researching Lupus for Dr. Lightbody. I then accepted a position at General Motors' Biomedical Research department. I researched health effects of diesel engine exhaust, air conditioning odor root cause and prevention and plant air quality studies. I attended University of Michigan's MBA school (killed me to go there) and then began moving throughout General Motors in various capacities – but mostly in data management. You see, collecting all that data by hand served me well for Information Technology.

Unfortunately, after 29 years at General Motors, I was unceremoniously walked out last April. Throughout the past year I have been job hunting and trying to determine 'what I want to be when I grow up'.

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I have JUST accepted a position with Henry Ford Hospital's Hypertension and Vascular Research Division as a Research Coordinator – back to my 'roots' so to speak. I am excited to return to science – unfortunately – I am starting at the bottom again. It should be a terrific job as working with scientists is always a pleasure. The head of the department is Dr. Jeffrey Garvin – have to say, a great organization!

As for my family – I have been married for 26 years to Richard Rosenbaum. My young son (Eric Rosenbaum) attended MSU (loved it!) – received his degree in Chemical Engineering and Psychology last year and is applying for medical school and graduate schools. He did admit he should have majored in Biochemistry as it is much more interesting. Eric is getting married in May.

My older 'bonus' son (Jared Rosenbaum) is married, went to Goucher College (where he could play basketball @ only 5'7"), has his MBA, is married and just became a new father to a baby girl.

Again, Thank you for a wonderful base for my long career. I hope this is helpful. I would very much enjoy saying hello in person in the near future! MSU was a wonderful school. I have many very fond memories of my years there and proud to be a Spartan! Lisa L. Rosenbaum, LisaRosenbaum@comcast.net (Memories, 2010)

Ruckle, Homer A.—MS '64
Scrubber Chemist - Retired, Allegheny Power. From 1964-1966, Nutrition Research Chemist at H.J. Heinz; 1966-1968, Instructor at Geneva College; 1968-1977, Instructor at Penn State University; 1978-1996 Scrubber Chemist at Allegheny Power. (Biochemistry, 2000)

Rumler, Patrick C.—BS '79
Veterinary Lab Tech III, Animal Health Diagnostic Lab, Michigan State University, East Lansing, MI (Biochemistry, 2000)

Ruwart, Mary - BS '70
In the summer of 1966, I attended a summer program at MSU designed for high school juniors interested in pursuing a research career. I fell in love with the laboratories and realized that I wanted to work in one as soon as I became a college freshman.
When I returned home, a Parke Davis employee connected me with a professor of microbiology at MSU who would allow me to pursue research in his laboratory should I

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decide to go to MSU. U of M wouldn't allow me to get into the laboratory until at least my sophomore year. U of M was considered the more prestigious college for the sciences, but the lure of immediate laboratory access and the wonderful memories of the summer program sold me on MSU.

I had scholarship money for three years, so I crammed my undergraduate biochemistry program into that time frame and still managed to put in about 20 hours per week at the lab. One of my chemistry professors asked me if I had considered graduate school. About that time, I had begun to realize that I wanted more than a technician job. Since money was an issue, I applied to several MSU departments, including physiology, pharmacology, and biophysics. The Biophysics Department offered me a small stipend for my graduate years, so I began my Ph.D. studies there in the fall of 1970.

In January 1974, I accepted a post-doctoral position in the Surgery Department at St. Louis University Medical School to go from the molecular level to the physiological one. What a jump that was! In 1976, I was hired by The Upjohn Company in Kalamazoo, Michigan. After 19 years of pharmaceutical research, I began teaching scientists how to quickly and efficiently write papers, give talks, and prepare posters.

I currently serve on the Libertarian Party National Committee, am the Chair of the International Society for Individual Liberty, and the Secretary of the Foundation for a Free Society. My book, "Healing Our World in an Age of Aggression" reached #5 in Amazon.com's nonfiction list in 2005. You can get a free download of the 1993 edition on my website at www.ruwart.com. Mary Ruwart (Memories, 2010)

Rynbrandt, Donald J. PhD '67

My fondest memories of my days as a graduate student come from the early days spent in Dr. Speck's lab in Kedzie Hall. My task was to synthesize acetals and ketals substituted with groups capable of anchimeric assistance of acetal/ketal hydrolysis. Unfortunately, many of these compounds contained thiol groups. The synthetic process generated vast amounts of vile-smelling byproducts, which the antiquated Kedzie hood system could not effectively deal with. The result was a "earthy"-smelling lab, and a vile vapor trail that drifted downwind across campus. I was probably not the most popular grad student!

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Life was different in those days; I remember living on Bogue Street and spending 10 bucks a week for food, including 3 chickens for a dollar at Shaheens.....

After 30+ years as a Biochemist/Clinical Chemist/ Toxicologist in Cleveland and Detroit, I am now happily retired and enjoying my volunteer activities, and of course, my grandaughter. Donald J. Rynbrandt, PhD donkathy1967@sbcglobal.net (Memories, 2010)

Sabularse, Dario C.—PhD '82
Deputy Executive, Fertilizer & Pesticide Authority (FPA); Associate Professor of Biochemistry, University of the Philippines, Quezon City, Philippines. Upon my return to the Philippines after obtaining a Ph.D. degree in Biochemistry at MSU, I resumed my post as Assistant Professor of Biochemistry at UP Los Banos where I am currently an Associate Professor in Biochemistry. Since 1995 I have been on full-time special detail at the Department of Agriculture serving as the Deputy Executive Director of the Fertilizer and Pesticide Authority. (Biochemistry, 2000)

Sasavage, Nancy—PhD '81
Editor, Clinical Laboratory News, American Association for Clinical Chemistry (AACC), Washington, D.C. After receiving my Ph.D., I began a career with a Maryland biotechnology company - Bethesda Research Labs (no Life Technologies, Inc.) - that produced research products. I moved from the research bench to teaching molecular techniques, especially DNA sequencing. In 1983, I took on responsibility for the Technical Services Department at LTI, where I managed a group of scientific customer support staff. During my ten-year tenure at LTI, I also edited and produced a variety of technical publications for the company, including Focus, a technique journal. After leaving LTI, I did freelance technical writing and editing for biotech companies and publishers. For the past five years, I have served as editor of a monthly news publication for clinical laboratories published by AACC. I also act as the program coordinator for an annual scientific meeting for the association. (BMB Brochure 2000) Besides editing the Clinical Laboratory News she also coordinates an annual conference on emerging technology for clinical laboratory testing. After a vacation on Mackinac Island last year, Nancy stopped in East Lansing to visit with her old friend from days in the Fritz Rottman laboratory, Karen Friderici (Karen is now an Associate Professor of Microbiology and Molecular Genetics at MSU). Nancy also enjoyed seeing the new

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Biomedical and Physical Sciences Building and taking a nostalgic walk through the halls of Biochemistry. She lives with her l0-year old son, Russell, in North Potomac, MD, and may be contacted by e-mail to nsasavage@aacc.org. (Biochemistry, 2003)

Saxe, Stephen A.—MS '78
Rothwell, Figg, Ernst & Kurz, p.c., Washington, DC. I have done a number of things since leaving MSU. From MSU I went to work at Schering Plough for a short time. I then continued my education at Wesleyan University in Connecticut where I received my Ph.D. in Molecular Biology and Biochemistry, having studied gene regulation of collagen genes in chick embryos. I followed that with a postdoctoral stint at the National Institutes of Health in Bethesda, Maryland, where I studied gene regulation in the slime mold *Dictyostelium discoideum*. This was followed by my becoming an Assistant Professor at the Albany College of Pharmacy in Albany, New York where I taught biochemistry (of course). I eventually decided to leave the world of teaching and put my expertise to use in the world of patents. I spent a year as a patent examiner at the U.S. Patent and Trademark Office and then returned to school once again. I attended Georgetown University Law Center from which I received my J.D. degree. I began my patent law practice at the firm of Venable, Baetjer, Howard & Civiletti, L.L.P. in Washington, D.C. and then moved to the firm of Rothwell, Figg, Ernst & Kurz, p.c. also in Washington, D.C. My practice mostly involves the preparation and prosecution of patent applications related to biotechnology. Along the way I got married to Xiaosha Ge who I met at Wesleyan University and who I married while I was a postdoc at NIH. We now have 3 sons, Andrew age 10, Benjamin age 8, and Zachary age 4. We are expecting our fourth (and last) child in January and this one is a girl. (BMB Brochure 2000)
In October, 2001, Steve assumed his new position as in-house patent counsel for Nexion Pharmaceuticals, Inc., in Chesire, 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). (Biochemistry, 2002)

Schilz, Robert—DO/PhD '88
Staff Physician, Cleveland Clinic Foundation, Cleveland, OH. 1996-present Staff Physician at the Cleveland Clinic, Department of Pulmonary and Critical Care Medicine. Current Research: Pulmonary Vascular Diseases and Transplantation. (Biochemistry 2000)

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Schneider, Donald L.—PhD '69
National Institutes of Health, Bethesda, MD. Academic positions included Cornell, Ithaca (69-71); Rockefeller (71-73); University of Massachusetts, Amherst (73-76); and Dartmouth (77-90). Notable projects included being involved in discovery of vacuolar proton pump. Since 1990, I have been in review at the NIH. (BMB Brochure 2000). Don Schneider was a PhD student with Professor Willis Wood. We suspect that he no longer looks quite like he did in the photo of Woody's research group (circa 1967) that appears elsewhere in this magazine. Currently, Don is Director of the Division of Molecular and Cellular Mechanisms, in the NIH Center for Scientific Review, Bethesda, MD. Don mentioned that three of the five Division Directors in the Center for Scientific Review are MSU graduates, the others in addition to himself being Suzanne Fisher (Director, Receipt and Referral Division) and Elliott Postow (Director, Biological Basis of Disease Division). Former faculty member, Arnold Revzin, is also involved in the review process at NIH; Arnie administers the Biophysical Chemistry Study Section and also works with Suzanne as a Referral Officer. Quite remarkable that such a cluster of Spartans are involved in shepherding NIH research proposals through the peer review process.

Don also reminded us that two other MSU PhDs from his era, George Johnson (PhD with Professor Bill Deal) and Ken Rabinowitz Warren (also did his PhD work with Professor Wood, and also seen in the group photo along with Don) are at NIH. Don can be contacted by e-mail to schneidd@csr.nih.gov. (Biochemistry, 2003)

Fondest memory of MSU Biochemistry
In its heyday, the Willis Wood laboratory was a lively scientific and educational operation. Woody had a way with people and organizing and science. To keep the lab running smoothly, he gave us assignments to look after aspects of lab maintenance but also gave us responsibilities and titles: we were not simply in charge of x, we were Vice Presidents of X. I was Vice-President of Gilford spectrophotometers and was forever being called on to make adjustments, and got accomplished enough for Mark Roseman to name me the "Artisan". Intellectual activity was high, we had evening group meetings at which we were expected to present our data and our future research directions, everyone joined in and discussions were active, sometimes heated. We also played hard, who can forget the annual canoe trips down the Au Sable and Pine rivers?

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Earliest memory of MSU Biochemistry
I can still remember the summer of 1962 like yesterday, I was a junior at Kalamazoo College and got into the Undergraduate NSF Summer Research Participation program at MSU in the new Biochemistry Department, pre-Biochemistry Building (the Department was scattered around, on the main campus, Kedzie Chemical, Dairy Science, Ag Hall, etc.). I remember the Wood group was doing ultracentrifugation (in the Dairy Science Bldg), and I was doing micro-Kjeldahls in the Benne and Luecke lab's, that was one hot summer, with all those Kjeldahl digestions using boiling sulfuric-nitric acid in the upper floors of Ag Hall, with no air conditioning. Other participants were Dave Petering, my roommate, now Medical College of Wisconsin, George Stone, retired Alcohol Chemist with Jack Daniels, and John LaRue, retired chemistry teacher living now in Montana. The faculty were enthusiastic and helpful. Each of them gave the summer participant group a seminar, and John Speck gave us an introductory biochemistry course.

Impression of MSU Biochemistry
The energy and optimism and standards of excellence that the young department exuded were superb, indoctrinations that have served us well throughout our careers. Strive to do something of significance, do it well, and have some fun along the way. Set high goals, and work hard to reach them. Be prepared for opportunity, and seize it. All graduate students had to take electronics from Jack Holland, also graduate level physical and organic chemistry. In Woody's lab we were all required to take microbiology lab, which proved handy when gene cloning came along! We worked hard and obtained solid, well-rounded training. The can-do attitudes have paid dividends. Consider three examples, from the Wood lab in the 1960s: Don Beitz is Distinguished Professor at Iowa State; Phil Whanger is the world's expert on selenoproteins, discovered SePW, the protein targeted by methyl mercury, and is now Professor Emeritus at Oregon State; Ken Warren has been acting Director of the National Institute of Alcohol Abuse and Alcoholism since 2008. The Department has done well!

MSU Biochemistry PhD with Willis Wood, 1969
Postdoc with Ef Racker, Cornell, 1969-1971
Postdoc with Christian de Duve, Rockefeller, 1971-1973
Asst Prof, Biochem, U Mass Amherst, 1973-1976
Asst and Assoc Prof, Biochem, Dartmouth, 1977-1990

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Sabbatical with Harvey Lodish, MIT, 1988-1989
NIH Center for Scientific Review, 1990-present
Don Schneider, Director, Division of Basic and Integrative Biological Sciences, Center for Scientific Review, National Institutes of Health, HHS. (Memories, 2010)

Schroeter, Bernard M.—BS
5th Grade Teacher, Waverly School District, Lansing, MI. I have worked at MSU as a Research Assistant in five unique labs. My most recent lab work/research was funded through the Center for Microbial Ecology, and it involved the sequence mapping of the 165 regions of DNA of the LTER strains (from the LTER project). I have decided to take my diverse science background and bring it into the elementary classroom. I am employed presently as a fifth grade teacher at Waverly East Intermediate - teaching math, science, and language arts. (Biochemistry, 2000)

Schwing, Joan Moyer BS '71
I got my BS in Biochemistry from MSU in 1971. Besides remembering all of the good friends I made and still have and meeting my husband there, I remember two stories vividly about the Biochemistry Program.

The final exam for Biochem 401 was from 5:30pm to 7:30pm and consisted of one essay question which was: "Please describe all the biochemical cycles that are going on inside your body right now since you all ate dinner before you came to class." One show-off in the class raised his hand and said that he had not eaten dinner before he came to class. The professor asked for his name and told him that his question, therefore, was different. Since his body was in "hunger mode" he was to describe all the reverse cycles that were happening in his body which was a more difficult question!
Secondly, I remember an independent study course that I was taking in the department that started at 8 am. I was looking at the biochemistry of rat brains and had to kill the rats with a little guillotine since we could not drug them without damaging our experimental results. It was bad enough killing a rat at 8 am but then someone stole the guillotine and I had to kill the rat by sticking a pair of shears into the eye sockets. It really got to me and one week I dropped the squealing rat in the process and it proceeded to run all around the animal room. I could not catch it. When I graduated and went to Johns Hopkins Medical School for my graduate program, I switched to Microbiology because I could not bear to kill another rat.
Joan Moyer Schwing (Memories, 2010)

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Scopel, Jerry L.—BS ’70
Vice President, Alpha Amusements, Madison Heights, MI. I graduated in 1970 - from 1971 to 1980 I worked as an analytical chemist at Difco Laboratories in Detroit. In 1980 I left the scientific field and started my own business. (Biochemistry, 2000)

Sekedat, Matthew BS ‘02
Thank you for the email. I’m very proud to have graduated in 2002 from the Biochemistry turned BMB department. For most of my undergrad years I had no idea what I should major in, and bounced around from art history to english before deciding that I wanted to try biology (zoology, to be precise). My first semester as a zoology major, remember thinking that two of my classes would be polar opposites with regards to the degree of enjoyment I would receive from them. My zoology class was titled “Animal Behavior”, exactly the area that I was most interested in at the time. My BMB 401 class appeared too onerous - and why would I be interested in molecules of life? What did they have to do with the organisms I was fascinated by?

Well, halfway through the semester I realized that animal behavior was far too macroscopic of a science for me, and how perfectly fascinating proteins were. I quickly switched majors and signed on as a research assistant in a lab within the department. I worked harder in those final two years than I had my entire life up to that point. I had finally found something to be passionate about, because the professors who taught and mentored me revealed how beautiful science could be. I graduated and went on to work in a lab as a technician before returning to school, and am currently writing my dissertation, and will be defending it in November. As a graduate student I have had many amazing opportunities to meet and work with some of the most brilliant people that I can imagine. I have been honored to discuss my research and even publish with Nobel Prize winners - a humbling but exciting experience. Looking back, I can attribute all of my scientific adventures to BMB 401. Matthew Sekedat, Graduate Fellow, Laboratory for Mass Spectrometry and Gaseous Ion Chemistry, The Rockefeller University, sekedam@rockefeller.edu, (212) 327-8852 (Memories, 2010)

Sellers, Larry G.—MS ’68
Professor of Biological Sciences, Louisiana Tech University, Ruston, LA. Since 1974 to present, I have been teaching biology and entomology at Louisiana Tech

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University. In the past 10 years I have become interested in medical ethics also. Presently I am Chair of Pre-Medical/Pre-Dental Advisory Committee. (Biochemistry, 2000)

Shea, Robin J.—BS '96
Graduate Assistant, Department of Microbiology, Michigan State University, East Lansing, MI; E-mail: shearobi@pilot.msu.edu. I am currently a graduate assistant in the Department of Microbiology at M.S.U. pursuing a Ph.D. in microbiology with an interest in pathogenesis and the identification of bacterial genes involved in disease induction. (Biochemistry, 2000)

Sheng, Jun—PhD '97
Postdoctoral Scholar, California Institute of Technology, Pasadena, CA (Biochemistry, 2000).

Sherman, Thomas G.—BS '77
Associate Professor, Georgetown University, Washington, D.C. (Biochemistry, 2000)

Siefker-Radtke, Arlene O.—BS '92
Oncology Fellow, M.D. Anderson Cancer Center, Houston, TX (Biochemistry, 2000)

Snyder, Russell H.—BS '70
Medical Sales Rep., G.D. Searle, MI. Received an M.S. in Microbiology from Central Michigan University in 1978. (Biochemistry, 2000)

Smith, Allen D.—PhD '91
Research Virologist, USDA/ARS, Beltsville, MD. I spent six years at Rutgers University conducting research on recombinant human rhinoviruses and AIDS. I am now a Research Virologist for the USDA/ARS studying the effects of nutrition on viral pathogenesis. (Biochemistry, 2000)

Smith, William - Biochemistry Faculty (1974-2003)
After postdoctoral training with Clint Ballou at UC Berkeley, I moved to Evansville Indiana to become a Senior Scientist at Mead Johnson, which was a subsidiary of Bristol-Myers. After about two months, my wife Andrea and I were lying in bed watching the lightning flashes from the most recent tornadic storm, when she asked one of those wifely, rhetorical questions: "Are you really planning to stay here?" This siren call led back through Clint Ballou to an invitation to Finn Wold's home in Minneapolis during the 1974 ASBMB meeting where I met Bob Barker who had recently moved from

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Iowa to Michigan State as chair. I applied for an opening in Biochemistry at MSU and was granted an interview, which was on Dec. 9-11th. I recall this very distinctly. It was a beautiful snowy visit. I met with Bob Barker, John Wilson, Bill Wells and others. Only one person, Ed Tolbert asked me a difficult question—something about how many patents I had generated (the answer was zero)-- during my visit. (I later came to learn what a terrific person Ed was). Upon returning to Evansville from a Colorado Christmas trip, I found that I had received an offer letter from Bob Barker through the mail. Of course, I was delighted and initially informed him that I would like to come to East Lansing in June. However, Mead Johnson, although they were definitely good to me, began to have much less interest in my services, and so I ended up starting in East Lansing on February 1, 1975.

My career at Michigan State which came to a formal end on April 30, 2003 with Emeritus status, was a wonderful period for me and my family. My colleagues were terrific, many lifelong friendships developed, and I felt like I accomplished much. Michigan State was quite simply a superb fit for me. I became chair of Biochemistry in 1994 when Frank Hoppenstadt was still Dean of CNS and then served under George Leroi. Of course, the Department was jointly administered by CHM, COM and the AES. All of these units were quite supportive of the Department. I think sometime during my chairmanship, the Department was renamed Biochemistry and Molecular Biology.

What was I most proud of professionally? I thought I did a good job in my research, teaching and as chair. I think that most students and fellows who trained in my laboratory received good training and many have gone on to distinguished careers. I've certainly been pleased to see that. No single event stands out and yet all the events stand out.

In 2001, I was contacted about the chairmanship in Biological Chemistry at UM, which had been my PhD alma mater. We were trying to recruit a Hannah Chair at the time, and so I did not pursue it. In late 2001, the Hannah chair recruitment fell through, and it was not long afterwards that I decided I should step down as chair. I felt like I was getting a bit flat and that my research was beginning to suffer and that Shelagh Ferguson-Miller would be a very capable replacement. It was about that time that the UM recruitment of Betty Craig from Wisconsin, fell through so when they approached me again, I agreed to interview and we ultimately moved to

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Ann Arbor. I tell people that I was too happy and content in East Lansing. This is roughly the truth. Biochemistry and Molecular Biology at MSU continues to be a super place. (Memories, 2010)

Spellman, Michael- PhD '83
A former PhD student with Professor Ed Tolbert, Michael sent us a note to give his present home address as 2 Hastings Road, Weston, MA 02493. (Biochemistry, 2003)

Spencer, Andrew - PhD '98
Since receiving his PhD, Andy had been doing post-doctoral 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. (Biochemistry, 2002)

Spike, Thomas E.—MS '69
Senior Technical Advisor, Dairy Research, Elanco Animal Health Division of Eli Lilly & Co., Greenfield, IN (BMB Brochure 2000) I have very fond memories of my days as a masters student at MSU. Steve Aust was a great mentor for me and was so interested in making sure his students were successful that he even washed glassware for us sometimes so that we could keep doing experiments. That was in 1969, I doubt any major professors today would do the same. The masters program convinced me to stay in biochem and I continued my learning at U of Illinois at Champaign Urbana, completing my PH.D. in Biochemistry in 1973. I returned to our family dairy farm in Michigan and operated our 400 lactating cow herd for 15 years before joining Elanco Animal Health, a division of Eli Lilly and Company, in 1988 as a Research

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Scientist. I retired from Elanco at the end of 2008 and started a biotech company, Biota Biosciences, Inc. focused on developing products for animal agriculture that increase food production while reducing costs and environmental impact. I am having a lot of fun!, Thomas E. Spike, Ph.D., Chief Scientific Officer, Biota Biosciences, Inc., 16239 Wagner Road, Cambridge City, IN 47327, tspike@biotabiosci.com, (765) 702-3744. (Memories, 2010)

Stancel, George M .. PhD '70

Since his departure from MSU many years ago, George Stancel has had a distinguished career as teacher, researcher, and administrator. His accomplishments were recognized with this Department's Boezi Award in 1990. George is currently Dean of the Graduate School of Biomedical Sciences and John P. McGovern Professor of Biomedical Sciences at the University of Texas Health Science Center in Houston. Despite his administrative responsibilities, George still teaches and maintains an active extramurally funded research laboratory, and says he's 'still enjoying what we do." George and his wife, Mary, have three grown children; their oldest son works in patient relations at the M.D. Anderson Hospital in Houston, another son is about to enter third year of medical school. and a daughter will be finishing her undergraduate work at University of Texas, Austin. George can be contacted by e-mail to George.M.Stancel@uth. tmc.edu. (Biochemistry, 2003)

MSU Memories: I graduated with a B.S. in Chemistry in June, 1966, from a small liberal arts college (St. Thomas, MN), stopped at home in Chicago after commencement, and headed out a week later to start adventures in biochemistry at MSU. Because I was from a small school I arrived at MSU with some trepidation…."Could I keep up with the students from larger, better known schools?" After that first summer in the lab I knew the answer was, "Yes" – not because I was any smarter than the other students but because everyone went out of their way to make me feel welcome and help me learn the myriad new things that overwhelm new grad students. I felt the faculty really believed in me and wanted me to do well, and that gave me the confidence that I could make it in grad school.

This is my overarching memory of days at MSU – the sense of community, friendship, and support from faculty, other students, and staff. I felt that sense of community throughout all my years at MSU whether in the classroom, the lab, pick up basketball games, or socializing. I felt a great sense of community in the department but also

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the entire campus and it involved not just science but the broader community and important social issues of the day such as civil rights and the Vietnam War. I entered MSU with trepidation but left with a sense of confidence that I knew biochemistry and with a great set of memories that I still carry with me. Some of those best memories were of Saturdays – mornings in the lab, afternoons at the football or basketball games, and evenings at the Gables – all with great friends! George Stancel (Memories, 2010).

Stavoe, Andrea BS '08

I decided to pursue my undergraduate degree in Biochemistry and Molecular Biology at MSU because of the amazing research experience offered to me, starting my first semester at MSU. As I completed more courses and gained a better understanding of biochemistry, I became even more fascinated with biology and the complex questions yet to be answered. I appreciated the challenge and the ability to create knowledge in previously uncharted territory. I worked in a plant biochemistry lab throughout my four years at MSU, gaining valuable skills and knowledge, much of which I can still apply to my current research in neurobiology. When I hear "MSU" or "Biochemistry," I am reminded of the biochemistry labs and the incredible amount of effort involved, both by students and by the faculty. Andrea Stavoe (currently at Yale University pursuing a PhD in Cell Biology; Hinsdale Township High School Central, 2004) (Memories, 2010).

Stearns, Mary Douglas BS '65

Great appreciation and fondest memories of the Biochemistry Department of Michigan State University, Mary Douglas, B.S., 1965. The fall of 1961 was the most exciting time of my life when I arrived at MSU to begin my education for my goal of becoming a medical doctor, toward which I had planned and worked since I was eight years old. The university had granted me a tuition scholarship and arranged a NDEA loan and part-time work in the horticulture department.

Figure 8.14: Mary Douglas Stearns. Courtesy of Mary Douglas Stearns

I was thrilled to move into Mason Hall, become familiar with the Library, and begin classes for my program in pre-medicine. Second term found me in the Honors Chemistry class taught by Professor Eick, and I made

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friends with a number of other students in the Honors College, several of whom were Alumni Distinguished Scholars. And I changed my part-time work to the Physics Department in the laboratory of Prof. T. H. Edwards to do data reduction for their research in high-resolution near-infrared molecular spectroscopy upon the suggestion of my cousin Ron Hill, a graduate student there. Consequently I worked full-time during my three summers in that lab on a NSF Undergraduate Research Participation grant. Throughout all four years my academic advisor, Prof. Richard W. Luecke, was a great help in planning my courses.

If I recall correctly, the new Biochemistry Building was built during those years. Especially meaningful was the biochemistry course taught during my senior year: Fall term, 1964, by Prof. Paul Kindel and two others; Winter and Spring terms, 1965, by Prof. Luecke and others. Again, if memory serves me correctly, we were the first class to graduate with a major in biochemistry as a specific area and department within the discipline of chemistry. Words are not adequate for me to express my appreciation for the highest quality instruction we received and the dedication and inspiration of our professors and instructors.

Women's Medical College in Philadelphia accepted me and gave me a full tuition scholarship. I had also been accepted at the University of Michigan and Case Western Reserve in Cleveland, but chose Women's Medical for historical reasons. However, seventeen days before my place in the class would have become final, I returned the offers, because I had decided to marry my friend, Mel Olman, a graduate student in "the lab next door" of Prof. C. D. Hause. Dr. Edwards and Dr. Hause shared the spectrophotometer and other equipment.

Dr. Luecke was stunned at the beginning of Winter term, 1965, by the news of my change, but recovered and hired me to work in his laboratory beginning in July after our wedding. That was an invaluable experience and wonderful to work in his lab in the new Biochemistry Building for a year on his research in zinc deficiency. Then Mel finished his Ph.D. in Physics, and we moved to Albuquerque, NM in 1967 for his position with Sandia Corporation (now Sandia National Laboratories). I did use my education and work experience in a small way when I worked part-time/full-time in the Chemistry Bureau at the Scientific Laboratory Division, Department of Health, State of New Mexico, as a laboratory scientist in the Air & Heavy Metals Section, 1984-1993.

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Sadly, Mel passed away (astrocytoma) in 1992. Subsequently I married a long-time family friend, Sam Stearns, an electrical engineer in digital signal processing, who retired from Sandia National Laboratories in 1996, and is currently a consultant and Professor Emeritus, Department of Electrical and Computer Engineering, The University of New Mexico.

The celebration of the 50 Year Anniversary of MSU's Biochemistry Department brings fondest memories and deepest appreciation. Congratulations! Mary Stearns (Memories, 2010)

Steinman, Gary D.· MS '63
Gary received the PhD in Biophysics from University of California, Berkeley, in 1965. From 1968-1972, he was Managing Director of Amesyissum, Ltd., a company in Jerusalem, Israel, that developed and manufactured medical diagnostic kits. Subsequently, he received an MD degree from University of Miami in 1973, and currently has an obstetrics/gynecology practice in Astoria, NY. A highlight of Dr. Steinman's medical career occurred approximately seven years ago, when he delivered a set of identical quadruplets (only 26 sets in the world), resulting in appearances on Dateline and on the Today Show. He indicates that his current research interest is monozygotic twinning. He can be contacted by mail to 46-01 Broadway, Astoria, NY 11103, or email to dav460 I @aol.com. (Biochemistry 2004). Gary is now chairman of biochemistry of Touro College of Medicine in New York City. His area of research is spontaneous twinning and he was featured in an episode of National Geographic Explorer which aired in November. (Biochemistry, 2009)

Suelter, Clarence, Biochemistry Faculty (1961-1994)
After being born and raised on a farm in Kansas, completing a Bachelors and Masters degree at Kansas State followed by a 2 year stint in the Air Force directly responsible for the development of aircraft sanitation equipment, I was ready to pursue my career in Biochemistry. So I must express my appreciation to Professors David Metzler and Paul Boyer for preparing me for an appointment in the new Department of Biochemistry at Michigan State in 1961.

During my stay at Michigan State, I was fortunate that many undergraduate, graduate and postdoctoral students decided to pursue their studies in my laboratory. Without their commitment and dedication to their research problem, the research productivity of the laboratory would not have been as significant. I also must acknowledge the contributions of Professors Gregorio Weber, University of

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Illinois, Eraldo Antonini, Citta Universita. Roma, Esmond Snell, University of California, Berkeley and Marlene DeLuca, University of California, LaJolla to our research program.

My interaction with undergraduate biochemistry students has also brought me many memories. First was working with undergraduate students in the redesigned Biochemistry 451 laboratory course that they helped us to develop. The main features of the laboratory course are still in place today. I will also never forget the memories of traveling with undergraduate students to the Upjohn Company for tours of their facilities and the creation of the Biochemistry Sweat Shirt by the Biochemistry Club members that was sold to begin the process of raising money to remodel Room 301 that eventually became the Upjohn-Haworth Student Center. Finally, we were fortunate to work with colleagues from the College of Education, and Lyman Briggs College to successfully obtain a grant from NSF to work with over 100 High School Teachers from Michigan, Ohio, Illinois, Indiana and Wisconsin in a Workshop in Molecular Biology offered in the first floor Biochemistry laboratories. Unfortunately we can not determine whether these teachers ever encouraged students to pursue an undergraduate degree in Biochemistry from Michigan State or any other university.

Figure 8.15: Luncheon meeting of Biochemistry Emeritii arranged by Professor John Wilson during a visit by Professor Willis Wood in 2007. (l to r) William Smith, John Wilson, Clarence Suelter, Richard U. Byerrum, Charles Sweeley, Richard Anderson, Willis Wood, and Paul Kindel. Courtesy of Willis Wood.

One memory I will always have is the meeting with colleagues who have retired from the Department and who live in the area, except for Professor Willis Wood, who came to the area for a visit. Clarence Suelter (Memories, 2010)

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Swaisgood, Mark H.—PhD '87
Software Engineer, Bioinformatics, Molecular Simulations, Inc., San Diego, CA. I've moved into software development. Currently I'm working on a product called Gene Explorer, a molecular biologist's tool kit for the computer. We recently had a second son and so I have a full family life out here in lovely San Diego. (Biochemistry, 2000)

Taki, Hiroe—BS '98
Graduate Assistant, University of Southern California, Los Angeles, CA. I am currently in a Ph.D. program at the USC in Molecular Pharmacology and Toxicology. (Biochemistry, 2000)

Taylor, Mark BS '75
Hello Dr Suelter. I don't know if you remember me, but you gave me an opportunity to do undergraduate research in Biochemistry my freshmen year in 1972. I helped a Chinese graduate student with identifying the molecular weight of yeast pyruvate kinase using gel acrylamide electrophoresis. I am currently teaching chemistry and forensics at Pontiac High School. We recently separated DNA in a Southern Blott test using a simular electrophoresis test. Even though I did not pursue a career in biochemistry, I have often used my experience in biochemistry in my teaching of chemistry, biology and forensics. Mark Taylor - Teacher at Pontiac High School, Education:
1978 M.A.T., Chemistry Education, MSU
1976 Teaching Certificate, Chemistry and Physics, MSU
1975 B.S. in Biochemistry, MSU
1972 Diploma, Ypsilanti High School. (Memories, 2010)

Tobin, Ann Marie—BS '95
Department of Defense, OPTEC, Alexandria, VA. I received a B.S. in Biochemistry the year of 1995. I moved to Silver Spring Maryland and was employed at Genetics and IVF Institute in Fairfax, Virginia. I worked in a research and development lab for two years. After being treated like an assembly line worker, I decided it was time to move on. I took a professional computer training course and managed to land a help desk position on a government contract. I work for a consulting company called MadenTech. My hours are somewhat flexible and the pay is okay. I am able to be self sufficient. I really enjoy the people I work with and love my job. This fall I'm going to start working on my CNE/CNA and take piano lessons. I have no idea what happened to any of my classmates, but it would be interesting to find out.

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My Mentor was Dr. Shelagh Ferguson-Miller. I have not spoken with her since I left MSU. I periodically think of her and the wonderful days spent working in her lab. Please give her my regards. (Biochemistry, 2000)

Tolbert, Ed – Biochemistry Faculty (1961- 1998)
In Memoriam: The plant sciences have traditionally been a strength at MSU. After coming to Michigan State in 1958, Ed Tolbert became part of that tradition. A member of the National Academy of Sciences and internationally renowned for his work. in several areas of plant biochemistry, Ed consistently set an example of enthusiasm and dedication to research, which he described as "my only work and hobby." This continued after Ed became Professor Emeritus, and he was here in his office, working on a manuscript, just two days before his passing on Dee. 13, 1998. Many of Ed's family, friends, past students. and colleagues gathered in MSU's Alumni Chapel for a memorial service at which Ed's brother, Bert, and former students recalled the highlights of a life that began in 1919, on a farm in Twin Falls, Idaho, and ended after 40 years of service to Michigan State University. In Ed's memory, the N. Edward Tolbert Endowed Lectureship in plant Biochemistry has been established. Contributions designated for this fund can be made by contacting the Department. (Biochemistry 2000, p. 9)

Verhoef, Vernon—PhD '78
Director, Project Management, Knoll Pharmaceutical Company, Mt. Olive, NJ (Biochemistry, 2000)

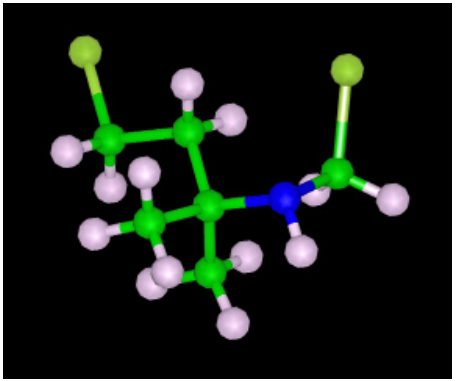

Figure 8.16: Plant growth regulator or Cyocel (2-chloroethyl-trimethylammonium chloride) developed and patented in the late 1950s at MSU by Nathan Ed Tolbert, Biochemistry and Molecular Biology. Royalties from this patent was a major contributor to the success of the MSU Foundation. Molecular graphics courtesy of K. Padmanabhan, Department of Biochemistry and Molecular Biology.

Voetberg, Bryan J.—BS '90
DVM '94; Veterinarian, Puloski Veterinary Clinic, Puloski, WI. Married 9/20/97 to Marianne McKenzie. (Biochemistry, 2000)

Villanueva, Marco A.—MS '84; PhD '88
Professor, Instituto de Biotecnologia, UNAM, Mexico.

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After graduation I returned to Mexico where I worked as a researcher at CICY (Center for Scientific Research of Yucatan) on lethal yellowing disease of coconut palms. In the 3 years that I spent there I published 4 scientific papers and directed 1 master's and 1 undergraduate research thesis. I then became staff of the National University of Mexico (UNAM) from January 1991 and was granted a leave to do postdoctoral work with Dr. Larry Griffing at Texas A&M University. I spent 2 and a half years there (1991-1993) and published 1 scientific paper, 1 book chapter and 1 proceedings chapter, all of them dealing with confocal microscopy techniques to study endocytosis in soybean cells. I came back to Mexico in January 1994 to my present job at the Institute. My current interests are the study of the cytoskeleton, specifically actin and actin-binding proteins in seeds and during germination of *Phaseolus vulgaris* to understand the role of this fundamental cell organelle in this system. I have directed an undergraduate research thesis and published 1 proceedings paper, 1 book chapter and 1 scientific paper has just been accepted. I am currently supervising 2 undergraduate, 1 M.S. and 1 Ph.D. research thesis. (Biochemistry 2000) Marco is a professor at the Institute for Marine Science and Limnology of UNAM in Puerto Morelos, Mexico. He is studying signal-transduction and cytoskeletal proteins in photosynthetic algae with a focus on how they participate in the establishment of symbiosis. (Biochemistry, 2009)

Voige, William H.—BS '69

Professor of Chemistry, James Madison University, Harrisonburg, VA. I was pleased to get the recent mailing from your office. I look back fondly on my time at MSU and the superb undergraduate education I received in the Biochemistry Department. I am currently beginning my 24th year as Professor of Chemistry at James Madison University in Harrisonburg, teaching undergraduate biochemistry and general chemistry and supervising undergraduate research. One of the more interesting things I've done is develop a London-based travel-study program for science majors to complement the more traditional programs here (which tend to attract mainly majors in the humanities). Highlights for me are viewing Watson & Crick's model of DNA in the (London) Science Museum, having lunch at The Eagle in Cambridge, the pub where W&C celebrated their discovery of the structure of DNA (according to Crick), and visiting Charles Darwin's home (where he wrote "Origin of Species"). With retirement from full-time teaching on the not-too-distant horizon, I have shifted my interests toward

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writing and am planning a second career as a technical or medical writer for my post-JMU years. I'd enjoy hearing what colleagues from my undergraduate days (I graduated in 1969) are doing with themselves. Thanks for making the effort to keep in touch. William H. Voige, Professor Emeritus, Department of Chemistry & Biochemistry, James Madison University, MSC 4501, Harrisonburg, VA 22807, (540) 434-7152 (Memoires, 2010)

Vrbanac, John J.—PhD '83
Senior Research Scientist, Drug Metabolism Research, Pharmacia & Upjohn, Kalamazoo, MI. From 1983-1988 I was at the Department of Pharmacology at the Medical University of South Carolina as an Assistant Professor. In 1988 I moved to The Upjohn Company as a Research Scientist. My interests include: xenobiotic metabolism, mechanistic toxicology, drug development, all aspects of biomedical mass spectrometry. My current assignment includes 50% laboratory research and 50% acquisitions review. (Biochemistry, 2000).

Walter, Richard, Jr.—PhD '72
Chief Microbiologist, The Dow Chemical Co., Midland, MI. My postdoctoral years were spent at the University of Colorado Medical Center from 1972-1974 where my research focus was on mammalian ATPase. Since 1974, I have been with Dow Chemical researching biocatalysis, biopolymer fermentation, pharmaceutical antimicrobials, and antibiotics, industrial antimicrobials, identification, evaluation, and development. Member of SIM, ASM, ACS, ASWPA, and ASTM. Recently received an Award of Merit from ASTM. (Biochemistry, 2000)

Wang, John, Biochemistry Faculty (1977-)
I interviewed with the faculty and students in the Department of Biochemistry at Michigan State University over February 16 - 18, 1977. I could sense the camaraderie of the faculty during the after-dinner gathering at Bob Barker's house. It was apparent that everyone had turned out. The den in the Barker house was so full that we all had to remain vertical while Dave McConnell scooped up the pop corn that he had spilled all over the floor! Although Dr. Barker made an offer of a faculty position on March 8, 1977, it was not soon enough because Magic Johnson had already announced that he was coming to Michigan State and I missed out on the basketball tickets!

Over the years, I have been truly blessed with wonderful colleagues. Within the lab, Patty Voss served for nearly

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30 years, not only as a virtuoso bench scientist but also as a steadying influence in guiding some 20 graduate students to successfully complete their Ph.D. degrees. In the Department, our laboratory had a close collaboration with that of Mel Schindler who bombarded us with many new ideas, fitting his "idea per minute" reputation that was coined by his previous colleagues at the Weizmann Institute. Finally, we were particularly stimulated by a long-standing collaboration (early 1990s to present) with Ron Patterson and his laboratory in the Department of Microbiology. Together with graduate students and faculty colleagues, we contributed experimental evidence that provided new perspectives on three paradigms: (a) negative regulators of cell growth, to complement the plethora of growth stimulatory factors; (b) cytoskeletal structures in cells during interphase (not just in metaphase), including actin and microfilaments in plant cells; and (c) saccharide-binding proteins in the cell nucleus, participating in RNA processing activities not normally associated with cell surface carbohydrate receptors. Indeed, we had a fun time of it! John Wang (Memories, 2010)

Washburn, Michael P. PhD, '98: and Florens, Laurence

Mike was the last graduate student who worked under the mentorship of Professor Bill Wells, who retired last year. Mike moved to Seattle to begin postdoctoral work with Dr. John Yates at the Univ. of Washington, but Professor Yates soon moved his lab to the Scripps Research Institute in San Diego, where he also accepted a position as Director of Proteomics at the Novartis Agricultural Discovery Institute. Mike and several other members of the Yates laboratory also made the move to San Diego, and Mike currently holds a position as Staff Scientist, Protein and Metabolite Dynamics, with the Novartis Agricultural Discovery Institute. He can be contacted by mail to 1571 Avenida de los Linios, Encinitas, CA 92024. (BMB Brochure 2001) After completing his PhD with Professor Bill Wells, Mike did postdoctoral work with Professor John Yates III in the Department of Molecular Biotechnology at the University of Washington. During this time. he developed a multi-dimensional chromatography and tandem mass spectrometry system for assessing the "proteome" (the protein population in a cell or organism). In 2000, Mike moved to a position as Senior Staff Scientist in Proteomics at the Torrey Mesa Research Institute in San Diego, CA. Dr. Yates also moved to the San Diego area, taking a position at the Scripps Institute, and their collaborative work on quantitative

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proteomics continued. Recently, Mike accepted the position as Director of Proteomics at the Stowers Institute for Medical Research in Kansas City (http://www.stowers-institute.org). In an extensive e-mail to former Chairperson Bill Smith last February, Mike made clear his excitement about his new position, The Stowers Institute is making a very substantial commitment to research in proteomics, and Mike is clearly in on the ground floor: so it is easy to see why he should be so excited about this opportunity. During his graduate student days at MSU, Mike met and subsequently married Laurence Florens, then a postdoctoral associate with Professor Ferguson-Miller. With the move to the Stowers Institute, Laurence will also have an independent position there. Mike says that they will continue to work closely, even though their positions are independent, and notes that each position is ideally tailored to our skills. It is almost too good to be true. (Biochemistry, 2003)

Watson, Ronald—PhD '71
Professor, Public Health, Arizona Prevent Center, University of Arizona School of Medicine, Tucson, AZ. Since leaving MSU I did a postdoctoral fellowship at Harvard School of Public Health with another MSU graduate, A. Bruce MacDonald, and through that experience became an immunologist. I have taught in faculty positions thereafter at the Medical School in Mississippi, Indiana and now Arizona, with a time at Purdue. We use nutrients as immune modulators. So I did research in Colombia, Egypt and Saudi Arabia while working in the USA as a Professor. Currently, we have a 5 year NIH grant to study heart disease due to immune damage in a murine model of AIDS and leukemia. We have developed a treatment for it, which is licensed to be tested in HIV patients. We are continuing a long research study of cofactors that exacerbate immune dysfunction in murine AIDS, alcohol, cocaine, Coxsackie virus. As I train Ph.D. nutrition students we have been doing human trials of antioxidants to promote restoration of immune dysfunction in older people using beta-carotene, extracts of vegetables, DHEA. I have 4 children. One is working and going to school part time as a programmer in East Lansing. We have two grandchildren which are fun, most of the time. (Biochemistry, 2000)

Weems, Charles N. - BS '73
Charles writes that he is "somewhat retired" from a position with Stauffer Chemical Co. He can be contacted by mail to 337 Lemon St., Apt. 6, Marietta, GA 30060. (Biochemistry, 2004)

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Welch, Shirley L. BS '73
After MSU, Shirley proceeded to the University of California, Berkeley, from which she received her PhD in Biochemistry in 1977. During her undergrad years, Shirley worked in Clarence Suelter's laboratory, and the acquaintance was renewed when Clarence spent a sabbatical at UC Berkeley while Shirley was a student there. Shirley did postdoctoral work in biochemistry and biophysics at Oregon State University in 1977-1980, and for the past 23 years, has been a resident of Portland, OR. where she is currently Director of Chemistry for Kaiser Permanente NW Regional Laboratory, and also an Asst. Professor of Pathology at Oregon Health Sciences University. Off duty, Shirley enjoys hiking, climbing and skiing in the Northwest and other mountainous regions of the world. Her address is 3724 NE 24th, Portland, OR 97212, or she can be contacted bye-mail to Shirley.L.Welch@kp.org. (Biochemistry, 2003)

Wells, William W., Biochemistry Faculty (1965-1997)
Recollections of Early Departmental Events. While I was finishing my Ph.D. thesis in the Department of Biochemistry, University of Wisconsin in 1955, I was invited by the Department of Chemistry at MSU to apply for the position in Biochemistry to be vacated by Professor Charles Ball. Professor Ball, then age 65, was retiring from MSU due to the State's mandatory age-limit at that time. I gave a seminar on skin sterols in the rat in Kedzie Hall, and learned I was to be offered Professor Ball's position. However, a new retirement age came into effect at the State of Michigan Universities, and Professor Ball chose to remain at MSU for several more years. Instead, I accepted a faculty position at the University of Pittsburgh, School of Medicine, on July 1, 1955, where I taught medical students, biochemistry undergraduate and graduate students. I also conducted research on cholesterol metabolism and the causes of atherosclerosis in experimental rabbits fed cholesterol. Shortly after my arrival in Pittsburgh, I was introduced to gas-liquid chromatography of steroids by Dr. Charles C. Sweeley, Graduate School of Public Health at the University, and I immediately applied this technique to my own sterol and bile acid research. Chuck and I lived near each other in Mt. Lebanon, PA, so we often pooled car-driving down to Oakland to the University and back home. In my laboratory, my post-doc from Japan, Masami Makita and I had just published the successful gas-chromatography of bile acid methyl esters, by the facile formation of trimethylsilyl ethers using trimethylchorosilane, and hexamethyldisilazane, in pyridine. Carbohydrates had

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not been successfully gas-chromatographed at that time, and since carbohydrates are readily soluble in pyridine, we both wondered whether they could be gas-chromatographed as volatile trimethylsilyl ethers on a certain day's drive into Pittsburgh. By noon of that day, we each had shown the complete separation of α and β-D glucose as trimethylsilyl ethers, and excitedly called the other by phone. This began a long and fruitful collaboration with Chuck, who Gaurth Hansen was able to recruit to MSU two years after my arrival in East Lansing. The gas chromatography of carbohydrates opened my interest into the genetic disease, galactosemia, which led to our discovery of galactitol in all tissues of patients of the disease. We spent several years looking into the toxic effects of dietary galactose on the brains of chickens as an experimental model for human galactosemia.

While I was associate professor of Biochemistry at the University of Pittsburgh, in the fall of 1964, I attended the 20th reunion of my East Lansing High School football team at an October home-coming game in East Lansing. In Pittsburgh, I had heard news about the changes going on in Biochemistry at MSU that year with the construction of the new department building on Wilson road and the founding of the two-year College of Human Medicine. MSU faculty members were transferred from other Departments including Chemistry, Agricultural Chemistry, and Dairy Science under the leadership of Professor Gaurth Hansen. I knew of Professor Hansen's research interest in lactose biosynthesis and related studies, so I arranged a visit with him during the home-coming weekend. After seeing the new building and meeting the faculty, I was invited to return to give a seminar and then to return as a professor in the Department in September of 1966. I was invited to attend the dedication of the new building on June 3, 1965 with a special lecture by Dr. Severo Ochoa, Nobel Laureate, entitled, "The Genetic Code." During the summer of 1964, I had made plans to spend a sabbatical year with Professor Feodor Lynen at the Max Planck Institute for Cell Chemistry in Munich, Germany during 1965-1966. The year with Lynen was especially fruitful giving me my first experience with the purification of fatty acid synthase from baker's yeast. When I learned that Lynen would be in the United States in the fall of 1966, Gaurth Hansen made arrangements to invite him to come to Michigan State University that September as a featured colloquium speaker. Fitzie and his wife, Eva, enjoyed their fine welcome by the faculty and students on that occasion. However, Lynen was astonished that he could not order a beer on campus at

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The Kellogg Center in those days. I arrived in East Lansing with my family in August of 1966 in preparation for teaching Biochemistry to College of Human Medicine freshmen and in planning for other courses in our undergraduate and graduate programs and to continue with my research interests in room 413 and adjacent rooms in the biochemistry building. During my sabbatical year, my future lab space was occupied by Professor Joe Varner, whose lab in Plant Physiology across the street was under construction.

Moving back to East Lansing after graduating from East Lansing High School in 1945 was very gratifying to me. The Department was then experiencing extraordinary growth with the acquisition of many outstanding new faculty members to complement those already on board. It was a heady time, and our graduate student population number grew to record heights. I look back with great pleasure to the many wonderful friendships I enjoyed among colleagues, students and post-docs that helped carry out my research and teaching obligations until my retirement in 1997. (Memories, 2010)

Welton, Ann F.—PhD '74

Vice President, Biology and Preclinical Sciences, Axys Pharmaceuticals, S. San Francisco, CA. From 1974-1977 I did a Postdoc with Dr. Martin Rodbell at the NIH. I was then employed at Hoffmann LaRoche, Inc., from 1977 until my retirement in January 1998. The last position I held there was Vice President of Preclinical Development. I have been with Axys Pharmaceuticals since January, 1998 (Biochemistry 2000). 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 EI Sobrante St., San Mateo, CA 94403-3714) or e-mail (weltona@ad.com or ann.welton@celera.com). (Biochemistry, 2002)

Wernette, Catherine Marie PhD '88

As a graduate student, Dr. Wernette worked on the purification and characterization of *Drosophila*

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melanogaster DNA polymerase γ under the supervision of Dr. Laurie S. Kaguni from 1983-1988. After earning her Ph.D. in Biochemistry from Michigan State University, she completed an NRSA Postdoctoral Research Fellowship at the University of Texas Southwestern Medical Center at Dallas (1989-1992). There she studied yeast mitochondrial DNA replication and recombination in the laboratory of Dr. Ronald A. Butow. After joining the faculty at Auburn University in 1992, she taught biochemistry and molecular biology at undergraduate and graduate levels, and trained a number of undergraduate and graduate students in laboratory research. Her teaching expertise includes biochemistry, molecular biology, genetics, chemistry, immunology, and physiology, and her academic research has centered on topics in nutrition, infectious diseases, diabetes, and obesity.

Over a number of years, her interests have grown to include issues in scientific publishing, the public understanding of science, science policy, science funding, grant writing. A board-certified editor in the life sciences (ELS), Dr. Wernette is also a member of the American Association for the Advancement of Science, the Council of Science Editors, the American Medical Writers Association, and the Grants Professionals Association. As a professional scientific writer and editor with her own company, CMW Consulting LLC (http://cmwsc.com), she has examined issues involving food security, anorexia, diabetes, obesity, heart disease, Alzheimers disease, and Parkinsons disease, among others. Scientific and biomedical writing formats offered through her company include assistance with writing and editing research manuscripts, review articles, monographs, grant proposals, study reports, meeting summaries, professional and patient education, newsletters, marketing materials, slide sets, posters, and web sites. She has numerous clients who are active in diverse scientific fields worldwide.

While Dr. Wernette stays busy with her work, she enjoys reading books on her Kindle, sculpting, walking, yoga, and Zumba. Her husband, D'Arcy, is Risk Manager for the City of Auburn, Alabama, and active in various church outreach committees. In his spare time, he, an expert marksman, enjoys working out at the health club and puttering around their house, yard, and cars. Their son Matthew, born in Lansing in 1984, whom some of you knew, has obtained a Bachelor's degree in History and is presently employed as a manager by a major restaurant chain. His interests involve photography, motorcycles,

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and rock climbing, and volunteering at the local food bank. Born in Dallas, Texas (1991), their younger son Ben, is presently studying business, music, and women in college. He works at a sub shop and as an emergency medical technician, plays guitar in a band, and is learning to make guitars.

Many people come to the Southeast to retire and, unless something changes, Dr. Wernette expects to remain in the area—after all; she is already there and has found that she must be somewhere. In addition, it is usually sunny outside, Atlanta airport and the Gulf of Mexico are nearby, and the football is great. (Memories, 2010).

Weston, Matthew—BS '84
Technical Service Director, Resinall Corp., Severn, NC (BMB Brochure 2000). Matthew is Director of Technical Services for Resinall Corp. He can be contacted by mail sent c/o Resinall Corp., P.O. Box 195, Severn. NC 27877. (Biochemistry, 2001)

White, Peter Cooper—BS '77
General Pediatrics, Beachwood, OH. I have been practicing general pediatrics on the East Side of Cleveland, OH for the last 11 years. It's been fun and I expect to keep it up for a while. (BMB Brochure 2000) I remember fondly my time in the Biochemistry department of MSU. I was a biochem major in the mid seventies. I worked on my senior project in the lab of Dr Wells, working on the role of myo-inositol deficiency in the generation of fatty livers in rats. It was a time of great excitement with the new genetic techniques in biochemistry becoming available. Dr Wells also provided me summer employment for the summers of 1976 and 1977, a much appreciated benefit of my association with the lab. I went on to medical school at the University of Chicago, and now practice as a general pediatrician at Akron Children's Hospital. I look forward to spending time with some MSU friends at the E. Lansing campus in a couple weeks to watch a football game. Cooper White MD (Memories, 2010)

White, Tracy PhD '89
I don't know if you remember me, but I was a graduate student in John Wilson's lab and graduated in 1989. I think, perhaps, you were on my thesis committee. I think I remember that you asked some questions about HPLC methodologies that I stumbled over. Some of my fondest memories are of my time at MSU! Crunchy's! But aside from great hamburgers, I know that my time in

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the biochemistry department prepared me exceptionally well for my subsequent life as a scientist. I still distinctly remember the impression that John made as both a scientist and a human being – to this day it is my goal to emulate him on both counts. After I left MSU I did a number of post-docs, including a three year position at the Johns Hopkins University School of Medicine (the role of gangliosides in cell-cell interactions in the brain) and another three year position at the University of Connecticut Health Center Medical School (the role of cell surface proteins in cell-extracellular matrix interactions in melanoma cells). I am currently Associate Campus Dean (half time) and Associate Professor of Biology (the other half of the time) at the University of Wisconsin – Barron County in Rice Lake, Wisconsin. Tracy K. White, Ph.D., Associate Campus Dean, Associate Professor, Biological Sciences, University of Wisconsin - Barron County, 1800 College Drive, Rice Lake, WI 54868, (715) 234-8176 ext. 5437 (Memories, 2010)

Wilson, Barbara J.—Ph.D. '87
Forensic Scientist, Illinois State Police, Chicago, IL (Biochemistry, 2000)

Wilson, John E. – Biochemistry Faculty (1967-2004)
Thirty-seven years is a long time to be at one place but, looking back, it is hard to believe that it has really been that long since I joined this faculty, the last active faculty member to have been recruited by the founding Chairperson of this department, Professor R. Gaurth Hansen. I still remember arriving for my interview visit, landing at the Lansing airport on a snowy winter day and being met by Paul Kindel, the first MSU faculty member with whom I had personal contact.

According to the recruiting protocol that was operational at the time, the faculty candidate met with all the faculty (smaller in those days) for lunch at Kellogg Center. After lunch, I was to be off on a schedule of meetings with individual faculty members but first, Chairperson Hansen wanted to make sure that things were set for the next meal. Thus, while standing in the lobby at Kellogg Center. Gaurth asked me if I had any preference for the kind of food we might have for dinner. Nope, anything was fine. Gaurth then asked, "Would you like a drink before dinner?" This question was pertinent since, at the time, East Lansing was dry and hence an affirmative response would dictate that we would be outside the city

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limits for dinner. “Well,” I light heartedly responded, “I never turn one of those down.” Gaurth seemed to take that response in stride. Later that day, I learned that Gaurth was a dedicated Mormon, and in accord with the tenets of that faith, a non-drinker. At that point, I figured my flippant response and confessed non abstinence might have torpedoed any job opportunity. Fortunately, Gaurth was also a tolerant man (those who attended functions in his home, for visiting seminar speakers or faculty candidates, will know what I mean), and I was relieved to see that several faculty members who joined us for dinner that evening shared in a pre dinner libation. (Dinner was at Warren’s Poplars - old timers will recall that this was east of East Lansing, just beyond the infamous Coral Gables, the student watering hole in those days.) Clearly there was room for non-teetotalers on the faculty, and I slept better that night. In addition to faculty candidates, it was also customary in those days for the entire faculty (or as many as could make it - and some were famous for never missing a free lunch) to join visiting seminar speakers for lunch at Kellogg Center. However, as the size of the faculty increased, and the cost of such affairs became excessive, the practice was abolished in favor of smaller luncheon gatherings, just a few faculty along with the visitor. At the departmental Christmas (Holiday) Parties that were being held in those days, the graduate students would present a series of clever, and frequently provocative, skits based on various personalities and events in the department. At the first party after the abolishment of the “entire-faculty luncheon” gatherings, the graduate students preesented “The Last Luncheon.” Based on Da Vinci’s famous “Last Supper,” this featured graduate student faculty impersonators gathered around a long table and silhouetted by subtle background lighting. Like the faculty luncheons, the party skits have now gone their way, but those old enough to remember will recall them fondly.

The “preliminary examination,” an integral part of the graduate program, has changed in many ways over the course of this department’s history. However, since the early days of the department, the preliminary exam has generally been regarded as a critical factor in evaluation of graduate student progress. Failure to satisfactorily complete the preliminary exam led to termination, or to transfer to the MS program, in which the student might have further chance to prove their worthiness to progress to the PhD. Perhaps my memory fails me, but to the best of my recollection, there had been no exceptions to this policy until a particular student, a real dynamo in the lab,

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had the misfortune to not do well on the prelim. Dismissal loomed. Would the faculty make an exception based on other demonstrated qualities of that student? They did, by a vote of 13 in favor of granting the exception to 12 against. A close call at an emotional faculty meeting that still sticks in my memory. Subsequent to that decision, the student went on to successfully complete the PhD, and to a distinguished career that, some years later, resulted in recognition with this department's Boezi Award. While my general tendency is to believe that good order requires adherence to established policy, I will never forget this incident as a reminder that inflexible interpretation of rules is not always the best option.

In 1975, life changed dramatically. Our second son, Jason, was diagnosed with lymphoma. His predicted survival was one to two years. Two surgeries, followed by an extended period of chemotherapy, ensued. Sandy and I will never forget the many kindnesses of departmental colleagues during this ordeal. Within days of the diagnosis, Andrea Smith and Nina Ronzio showed up at our front door, with casseroles in hand and kind words and offers of help on their lips. As Jason was in ICU after his first surgery, Pat and Dave McConnell arranged for delivery of a stuffed lion with the inspirational message: "Be a lion, Jason." Loretta Suelter took care of our older son, John, while Sandy and I took Jason for consultations at U of M Medical Center. I was co-teaching a course with Willis Wood (Woody) but when I had to take Jason to Houston for several months of chemotherapy, Woody graciously took over my part of the course in addition to his own. I mention these few incidents but there were many more that Sandy and I will always treasure as memories of the support and kindliness of faculty and spouses of this department. Many of them will read this, and so I take this opportunity to say once again, thank you, dear friends. (The story does have a happy ending, as Jason went on to do well and, at the age of 32, is currently working in New York City.)

In the 1970-1980 years, ours was still a young department, with many of the faculty members having received their PhDss in the I960s and then being recruited to the growing department. In such a youthful environment, the sudden death of a vigorous young faculty member, John A. Boezi, in 1980, was a stunning blow. Those of us who were friends and colleagues of John will remember his dedication to high standards of performance, both for himself and his students. We will also remember his love for his family, his good humor, and his interest in things

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non-scientific, such as golf, good wine, and gourmet cooking. Established by his many friends and colleagues, the Boezi Award is given annually to an outstanding alum of this department and serves as an enduring tribute to John's memory.

Shortly after joining the department in 1967, I was enticed into a regular poker game that included fellow faculty members Steve Aust, Loran Bieber, and Al Morris. (I shudder to recall that these usually broke up at the crack of dawn, and now feeling my age, I wonder how we ever did that!) It turned out that we also shared an interest in fishing, and each fall for several years, the four of us would take a "fly-in" fishing trip into the Ontario wilderness. It is rumored that beer sales would spike in Canada when we laid in supplies for the trip. Those were times of pure fun, lots of laughs, and wonderful memories of that special feeling that comes from sharing time with good friends.

Doug Randall was a grad student with Ed Tolbert when I came to MSU. Doug was also an avid fisherman. While this was typically done with the classic rod and reel, Doug, Loran Bieber, and some others from the department also used "dip nets" when the annual smelt run was on. They would head north and, after a night's work, return with garbage cans full of fresh smelt. These would become the main dish at what was, for several years, a wonderful departmental tradition - the smelt fry. I'll bet many of you reading this will remember enjoying those crispy fried little fish, along with the other good things that people would bring to supplement the main menu item. Good food? Yes. But more importantly, good times, when the departmental "family" got together to enjoy each other's company.

I have four sisters, three of whom married ardent golfers. Sandy and I have three sons, two of whom are ardent golfers (and the third is now taking up the game). Several years ago, I noticed what had become a disturbing routine. At summer family gatherings, the two sons would go off with their uncles to play golf while I, a dedicated scientist and non golfer, would remain at home, reading JBC or Science. There seemed to be something wrong with this picture. Perhaps there was something to this game of golf after all? So at about 50 years of age (too late to develop a good swing, according to one brother in-law - and I guess he was right), I decided to give it a try. Dick Anderson proved to be a willing companion during my initial forays onto the golf course. Dick once had been an active

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golfer but had tapered off. My interest re-ignited the flame, and Dick and I became regulars at some of the less challenging courses in the area. When

I finally got up the courage to venture out on a "real" golf course, MSU Forest Aker's East, Bill Smith and Jon Kaguni, along with Dick, were kind enough to overlook my dubbed drives and hopeless iron shots. Thus the four of us began a more-or-less regular schedule of Friday afternoon "Turf Management Conferences" at Forest Akers East. This is now in the past, Timber Ridge Golf Course has become the favored venue, and faculty colleague Dean DellaPenna has been my most reliable commpanion (along with Bill Smith, prior to his move to Ann Arbor). Based on experience thus far, I have solid evidence for the conclusion that the quality of one's golf game does not improve in proportion to the number of rounds played. Nevertheless, I keep hoping, and plan to further test this conclusion after retirement.

In 37 years, there are a lot of memories. The above are just a few, some bitter, some sweet. I hope I have not bored you with this highly personal account. When we think of "The Department," things like courses, research grants and publications, and academic and professional honors earned by students and faculty naturally come to mind. Certainly important, but "The Department" is, ultimately, people. As my years as an active MSU faculty member come to an end, I take great pleasure in recalling the many people - some still here, some now gone - that I have called friends and colleagues. (Biochemistry, 2004, pp 23-25)

Wood, Willis A. Biochemistry Faculty (1961-1982)
The W. A. Wood Laboratory was located in the Food Science Building at the end of Farm Lane Road when I, Don Beitz, arrived on the Michigan State University (MSU) campus in the fall of 1963. I had just completed my M.S. final examination at the University of Illinois, become married to Judy, and went on a $100 honeymoon to St. Louis. Of course, a Cardinal baseball game and dinner at Stan Musial's restaurant was on the agenda. We made 1623L Spartan Village as our MSU home. I initiated a study of milk fat depression at the MSU Dairy Farm under the direction of William Thomas in the Department of Dairy Science and W.A. Wood in the Department of Biochemistry. Yes, I had initiated a Ph.D. degree program with a joint major in dairy nutrition and biochemistry that was similar to that of an earlier student in the Wood laboratory, Lee Baldwin (deceased), who graduated with a Ph.D. in 1962. After about a year of graduate study, Roy Emery, a colleague of William

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Thomas', suggested that I research milk protein biosynthesis. That sounded like a good idea. Because that new project required a preparative ultracentrifuge for ribosome isolation from the bovine mammary gland, I began research activities in the Wood laboratory. Allen Phillips (atp@psu.edu) was a member of the Wood group at that time. He completed a dissertation in which he described several kinetic and physical properties of threonine dehydrase from E. coli. Allen graduated in 1964 and had a productive career in the Departments of Biochemistry at Louisiana State University and then at Penn State University. He retired from Penn State University in 2001. Another Ph.D. student, Jordan Ingram, a Canadian, was also in the group. He characterized the enzyme known as KDPG aldolase from Pseudomonas fluorescens for his dissertation. After graduation, he returned to Ottawa, Canada.

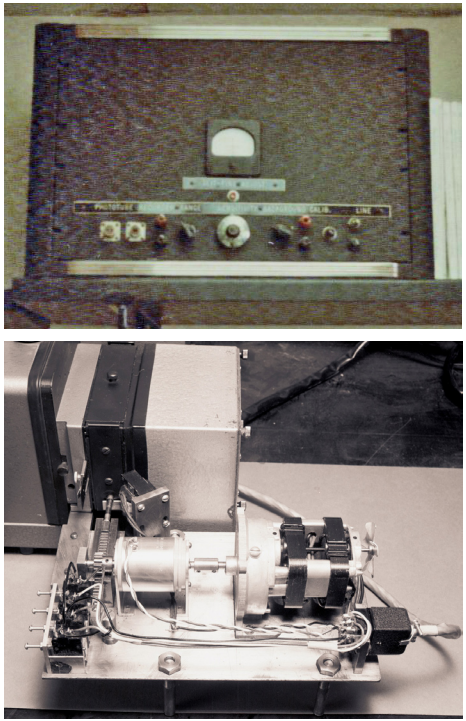

Figure 8.17: Automatic cuvet changer that formed the basis of a patent for a cam operated commercial cuvet changer issued to Saul Gilford and Willis Wood (Wood and Gilford 1961). Michigan State University Archives and Historical Collections, (Media Collection, Negative 22931). A view of the electronic box associated with the cuvet changer is shown above.

During the early 1960s, Dr. Gaurth Hansen, chair of the Department, along with assistance of Profs. Ed Tolbert, W.A. Wood, and other colleagues, secured federal and state funds to build the Biochemistry Building. This Building was a dream come true for the small, new (1961) Department of Biochemistry as all faculty would become officed in the same building. With the help of the relatively small Wood laboratory group to move the laboratory, the Wood Institute had its beginnings in room 410 of the new Biochemistry Building. During the next year or so, the Wood group grew into a large group of aspiring young scientists that peaked in number during 1967. Woody named each student or post-doctorate in his laboratory a Vice President of something, with a responsibility for management and maintenance of, for instance,

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centrifuges, spectrophotometers, and so forth. At times, there were meetings of the Vice Presidents to declare a "dividend" (party). This working relationship morphed into the mythical Wood Institute. Besides being a hard working group of young scientists with Journal Club meetings on Tuesday nights, the Institute took on an existence of its own, complete with a Poet Laureate, Les Barran, Stand-up comedian, Mark Roseman, Wood Institute tee shirts, and custom match books. Members enjoyed each other with numerous social activities that included hundreds of games of newly developed lab hockey, several golf outings, canoe trips, memorable remodeling of Woody's lawn and office, regular parties , and socials at FASEB meeting hosted by Woody. Lifelong friendships were established!

The Wood Institute consisted of these people, along with some biographical information, during the 1963-1967 period:

Wijaya Altakar—Post-doctoral associate and visiting scientist from the National Atomic Energy Laboratory, Mumbai, India; Has been (now?) at National Chemical Laboratory, Poona, India.

Don Beitz—B.S. and M.S., University of Illinois-Urbana; Ph.D. student; Graduated in 1967; Faculty member in Departments of Animal Science and of Biochemistry, Biophysics, and Molecular Biology at Iowa State University; Research has focused on topics of nutritional biochemistry; dcbeitz@iastate.edu.

Les Barran—Trained in Canada; Ph.D. student; Graduated in 1968; Research at Agriculture Canada, Ottawa, Canada. (lbarran@gmail.com)

Howard Brockman—B.S., Southern Illinois University; Ph.D. student. Graduated in 1971; Biophysicist at the Hormel Institute of Austin, MN where he focuses on structure and function of cell membranes as Section Leader of Biophysics; hlbroc@umn.edu.

Karl Decker—Visiting scientist during 1967 from the Biochemical Institute of the University of Freiburg in Freiburg, Germany; Retired in 1993 but continued research and writing of science; karl.decker@biochemie.uni-freiburg.de.

Jean Deupree—B.S. from Ferris State University; Ph.D. student; Graduated in 1970; Faculty member

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in Department of Pharmacology and Experimental Neuroscience at University of Nebraska Medical Center, Omaha, NE; Now is professor emeritus; jddeupre@unmc.edu.

John Gerlt—B.S. in Biochemistry at MSU; Worked in Wood Institute as undergraduate student; Nickname was OJ; Earned Ph.D. at Harvard University in 1974; Well known mechanistic enzymologist as Gutgsell Professor and chair of Biochemistry Department at University of Illinois-Urbana-Champaign. (j-gerlt@illinois.edu)

Roy Hammerstedt—B.S. from University of Minnesota-Duluth in 1963; Ph.D. from University of Minnesota; Post-doctoral research associate; Was faculty member in Department of Biochemistry at Penn State University until 1999; Founded BioPore in 1987 and APD Life Sciences in 2003 in which he currently is president; Professor emeritus; hammer@apdls.com.

Hans Moehler—Visiting graduate student from University of Freiburg in Freiburg, Germany; Worked with Karl Decker; Worked at Hoffmann-LaRoche; Retired in 2006 as Professor of Pharmacology at the Swiss Federal Institute of Technology and University of Zurich: Lives in Meilen on Lake Zurich; Niederman has an interesting story about 'Niederman as spy in his trench coat (with umbrella?) at the German-Swiss border' on a visit with Hans; mohler@pharma.uzh.ch.

Harvey Mohrenweiser—B.S. and M.S. from University of Minnesota; Ph.D. student with majors in dairy science and biochemistry. Graduated in 1969; After 10 years in Department of Human Genetics at University of Michigan, joined the Biology and Biotechnology Research Program and the Human Genome Center at University of California, Lawrence Livermore National Laboratory, Livermore, CA, serving stints as Director of the Institute of Genetics and Genomics and also as Group Leader of the Biological Dosimetry Program; Worked in Department of Epidemiology and as Associate Director of the Genetic Epidemiology Research Institute at the University of California-Irvine; Currently at Center for Research on Occupational and Environmental Toxicology at Oregon Health & Science University, Portland, OR; Liz and Harvey are now registered breeders of GoarRhein Standard Schnauzers in Turner, OR; mohrenweiser@wvi.com.

Bob Niederman—Ph.D. from University of Illinois-Urbana; Atomic Energy Commision post-doctoral associate; Professor of molecular biology and

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biochemistry on the Busch Campus of Rutgers-State University of New Jersey, Piscataway, NJ where he served as founding Vice-Chair of the Department and conducts studies on the structure, function, and assembly of bacterial photosynthetic membranes; rniederm@rci.rutgers.edu.

Jeanette Piperno—B.A. from Kalamazoo College; Ph.D. from University Michigan; Post-doctoral associate; Faculty member at the Thrombosis Center of Temple University, Philadelphia, PA; Died in early 1980s; Jeanette Piperno Award and Lecture presented annually in her honor at Temple University.

Don Robertson—B.S. from University of Dubuque; Ph.D. from Iowa State University; Post-doctoral associate. Faculty member at University of Kansas in Lawrence, KS until 1992; Then, moved to University of Idaho as Head of the Department of Microbiology, Molecular Biology, and Biochemistry and then moved to Kansas State University in 2000 to serve as Associate Dean of Research in the College of Veterinary Medicine until 2005; Retired in 2008 as professor emeritus of microbiology; droberts@vet.ksu.edu.

Mark Roseman—B.S. from University of Michigan; Ph.D. student; Faculty member of Department of Biochemistry and Molecular Biology at Uniformed Services University of the Health Sciences, Bethesda, MD; mroseman@usuhs.mil.

Don Schneider—B.A. from Kalamazoo College; Ph.D. student; Post-doctoral associate at Cornell University and Rockefeller University; Became faculty member at Dartmouth Medical School before going to the NIH; Director of Division of Basic and Integrative Biological Sciences at the NIH; schneido@csr.nih.gov.

Patti (Vignola) Prokopp—Secretary for the Wood Institute; Retired to El Paso, TX.

Kenneth Warren (formerly Rabinowitz)—B.S. from City College of New York; Ph.D. student; Graduated in 1970; Post-doctoral associate at University of California-Los Angeles (1970-72) and at the Mental Health Research Institute of the University of Michigan (1972-74; Joined Walter Reed Army Institute of Research as Chief of Biochemistry Section in 1974; In 1976, joined the National Institute on Alcohol Abuse and Alcoholism

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(NIAAA); Became Director of the Office of Scientific Affairs in NIAAA in 1984 and Institute Deputy Director in 2007; Since 2008, has served as the Acting Institute Director; Well known for his research on fetal alcohol syndrome (FAS) and fetal alcohol spectrum disorders; Research supported legislation requiring FAS warning labels on alcoholic beverages sold in the U.S.: kwarren@mail.nih.gov.

Whanger, Phil—B.S. from Berry College; Ph.D. from North Carolina State University in 1965; Post-doctoral associate; Professor of Agricultural Chemistry at Oregon State University; Had continuous NIH/USDA funding for his selenium biochemistry research; Discovered selenoprotein W (W refers to white as in white muscle disease); Have you tried some of his high selenium broccoli?; Professor emeritus and living in Sequim, WA; phil.whanger@comcast.edu.

William I. Wood—Son of W. A. Wood; Worked in Wood Institute on software for enzyme kinetics as high school student; Earned B.B. Degree from Cornell University and Ph.D. degree from Harvard University with K. Bloch; Senior Director of Bioinformatics at Genentech; Starting a winery. (w@wood47.com)

W.A. (Woody) Wood—Director of the Wood Institute; Ph.D. in Microbiology, Indiana University in 1950; Assistant/Associate Professor Dairy Microbiology at University of Illinois from 1950 to 1958. Professor of Agricultural Chemistry/Biochemistry at Michigan State University from 1958 to 1982; Director of Microbiology at Salk Institute Biotechnology Industrial Associates (SIBIA) in La Jolla, CA from 1982 to 1991; Principal scientist and vice president of Agouron Institute in Pasadena, CA from 1991 to the present; wwood12655@aol.com.

Other graduate students, post-doctoral associates, and visiting scientists became members of the Wood Institute after 1967.

What a great mentor Dr. Wood was for the above-mentioned members of the Wood Institute (1963-67) and others not mentioned here. He provided a stimulating and fun environment for our education and professional success. We all owe him a great amount of gratitude for the positive role that he played in our professional and personal lives!

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Authored by Donald C. Beitz, Distinguished Professor of Animal Science and Biochemistry at Iowa State University, Ames, IA. (Memories, 2010).

Worden, Kevin J.—BS ’85; MS ’99
Lab Scientist, Michigan Department of Agriculture, East Lansing, MI. I have been busy with family, work and am earning a masters degree in chemical engineering. (Biochemistry, 2000)

Wright, Terry R.—BS ’91
Development Biologist, US Technology Development, Dow AgroSciences, Garner, NC. I received a Ph.D. in Crop and Soil Sciences/Biotechnology Training Program in 1997 under the guidance of Dr. Don Penner. (Biochemistry, 2000)

Yang, William C.—BS ’91
Graduate Assistant, Boston University, Boston, MA. I am pursuing my Ph.D. degree at Boston University. Bill completed his Ph.D. and is now back in the Department doing postdoctoral work with Professor Steve Triezenberg (Biochemistry, 2000). In 2010, Bill is employed by the Department as the Management Analyst.

Yokoyama, Charles—BS ‘87
Graduate Assistant, University of Washington, Seattle, WA. Following my graduation from M.S.U. I attended Massachusetts Institute of Technology where I earned my M.S. degree. I am currently pursuing my Ph.D. degree at the University of Washington. (Biochemistry 2000) Charles was recently promoted to Senior Editor at the scientific journal Neuron - part of the Cell Press family of journals. He handles editorial and peer review of manuscripts in all areas of neuroscience and experimental psychology, manages an international network of authors and reviewers as well as the Neuron.org website and review articles, and travels to conferences and universities to recruit and advocate for neurobiology. (Biochemistry, 2009)

Young, Dave K.—BS ’77
Physician - Pulmonary, Pulmonary, Critical Care Consultants, Lansing, MI (Biochemistry, 2000)

Ortwine (Zaslona), Kelly—BS ’93
Physician, William Beaumont Hospital - Troy, Sterling Heights, MI. Graduated from Wayne State University - School of Medicine and I am a second year resident at William Beaumont Hospital. (Biochemistry, 2000)

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Figure 8.18: Zacharewski Laboratory Retreat on the Ausable River near Grayling, Michigan. Courtesy of Tim Zachrewski.

Zacharewski, Tim, Biochemistry Faculty (1998-)
People in labs tend to get thrown in together without any previous history. During their studies/research, they spend a lot of time together forging strong friendships and sometimes, lifelong relation- ships. Recognizing this from my own experience, I have strived to ensure a cohesive lab atmosphere that not only support a collaborative work environment but also provides fun enrichment opportunities through interactions with others with diverse backgrounds and cultural experiences. Each year in July/August everyone makes the trek up WAWASUM on the Ausable River near Grayling, MI for the annual lab retreat. In addition to getting caught up with research activities, we spend time together fishing, canoeing and tubing, as well as getting to know each other. It also provides an opportunity to get an interesting lab photo that I use for acknowledging lab members at the end of my research presentations. (Memories, 2010)

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Zaluski, Marty BS '97
I'm a 1997 graduate with a bachelor's degree. Currently, I'm state veterinarian for Montana, primarily addressing livestock disease issues.

One of my fondest experiences at MSU was during the senior biochem laboratory. During the 2 to 3 hour period while our cultures were incubating, I and my laboratory partner would take a walk to Anthony Hall where the ice cream store used to be and have a delicious ice cream. We used to request "generous singles" portions of ice cream from the staff. This seems insignificant, but yet the taste, texture, look and smell of the ice cream store have been imprinted on my mind for as long as I live.

During our last lab project, the incubation period was particularly long, (and here, you can use your discretion as to whether to revoke my degree), we ran out and got a 12 pack of beer and played frisbee on the grass lawn while we waited for culture. My motivation suffered followed this activity, but my appreciation for biochem and MSU grew.
The other lasting memory, and this is certainly of greater significance, is that my lab partner is still a good friend, and while his family lives nearly 1000 miles away, we keep in good touch. Sometimes we reminisce...
Marty Zaluski (Memories, 2010)

Zhang, Bin—PhD '97
Research Associate, Howard Hughes Medical Institute, University of Michigan, Ann Arbor, MI (BMB memories of my Brochure 2000) Thanks for updates on the Kroos lab history and the group photo. They remind me of the fond time at MSU: dairy store, the English conversations program, car-deer collision on the way back from the International Spores Conference, minimasters, thesis committee meetings, publication of my first J Bac paper, the birth of my son Jason, etc (and not necessarily in that order). You mentioned that *M. xanthus* project required collecting samples at all hours. I remember clearly that at some point I also needed to collect samples in the wee hours, because that was when I received my first traffic ticket (for failing to stop at a stop sign). I don't have a good group photo on hand. It would be nice if you can share ones you have collected from other folks. Bin Zhang (Memories, 2010)

Zhang, Wenge—MS '94
Research Associate, Protein Design Labs, Inc., Fremont, CA (Biochemistry, 2000)

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Zielke, Carol, PhD (1970) and Horst, PhD (1968)
In March 2011 it will be 40 years since Horst and Carol Zielke said farewell to their mentors and friends in the Department of Biochemistry at Michigan State University and headed down the road to the future under these last words of advice from Carol's research advisor, Dr. Clarence Suelter: "Horst, let Carol drive your car in front of the U-Haul van you will be driving." Sure enough, Carol's car came to a dead stop on the highway somewhere near Ann Arbor and refused to restart; but thanks to Dr. Suelter's advice, Carol was not left behind in the dark while Horst sailed on in the van! Was this a sign that we didn't want to leave? Probably.

Horst and I arrived at the Biochemistry Department in the summer of 1965. I joined Dr. Clarence Suelter's lab where the main focus at that time was the kinetics of monovalent cation activated enzymes and allosteric kinetics. My first project, however, was to synthesize ^{32}P-ATP labeled in the gamma-position. The effort required for this first small project went beyond the lab experiences of my undergraduate chemistry courses where lab assignments were mostly cookbook type designed to illustrate principles related to the lecture material. This project required planning, developing a protocol to synthesize the compound, finding ways to separate it from the starting material, and finally identifying the final product. It was a very good experience and in the process I picked up many laboratory techniques that would be useful in my thesis research which was to characterize and study the properties of the potassium activated enzyme rabbit muscle 5'-AMP-aminohydrolase. Karl Smiley, a post doctorate fellow in the lab, had developed a very elegant one step preparation for this enzyme utilizing cellulose phosphate to bind the enzyme and 1M potassium chloride to elute it from the column. I admit that serendipity was my partner in some of these studies as well as hard work and perseverance. I am indebted to the faculty for their excellent teaching, for the freedom to explore ideas and to gain laboratory experience, and for the nurturing guidance from my research advisor, Dr. Suelter. All have been invaluable in my later research endeavors.

Horst began his thesis research with Dr. Richard Byerrum, Professor of Biochemistry and Dean of the School of Natural Science. His project was to elucidate the pathway of nicotine biosynthesis in the tobacco plant by feeding ^{14}C-labeled precursors and breaking down the final product to determine the label enrichment of each carbon atom as contributed by the precursor-a jigsaw puzzle that today might be done using ^{13}C-labeled precursors and

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NMR detection of label enrichment. Upon completion of his thesis and obtaining his degree, Horst accepted a post doctoral position with Dr. Phil Filner at the AEC Plant Research Labs on the campus of MSU. Horst was still studying tobacco but this time using cultured cells to study the synthesis and turnover of nitrate reductase as induced by nitrate.
Somewhere along the way Horst and I met and we married in 1967. In early1971, after we had completed our studies at the university, we were off to Boston, Massachusetts. There Horst began a second post doctorate under Dr. John Littlefield at the Massachusetts General Hospital in the Human Genetics Unit. While in Boston, we started our family with the birth of the first of our two children.

In late 1973, Horst was appointed to the faculty at the University of Maryland, Baltimore, in the School of Medicine's Department of Pediatrics. By 1994 he was named head of the Division of Developmental Neuroscience and achieved tenure. In 1996 he became Full Professor of Pediatrics.
Early in his research at Maryland, Horst was the first to show that the amino acid L-glutamine was an energy source for human diploid fibroblasts which could explain why L-glutamine was required in the culture medium at higher concentrations than any other amino acid. This became the basis for our research of energy metabolism, especially in the brain.

In 1979, after taking a break to raise our two children, I joined the research group in Pediatrics where I did post doctoral studies with Dr. Pinar Ozand, Director of the Carter Research Center affiliated with the Pediatrics Department. A major focus of my studies involved development of a flow through assay of the enzyme L-glutaminase [E.C. 3.5.1.2] in living cells using a human diploid fibroblast cell line and primary cultures of rat brain astrocytes. We used this assay to show that the enzyme is tightly controlled in living cells as compared to its activity in cell extracts. In 1983, I was appointed Assistant Professor in the Department of Pediatrics at the University of Maryland Baltimore. Since then Horst and I have worked together on multiple projects.

Our early work with glutamine culminated in our study showing that neurons in vivo utilize multiple alternative substrates for energy instead of only lactate which other researchers in the field strongly proposed. Some of these studies involved showing that alternate ^{14}C-labeled substrates infused into the rat brain by microdialysis were

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oxidized to ^{14}C-CO_2 and that these substrates inhibited 14C-lactate oxidation in the living brain.

Among our other research projects, we also have studied Sudden Infant Death Syndrome and branched-chain amino acid metabolism in brain.

For the last twenty years, Horst also has been the Director of the NICHD Brain and Tissue Bank for Developmental Disorders. The bank has supplied human brain tissue collected at autopsy to approximately 800 research investigators world wide.

Although I am now retired, I am currently working as a volunteer to complete a project comparing glutamine metabolism in astrocyte and neuron cultures prepared from brains of wild type and null GSL-1 mice where the null mouse lacks the enzyme L-glutaminase. Horst is still very busy overseeing the Brain and Tissue Bank at the University of Maryland Baltimore.

We send our greetings to everyone in the Department of Biochemistry on the occasion of the 50th Anniversary of your founding! We could not have made it without the outstanding start we received there in our student years. (Memories, 2010)

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Chapter Nine

A Retrospective

The point of this short retrospective is to note the impact of the computer on the research program of faculty and students, the administration of the Department, and on the life of students, both undergraduate and graduate and faculty. What we find is that the impact is mostly positive but there are some negative elements as well.

The first computer on campus was built in 1957 on the fifth floor of the computer center. This computer was about 10 ft high, 11 1/2 ft long, and 2 ft wide (McGuire, 1958). Whether any one member of the Department of Biochemistry actually used the MISTIC Computer, as it was called, is not known. What we do know is that several research groups in the Department made use of the CDC (Controlled Data Corporation) 3600 computer that was purchased by the University to replace the MISTIC (Board of Trustees minutes, April 13, 1962). The CDC 3600 computer was used for analyzing research data; it was not used for office work.

The first computer committee of the Department of Biochemistry was appointed in the Fall of 1973 (Faculty Committees, 1973). It is believed that this committee had one or more computers placed in the Library so that researchers could use them to view the Current Contents publication being provided on floppy discs. Beginning in 1983, the decision was made by the Department of Biochemistry to place IBM Personal Computers in each faculty laboratory over a period of several years (Rayburn 1983a). This marked the beginning of a noticeable change in the operation of the Department. As the personal computers became available in each laboratory, the faculty began to type their own letters, student examinations, research papers, and grant applications. Secretaries no longer needed to provide this service. After computers were used to prepare examinations, the University provided copy centers where original documents such as an examination could be left for duplication at a cost per page. So now if you look at the number of faculty in the department and compare that number with the number of office staff, you find that the ratio of faculty to office staff has increased considerably (see Figure 7.5). Office Staff still

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provide assistance such as making travel plans, producing brochures, arranging for pay vouchers, and keeping financial records of research grants etc (See Chapter 7).

The next major change took place when the Internet was created in the 1980s and 1990s. This made it possible for students, faculty, and office staff to communicate practically instantaneously with anyone on or off campus even with individuals from foreign countries. The disadvantage is that paper copies of important correspondence is often not saved or archived. On the other hand, research journals are now published on-line so that research faculty and students do not need to leave the laboratory to view and read research papers. In addition, books are being digitized at a rapid rate so that they can also be accessed on line. Current PhD and MS Thesis are now on line. So the demand for library space is drastically reduced. In fact, the library in the Biochemistry Building that was moved to the Biomedical Physical Science Building has now been moved to the central Library Building. Fortunately, if anyone needs to view a research journal that has not been digitized, the central Library will make a copy for you, if they have it, and send it via campus mail at no cost. It is also important to know that research grants are now all handled in a digital fashion. No longer is it necessary to bring the grant application to the Dean's office and to the Central Administration for signature. Finally, social networking sites such as Facebook make it easier to stay in touch with alumni around the world.

The computer has also impacted student life on campus. The Admissions Office suggests that incoming undergraduate students have their own personal computer before they register for classes. This is not a requirement because the University provides access to computers at several facilities around campus. Even the Department provides computers that undergraduate and graduate students may use. So the great majority of students have their own laptop computers that they can carry with them as they attend class or go to the Library. Wireless local area networks in the library as well as many coffee bars makes it possible for them to access the Internet and thus their email when direct access to the Internet is not available. The technology also makes it possible to provide lectures on line, so that if they miss any point during the live lecture, they can revisit the material. They can also use the email system to query their class instructor for answers to questions or to participate in organized office hours. Of course, students can now register for classes on line. No longer is it necessary to go to some building and

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stand in line to have their registration approved. Faculty, now also use the Internet to access the transcripts of their students and to record grades obtained on examinations.

Research in the laboratory is now much different compared to the 1960's and 70's, thanks to the computer. First, all major equipment such as spectrophotometers, fluorimeters, scintillation counters, etc all come with an attached computer so that data can be collected and analyzed directly. It is not necessary to move computers from one instrument to another nor is it necessary to read the data off of a recording and plot the data by hand. The computer can also be programmed to control robotic titration devices to set up an experiment. Finally, computer programs are now available that allow one to predict the three dimensional structure of a protein by comparision of its amino acid sequence with the structure of other proteins of the same relative molecular weight.

In summary, the computer has, for the most part, created a positive impact on life at the University. In my view, the loss of archival material is the major negative impact. However, with some thought and work this negative impact can be corrected. The other possible negative impact is the pressure to take work away from the Office Staff. On the other hand, Office Staff may view this as a positive impact.

Figure 9.1a-1d portrays some of the media that have been developed over the years to store digital data. Stored data always needs to be backed up because storage devices can be lost or the data itself may be destroyed by a variety of means. One of the possible negative aspects of recording digital data.

(a) Hollerith Card: A punched card, punch card, IBM card, or Hollerith card is a piece of stiff paper that contains digital information represented by the presence or absence of holes in predefined positions. Early digital computers used punched cards, often prepared using keypunch machines, as the primary medium for input of both computer programs and data. http://en.wikipedia.org/wiki/Punched_card

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b) Floppy disc, 5 1/4 inch used to provide the digital form of the Current Contents, Vol 38, August 14, 1995. A floppy disk is a data storage medium that is composed of a disk of thin, flexible ("floppy") magnetic storage medium sealed in a square or rectangular plastic carrier lined with fabric that removes dust particles. Floppy disks are read and written by a floppy disk drive. They were Invented by IBM and provided in 8 inch, 5¼ inch and 3½ inch forms from the mid-1970s to the late 1990s. While floppy disk drives still have some limited uses, especially with legacy industrial computer equipment, they have now been superseded by USB flash drives, external hard disk drives, optical discs, memory cards and computer networks. http://en.wikipedia.org/wiki/Floppy_disk

(d) DVD-R: DVD, also known as Digital Versatile Disc, is an optical disc storage media format, and was invented and developed by Philips, Sony, Toshiba, and Time Warner in 1995. Its main uses are video and data storage. DVDs are of the same dimensions as compact discs (CDs), but are capable of storing almost seven times as much data. http://en.wikipedia.org/wiki/DVD

(c) Cassette tape: Some early computers used a regular audio cassette tape to store digital data.

(e) Flash drive, 4 giga byte: A USB flash drive consists of a flash memory data storage device integrated with a USB (Universal Serial Bus) interface. USB flash drives are typically removable and rewritable, and physically much smaller than a floppy disk. Storage capacities in 2010 can be as large as 256 Giga Byte with steady improvements in size and price per capacity expected. USB flash drives are smaller, faster, have thousands of times more capacity, and are more durable and reliable because of their lack of moving parts. http://en.wikipedia.org/wiki/USB_flash_drive

Figure 9.1a-1d: The evolution of digital storage devices used in ordinary research laboratories, in offices or by students and faculty.

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Appendix 5.1

Biochemistry and Molecular Biology

Course Offerings

1961-2011

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Biochemistry/Biochemistry and Molecular Biology						
Course Offerings 1961-2011						
				Start	**End**	**Comments**
Course	**No.**	**Credits**	**Offered**	**Date**	**Date**	
Lectures in Biochemistry	100	1(1-0)	Sp	1985	1993	Biochemistry majors 1st and 2nd year
Current Issues in Biochemistry	100	1(1-0)	Sp	1993	2006	Freshman and sophomore students
Frontiers in Biochemistry	101	1(1-0)	F	1997	2011	Freshman and sophomore students
Introduction to Biochemistry	200	5(5-0)	W,Su	1965	1993	Non-majors
Introduction to Biochemistry	200	4(4-0)	F	1993	2011	Non-majors
Biochemistry	261	3(3-2)	F, W, Su	1962	1965	Non-majors
Biochemistry	262	3(3-2)	W, Sp, Su	1962	1965	Continuation of BCH 261
Biochemistry: Blood and Urine Analysis	263	2(1-3)	Sp	1962	1965	Veterinary medicine majors
Biochemistry: Clinical	363	3(2-4)	Sp	1962	1965	Quantitative clinical laboratory methods
Clinical Biochemistry	363	3(2-3)	Sp	1967	1979	Medical Technology majors
Biochemistry: Plant	364	5(3-6)	W	1962	1963	Agriculture majors
General Biochemistry I	401	5(5-0)	F, Sp	1965	1972	Undergraduate Biochemistry majors
Basic Biochemistry	401	4(4-0)	F, Sp	1972	1993	Undergraduate Biochemistry majors
General Biochemistry II	402	3(3-0)	W	1965	1971	Undergraduate Biochemistry majors
Gerneral Biochemistry III	403	2(2-0)	Sp	1965	1971	Undergraduate Biochemistry majors
General Biochemistry Laboratory I	404	2(0-6)	W	1965	1968	Undergraduate Biochemistry majors
General Biochemistry Laboratory I	404	3(1-6)	F,W,Sp	1968	1975	Undergraduate Biochemistry majors
General Biochemistry Laboratory I	404	3(1-6)	W,Sp	1975	1982	Undergraduate Biochemistry majors
General Biochemistry Laboratory I	404	3(1-6)	W	1982	1990	Undergraduate Biochemistry majors
General Biochemistry Laboratory I	404	3(0-9)	w	1990	1993	Undergraduate Biochemistry majors
General Biochemistry Laboratory II	405	2(0-6)	Sp	1965	1968	Undergraduate Biochemistry majors
General Biochemistry Laboratory II	405	3(1-6)	Sp	1968	1969	Undergraduate Biochemistry majors
Biochemistry Laboratory	405	3(0-9)	F,Sp	1983	1993	Undergraduate Biochemistry majors
Clinical Biochemistry	412	4(2-3)	W,Su	1979	1987	Medical Technology majors

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Biochemistry/Biochemistry and Molecular Biology						
Course Offerings 1961-2011						
				Start	**End**	**Comments**
Course	**No.**	**Credits**	**Offered**	**Date**	**Date**	
Biochemistry	451	4(4-0)	F,W	1971	1974	Undergraduate Biochemistry majors
Biochemistry	451	4(4-0)	F	1974	1980	Undergraduate Biochemistry majors
Biochemistry	451	3(3-0)	F	1980	1993	Undergraduate Biochemistry majors
Biochemistry	452	4(4-0)	W,Sp	1971	1974	Undergraduate Biochemistry majors
Biochemistry	452	4(4-0)	W	1974	1980	Undergraduate Biochemistry majors
Biochemistry	452	3(3-0)	W	1980	1993	Undergraduate Biochemistry majors
Biochemistry	453	3(3-0)	Sp	1980	1993	Undergraduate Biochemistry majors
Principles of Biochemical Methods	460	3(3-0)	Sp	1985	1990	Undergraduate Biochemistry majors
Biochemistry I	461	3(4-0)	F	1993	2007	Undergraduate Biochemistry majors
Biochemistry I	461	3(3-0)	F	2007	2011	Undergraduate Biochemistry majors
Biochemistry II	462	3(4-0)	Sp	1993	2006	Undergraduate Biochemistry majors
Biochemistry II	462	3(3-0)	Sp	2007	2011	Undergraduate Biochemistry majors
Biochemistry	470	3(3-0)	Sp	1962	1965	Undergraduate Biochemistry majors
Biological Membranes	470	3(3-0)	Sp	1986	1993	Interdepartmental course
Biochemistry Laboratory	471	2(0-6)	Sp	1993	1995	Undergraduate Biochemistry majors
Biochemistry Laboratory	471	3(0-9)	Sp	1995	2011	Undergraduate Biochemistry majors
Biochemistry Laboratory	472	3(0-9)	F	1993	2011	Undergraduate Biochemistry majors
Senior Seminar	478	1(1-0)	F,W,Sp	1966	1973	Undergraduate Biochemistry majors
Biochemistry Research	490	1-4 cr	F,Sp,Su	1993	2011	Undergraduate Biochemistry majors
Undergraduate Seminar	495	2(2-0)	Sp	1993	2011	Undergraduate Biochemistry majors
Senior Thesis	499	1-8 cr	F,Sp,Su	1993	2011	Undergraduate Biochemistry majors
Honors Work	400H	Var	F,W,Sp	1963	1990	Undergraduate Biochemistry majors
Medical Biochemistry	501	3(3-0)	F,W	1974	1977	Medical students
Medical Biochemistry	501	3(3-0)	W,Su	1977	1993	Medical students
Medical Biochemistry	502	2(2-0)	F	1977	1981	Medical students
Medical Biochemistry	502	3(3-0)	F	1981	1993	Medical students

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Biochemistry/Biochemistry and Molecular Biology						
Course Offerings 1961-2011						
				Start	**End**	**Comments**
Course	**No.**	**Credits**	**Offered**	**Date**	**Date**	
Cell Biology	503	5(5-0)	F	1981	1984	Interdepartmental for Medical Students
Introduction to Medical Biology	503	5(5-0)	F	1984	1987	For Human Medicine students
Medical Biochemistry I	511	4(4-0)	W	1981	1982	Medical students
Medical Biochemistry I	511	3(3-0)	W	1982	1987	Medical students
Medical Biochemistry I	511	4(4-0)	W	1987	1993	Medical students
Medical Biochemistry II	512	3(3-0)	Sp	1981	1993	Medical students
Medical Biochemistry	521	5(5-0)	F	1993	2003	Medical students
Genetics for Medical Practice	523	1(1-0)	Su	1993	2011	Medical students
Molecular Biology and Medical Genetics	526	2 cr	F	2001	2011	Medical students
Cell Biology and Physiology I	534	3 cr	F	2001	2011	Medical students
Cell Biology and Physiology II	535	4 cr	S	2001	2011	Medical students
Biochemical Research Methods	801	1(0-3)	F	1965	1984	Graduate level course
Molecular Biology and Protein Structure	801	(4(4-0)	F	1993	1996	Graduate level course
Molecular Biology	801	3(3-0)	F	1997	2011	Graduate level course
Advanced Biochemistry I	802	3(3-0)	W	1965	1971	Graduate level course
Metabolic Regulation and Molecular	802	4(4-0)	Sp	1993	1996	Graduate level course
Endocrinology						
Metabolic Regulation and Signal Transduction	802	3(3-0)	Sp	1997	2011	Graduate level course
Advanced Biochemistry II	803	3(3-0)	Sp	1965	1971	Graduate level course
Protein Structure and Function	803	2(2-0)	F	1997	2011	Graduate level course
Advanced Biochemistry Laboratory I	804	2(0-6)	F,Sp	1965	1967	Graduate level course
Advanced Biochemistry Laboratory I	804	3(1-6)	W	1967	1968	Graduate level course
Advanced Biochemistry Laboratory I	804	3(1-6)	F	1968	1980	Graduate level course
Biochemical Mechanisms and Structure	804	3(3-0)	Sp	1999	2011	Graduate level course
Advanced Biochemistry Laboratory II	805	2(0-6)	F,Sp	1965	1967	Graduate level course
Advanced Biochemistry Laboratory II	805	3(1-6)	Sp	1967	1968	Graduate level course
Advanced Biochemistry Laboratory II	805	3(1-6)		1968	1980	Graduate level course

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Biochemistry/Biochemistry and Molecular Biology						
Course Offerings 1961-2011						
				Start	**End**	**Comments**
Course	**No.**	**Credits**	**Offered**	**Date**	**Date**	
Advanced Biochemistry Laboratory III	806	3(1-6)	Sp	1969	1971	Graduate level course
Advanced Biochemistry Laboratory	806	3(1-6)	Sp	1972	1978	Graduate level course
Advanced Biochemistry Laboratory	806	3(0-8)	Sp	1978	1981	Graduate level course
Theories and Practices in Bioinformatics	810	3(2-2)	Sp	2009	2011	Graduate level course
Advanced Biochemistry	811	4(4-0)	F	1971	1984	Graduate level course
Nucleic Acid Structure and Function	811	4(4-0)	F	1984	1993	Graduate level course
Advanced Biochemistry	812	4(4-0)	W	1971	1984	Graduate level course
Protein Structure and Function	812	4(4-0)	W	1984	1993	Graduate level course
Advanced Biochemistry	813	4(4-0)	Sp	1971	1984	Graduate level course
Metabolism and its Regulation	813	4(4-0)	Sp	1984	1993	Graduate level course
Integrative Toxicology: Mechanisms, Pathology	816	3(3-0)	F, odd	2007	2011	Graduate level course
and Regulation						
Biochemical Mechanism and Structure I	821	2(2-0)	F	1980	1983	Graduate level course
Biochemical Mechanism and Structure I	821	3(3-0)	F	1983	1986	Graduate level course
Biochemical Mechanism and Structure I	821	4(4-0)	F	1886	1993	Graduate level course
Biochemical Mechanism and Structure II	822	2(2-0)	W	1980	1985	Graduate level course
Cell Structure and Function	825	4(4-0)	Sp	1988	1993	Graduate level course
Cell Structure and Function	825	3(3-0)	Sp	1993	2011	Graduate level course
Methods of Macromolecular Analysis	829	3(3-0)	F	1990	1993	Graduate level course
and Synthesis						
Methods of Macromolecular Analysis	829	2(2-0)	F	1993	2011	Graduate level course
and Synthesis						
Physiological Biochemistry I	831	3(3-0)	W	1980	1993	Graduate level course
Physiological Biochemistry	831	4(4-0)	Sp	1993	2003	Graduate level course
Physiological Biochemistry II	832	3(3-0)	Sp	1980	1993	Graduate level course
Plant Genetics and Molecular Biology	856	3(3-0)	Sp even	1985	1993	Graduate level course
Plant Molecular Biology	856	3(3-0)	Sp	1995	2011	Graduate level course
Research Methods	860	4(2-6)	Sp	1962	1965	Graduate level course

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Biochemistry/Biochemistry and Molecular Biology						
Course Offerings 1961-2011						
				Start	**End**	**Comments**
Course	**No.**	**Credits**	**Offered**	**Date**	**Date**	
Plant Biochemistry	864	4(4-0)	Sp	1980	1993	Graduate level course
Plant Biochemistry	864	3(3-0)	Sp	1993	2011	Graduate level course
General Biochemistry	870	3(3-0)	F	1962	1965	Graduate level course
General Biochemistry	871	3(3-0)	W	1962	1965	Graduate level course
General Biochemistry	872	3(3-0)	Sp	1962	1965	Graduate level course
General Biochemistry Laboratory	873	2(1-5)	F	1962	1965	Graduate level course
General Biochemistry Laboratory	874	2(1-5)	W	1962	1965	Graduate level course
General Biochemistry Laboratory	875	2(1-5)	Sp	1962	1965	Graduate level course
Special Problems	855	Var	F,W,Su,Sp	1962	2011	Graduate level course
Laboratory Rotation	888	Var		1982	2011	Graduate level course
Research	899	Var	F,W,Su,Sp	1962	2011	Graduate level course
Plant Physiology and Biochemistry I	952	3(3-0)	W	1971	1979	Graduate level course
Plant Physiology and Biochemistry II	955	3(3-0)	W	1971	1979	Graduate level course
Selected Topics in Biochemistry	960	2(2-0)	F,W,Sp	1962	2011	Graduate level course
Selected Topics in Biochemistry	961	2(2-0)	F,W,Sp	1962	2011	Graduate level course
Advanced Biochemistry	970	2(2-0)	F	1963	1965	Graduate level course
Advanced Biochemistry	971	2(2-0)	Sp	1963	1965	Graduate level course
Seminar in Biochemistry	978	1(1-0)	F,W,Sp	1962	2011	Graduate level course
Research	999	Var	F,W,Sp.Su	1962	2011	Graduate level course
F-Fall						
W-Winter						
Sp-Spring						
Su-Summer						
Odd/Even-Odd or even years						

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Appendix 5.2

Comparison of Requirements
for
Bachelor of Science
in

Biochemistry and Molecular Biology
and
Biochemistry and Molecular Biology/Biotechnology

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Degree Requirements for BS in Biochemistry and Molecular Biology and				
	Biochemistry and Molecular Biology/Biotechnology			
			BS	**Biotech**
		Credits	**Progm**	**Prgm**
	University Requirements	24		
	Foreign Language Requirement	0-8	yes	yes
BS 110	Organisms and Populations	4(3-3)	yes	yes
BS 111	Cells and Molecules	3(3-0)	yes	yes
BS 111L	Cell and Molecular Biology Laboratory	2(1-3)	yes	yes
CEM 141 and 142	General Chemistry	7(8-0)	yes	no
or			or	
CEM 151 and 152	General Chemistry	7(8-0)	yes	yes
or			or	
CEM 181H and 182H	Honors Chemistry I and II	8(8-0)	yes	no
CEM 161 and 162	Chemistry Laboratory 1	2(0-6)	yes	yes
or			or	
CEM 185 and 186	Honors Chemistry Laboratory	4(0-12)	yes	no
MTH 132 and 133	Calculus I and II	7(7-0)	yes	yes
CEM 351	Organic Chemistry I	3(4-0)	yes	yes
CEM 352	Organic Chemistry II	3(4-0)	yes	yes
CEM 355	Organic Chemistry Laboratory I	2(0-6)	yes	yes
CEM 356	Organic Chemistry Laboratory II	2(0-6)	yes	yes
CEM 383 and 384	Introductory Physical Chemistry I and II	6(8-0)	yes	no
or			or	
CEM 483 and 484	Quantum Chem and Molecular Thermodynamics	6(8-0)	yes	no
CEM 383	Introductory Physical Chemistry	3(4-0)		yes

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Degree Requirements for BS in Biochemistry and Molecular Biology and Biochemistry and Molecular Biology/Biotechnology				
			BS	Biotech
		Credits	Progm	Prgm
PHY 183 and 184	Physics for Scientists and Engineers I and II	8(10-0)	yes	yes
BMB 101	Frontiers in Biochemistry	1(1-0)	yes	yes
BMB 461	Biochemistry I	3(3-0)	yes	yes
BMB 462	Biochemistry II	3(3-0)	yes	yes
BMB 471	Biochemistry Laboratory	3(0-6)	yes	yes
BMB 472	Biochemistry Laboratory	3(0-6)	yes	
BMB 495	Undergraduate Seminar	2(2-0)	yes	yes
or		or		or
BMB 499	Senior Thesis	2 to 8	yes	yes
CHE 201	Material and Energy Balance	3(4-0)	no	yes
MMG 445	Microbial Biotechnology	3(3-0)	no	yes
CSE 131	Technical Computing and Problem Solving	3(1-3)	no	yes
or				or
CSE 231	Introduction to Programming I	4(3-2)	no	yes
BMB 472	Biochemistry Laboratory	3(0-6)	no	yes
or				or
CSS 451	Biotech Application for Plant Breeding and Genetics	3(2-2)	no	yes
or				or
MMG 408	Advanced Microbiology Laboratory	3(1-6)	no	yes
CSS 350	Introduction to Plant Genetics	3(4-0)	no	yes
or				or
ZOL 341	Fundamental Genetics	4(4-0)	no	yes

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Degree Requirements for BS in Biochemistry and Molecular Biology and				
	Biochemistry and Molecular Biology/Biotechnology			
			BS	**Biotech**
		Credits	**Progm**	**Prgm**
ANS 425	Principles of Animal Biotechnology	3(3-0)	no	
CHE 321	Thermodynamics for Chemical Engineering	4(5-0)	no	
CSS 441	Plant Breeding and Biotechnology	3(3-0)	no	
CSS 486	Biotechnology in Agriculture: Applications and			
	Ethical Issues	3(3-0)	no	
	Total	120		
Abbreviations				
ANS	Animal Science			
BMB	Biochemistry and Molecular Biology			
BS	Biological Science			
CEM	Chemistry			
CHE	Chemical Engineering			
CSS	Crop and Soil Science			
MMG	Microbiology and Molecular Genetics			
MTH	Mathematics			
PHY	Physics			
ZOL	Zoology			

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Appendix 5.3

Biochemistry Textbooks

used in

Graduate or Undergraduate Biochemistry Courses

1961-2011

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GENERAL BIOCHEMISTRY

SECOND EDITION

JOSEPH S. FRUTON
Eugene Higgins Professor of Biochemistry
Chairman, Department of Biochemistry
Yale University

SOFIA SIMMONDS
Associate Professor
of Biochemistry and Microbiology
Yale University

NEW YORK • JOHN WILEY & SONS, INC.
London • Chapman & Hall, Limited

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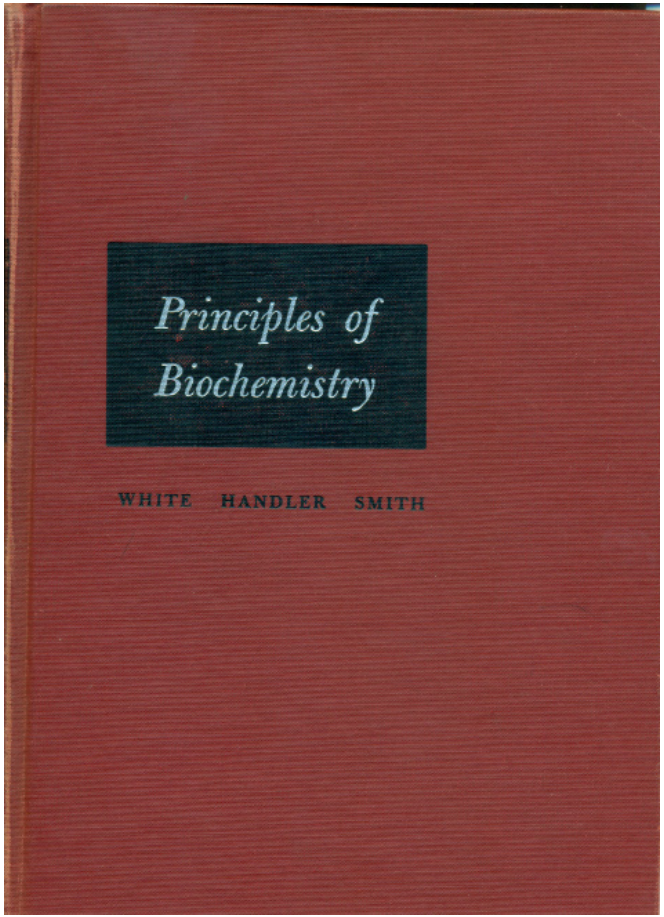

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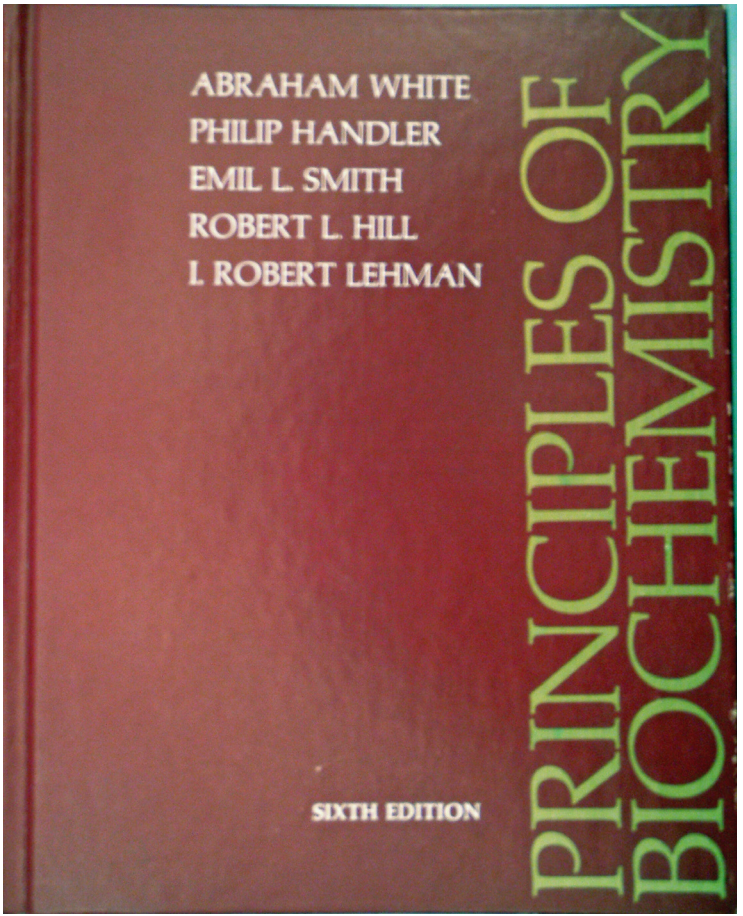

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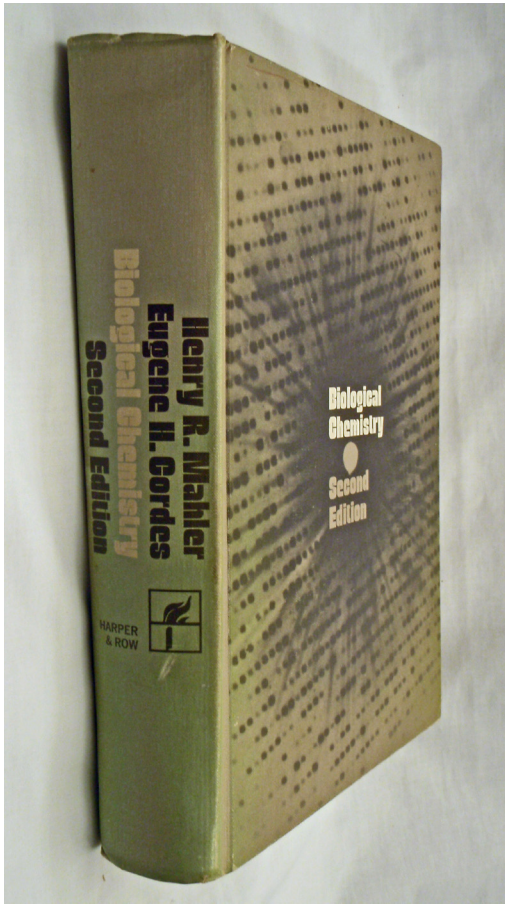

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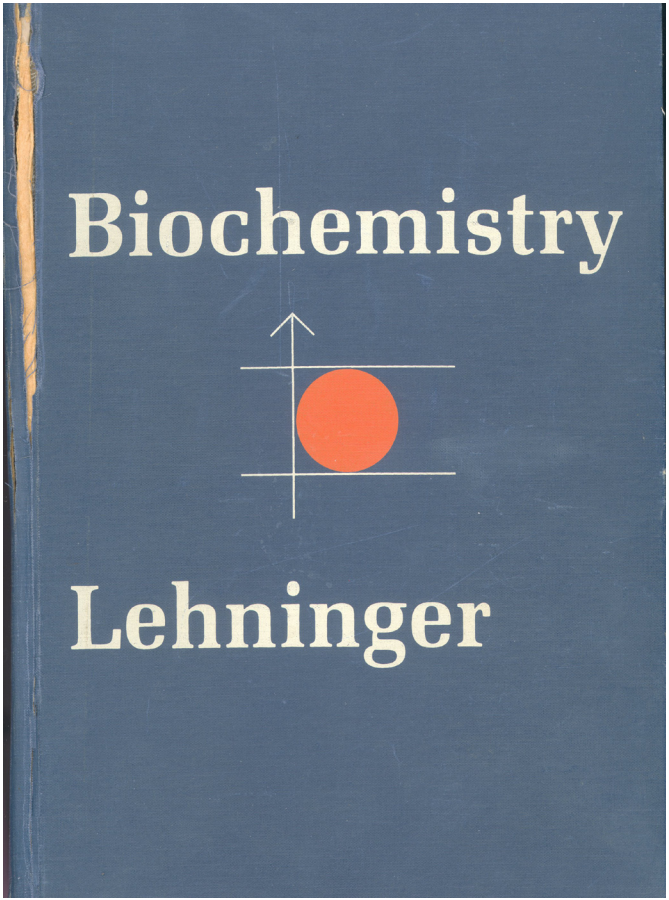

Copyright 1975

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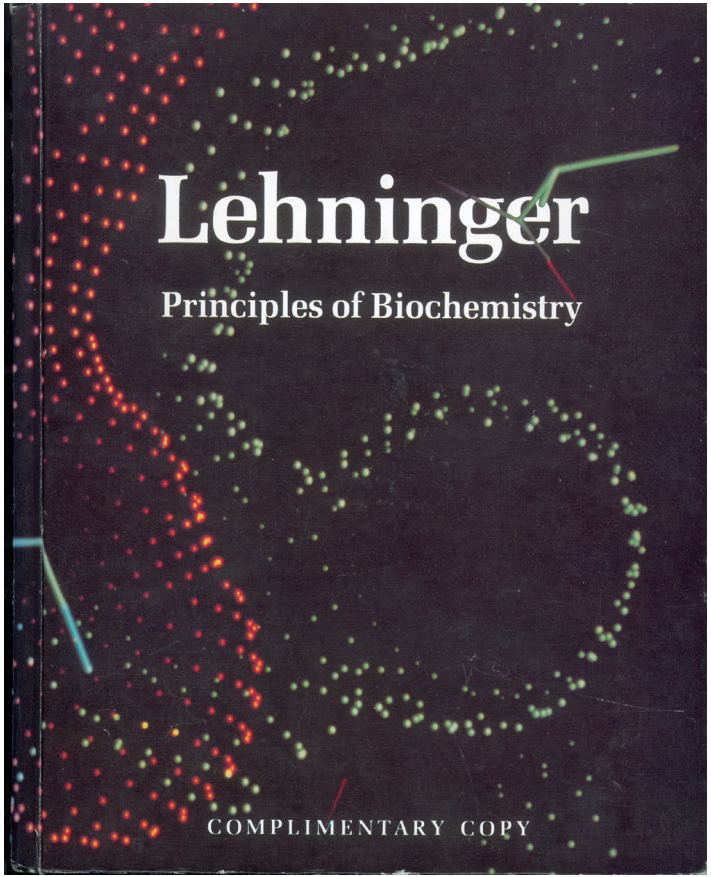

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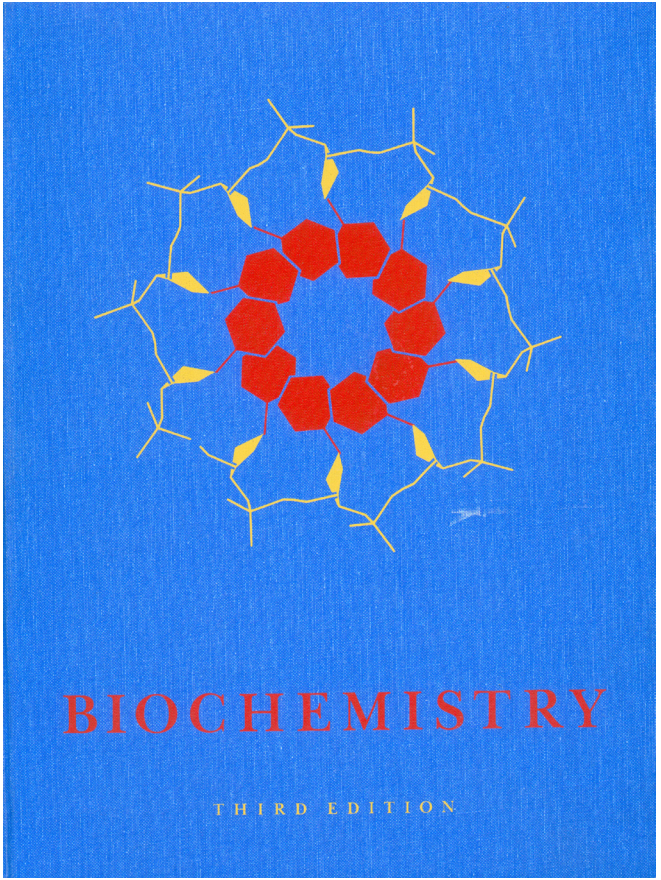

Copyright 1988

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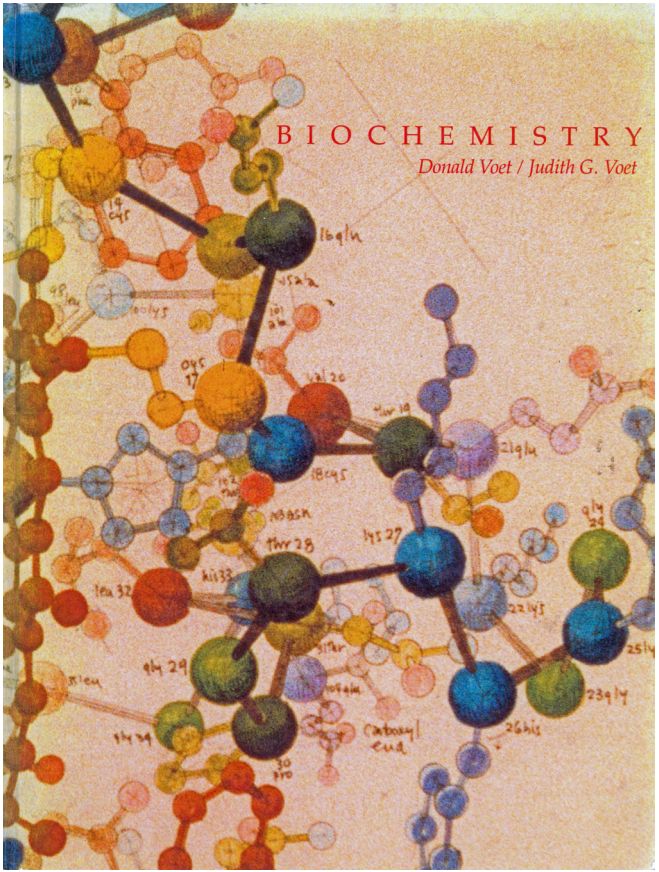

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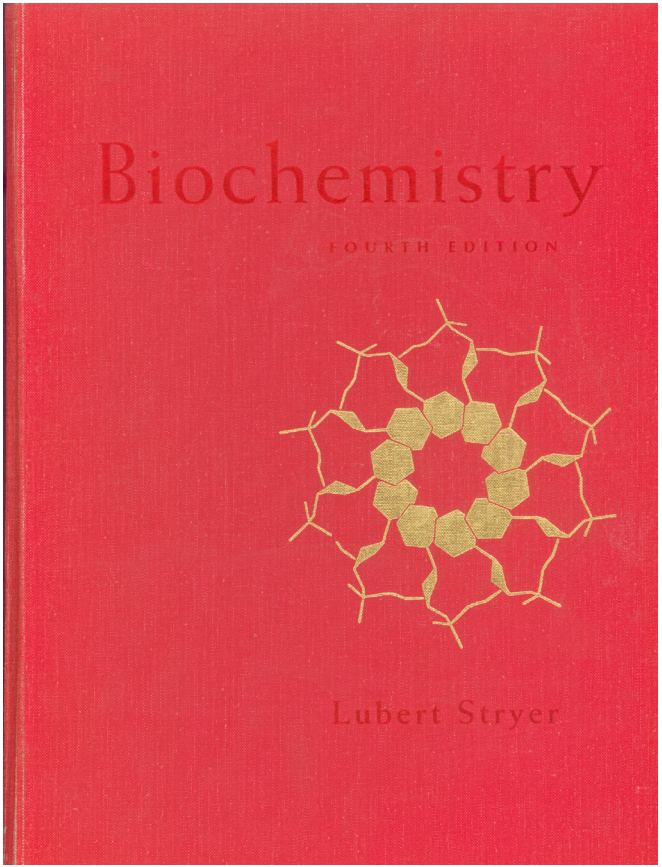

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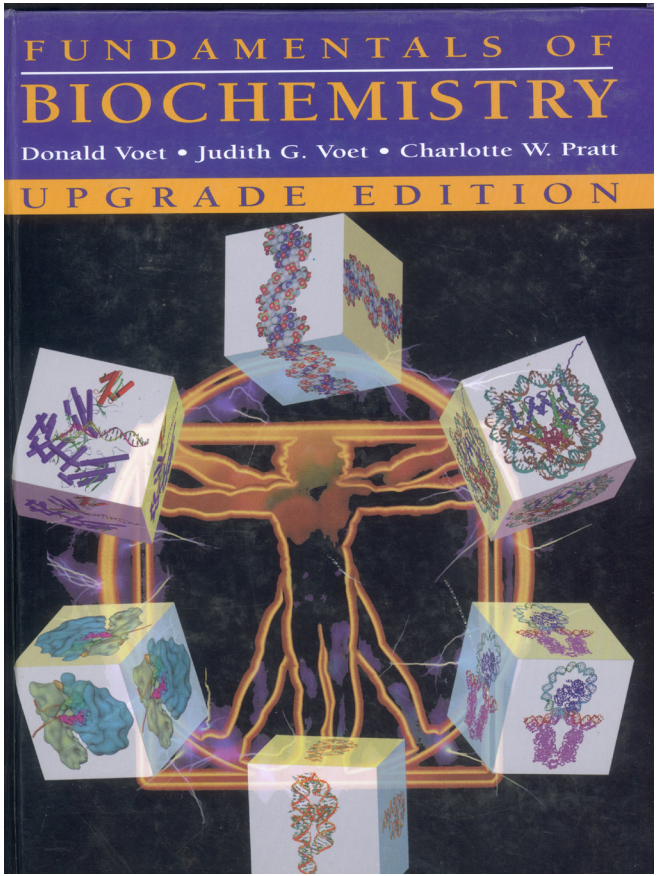

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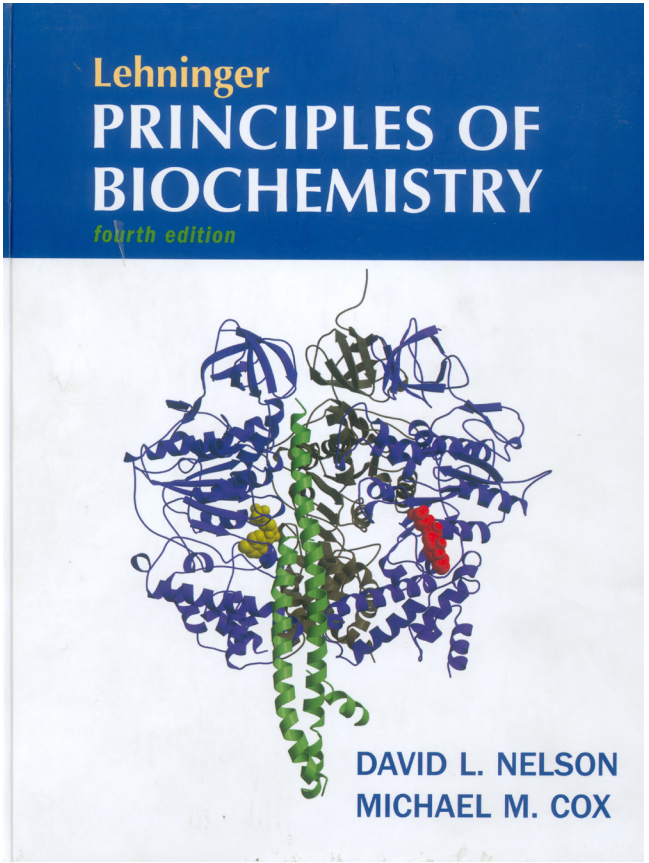

Copyright 2005

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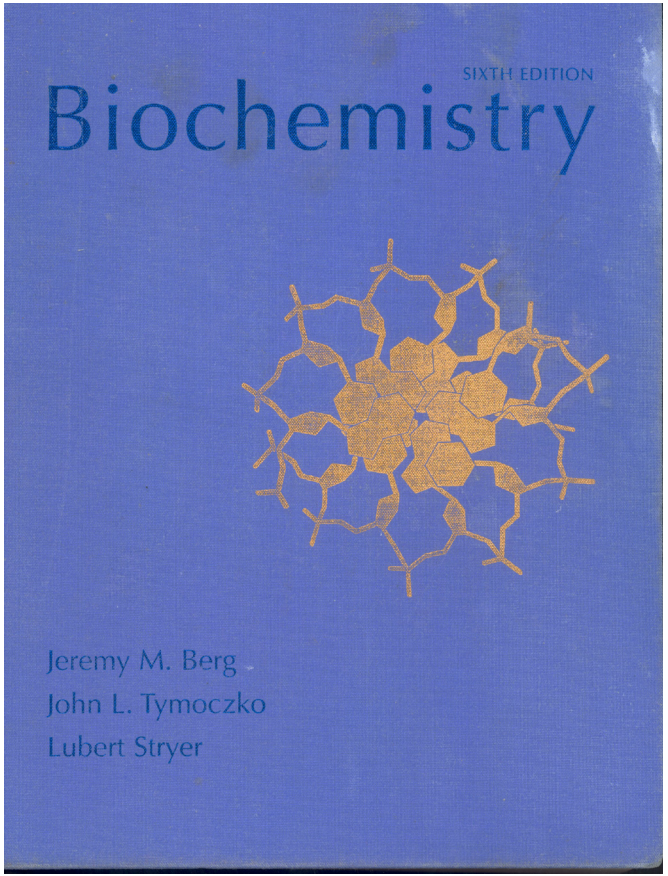

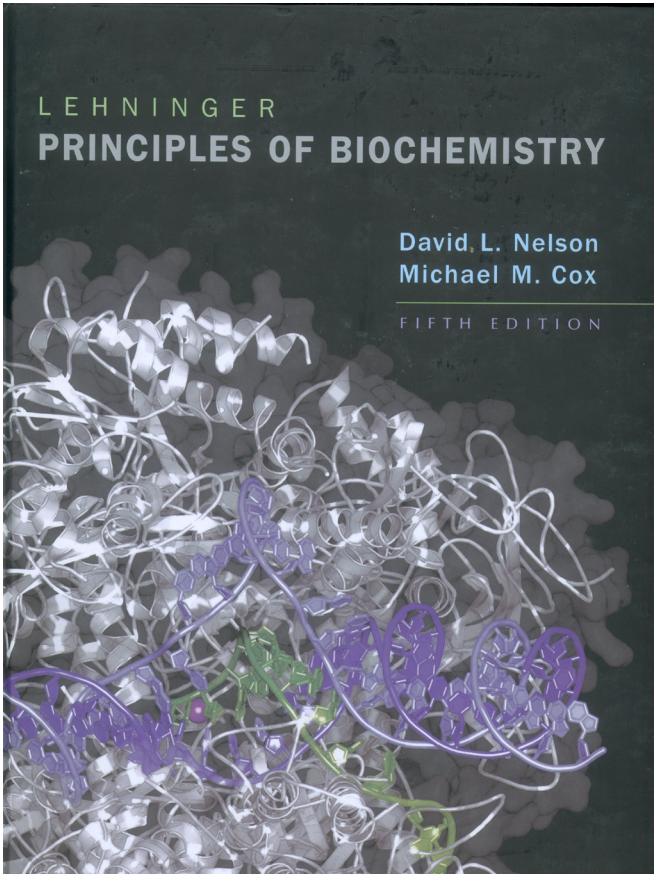

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Appendix 5.4

Photographs

of

BMB Club Activities

Created by the BMB Club in 2010
Dennis Minor, President

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BMB Undergraduate Club

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BMB vs. MMG Bowling

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DROP IN A BUSINESS CARD


MARVELANES

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LED ZEPPELIN
NEWPORT
EXIT
2005

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NEWPORT

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COLLEGE
Sigma Alpha
Iota
2010


Brunswick

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Victory for BMB…

2002-2003

2003-2004

2004-2005

2009-2010

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Biochemistry and Molecular Biology - Class of 2010

Front Row: Noor Mohd Isa, Sayarfa Mohammedakhiar, Catherine Nezich, Yasmin Ali, Judy Kovach, Justyne Matheny, Lindsey Johnston, Mary McCarthy, Lauren Grenzicki, Chelsea Hosey, Sarah Schroeder, Sarah Haskins, Haley Rupp
Second Row: Edita Klimyte, Jackie Brosius, Dennis Miner, Whitney Aultman, Josh Mackaluso, Jackie Lapp, Laura Schultz, Josh Bosch, Andrew Murley, Paul Luethy, Xiaozhou (Joe) Liu, Jessica Reemer, Shaima Al Failakawi, Lisa Blakeman
Third Row: Mohamad Zainal, Shahmi Sinan, Lauren Topper, Katherine Larkins, Mike Howard, Tom Cooke, Mike Ritt, Neil White, Mahesh Chandrasekhar, "Luke Fischer", John Barta, Paul Harris, Sarah Iqbal, John Krcatovich
Back Row: Tess Jeffers, Nick Hoover, Trey Urban, Jeff Halim

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Appendix 5.5

images of

T-shirts

designed and sold

by the

Biochemistry/Biochemistry and Molecular Biology Undergraduate Club

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T shirt 2002. Courtesy of Neil Bowlby.

T-shirt, 2003 Courtesy of Neil Bowlby.

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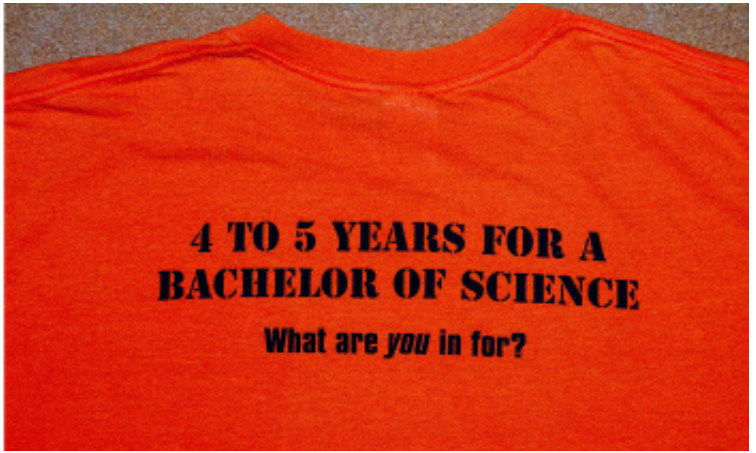
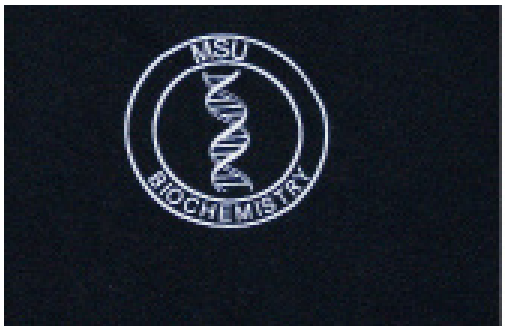


T shirt 2004. Courtesy of Neil Bowlby.



T shirt 2005. Courtesy of Neil Bowlby.

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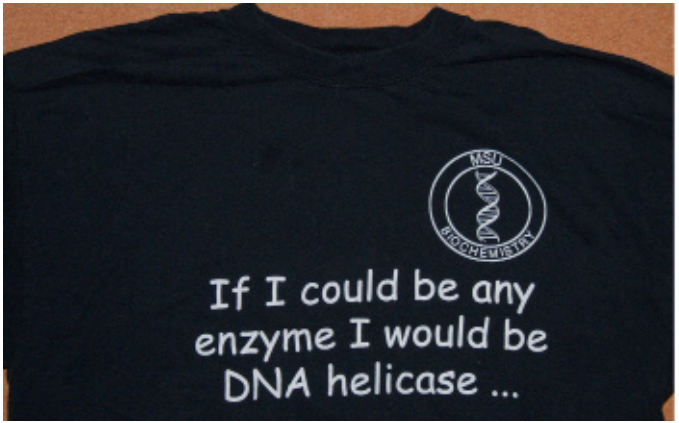
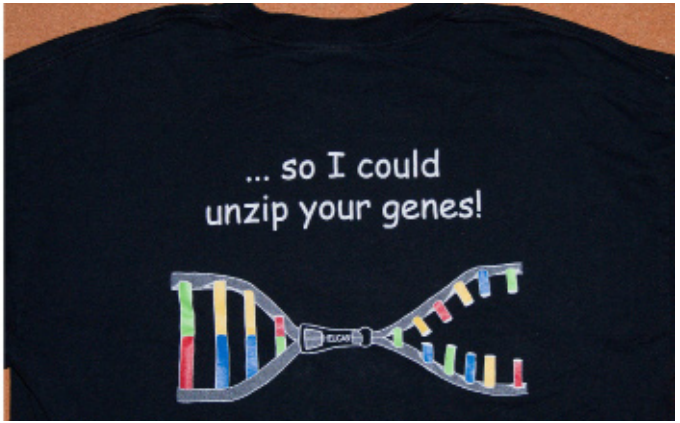
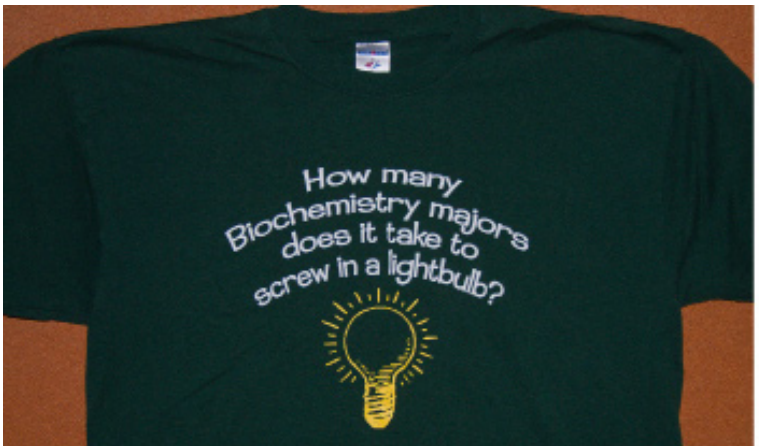




T shirt, 2006. Courtesy of Neil Bowlby.



T shirt 2007, Courtesy of Neil Bowlby.

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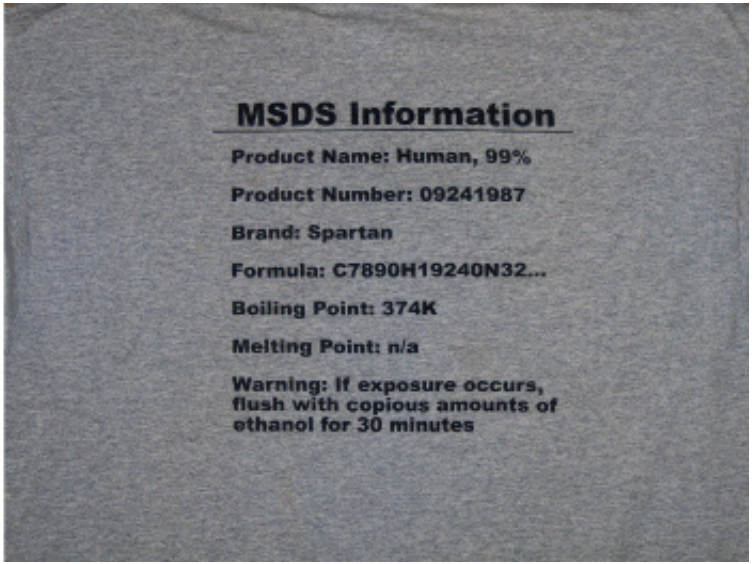

T shirt 2008. Courtesy of Neil Bowlby.

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T-shirt 2010. Courtesy of Neil Bowlby.

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Appendix 6.1

Graduate Degrees Awarded

1930-1965

to students
who studied with

faculty who became members of the Department of Biochemistry in 1961

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Relevant PhD Degrees granted 1930-1965

Name	Degree	Thesis Title / PhD Degree	Major Professor/Department
Webber, Perry A. (1931)	PhD	The Effects of certain Diets on the Teeth of the Albino Rat, with Special Reference to the Development of Dental Caries	Hoppert/Chemistry
Zichis, Joseph (1933)	PhD	Granulocytopoietic Fractions of Yellow Bone Marrow	Hoppert/Chemistry
Bechtel, Henry E. (1935)	PhD	Vitamin D Studies and Rickets	Hoppert/Chemistry
Ma, Frederick Ling-Yun 1937	PhD	Studies on the Production of Rickets in Rats and the Mode of Action of Vitamin D	Hoppert/Chemistry
Shannon, Albert Melvin (1939)	PhD	A Biological Method for the Determination of Essential Unsaturated Fatty Acids and Its Application to Various Animal and Vegetable Fats	Hoppert/Chemistry
King, L. Carroll (1942)	PhD	A Study of the Sterols, Sterolins, and certain Alcohols of some Legume See Oils	Ball/Chemistry
Ott, Arnold C. (1943)	PhD	Some Chemical Studies of the Navy Bean (*Phaseolus Vulgaris*)	Ball/Chemistry
Canniff, Thomas Lester (1943)	PhD	A Study of the Influence of Certain Dietary Constituents on the Development of Dental Caries in Rats	Hoppert/Chemistry
Olson, Kenneth Jean (1947)	PhD	A Study of the Effect of Flourides on the Development of Dental Caries in Rats	Hoppert/Chemistry
Pringle, Benjamin Hartley (1947)	PhD	A Comparative Study of the Effect of Dihydro- tachysterol and Various Vitamin D Concentrates on the Blood Calcium Level of Cows, Dogs, Chickens, and Rats	Hoppert/Chemistry
Shirley, Ray Louis (1949)	PhD	The Use of Radioactive Phosphorus in Tooth Metabolism Studies of Caries Resistant and Caries Susceptible Strains of Albino Rats	Hoppert/Chemistry

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Relevant PhD Degrees granted 1930-1965

Name	Degree	Thesis Title / PhD Degree	Major Professor/Department
Redemann, Carl T. (1949)	PhD	Biochemical Studies of Pollen from *Zea Mays*	Ball/Chemistry
Forist, Arlington A. (1952)	PhD	I. Kinetics of the Amino Acid and Peptide catalyzed Dealdolization of Diacetone Alcohol II. Determination of the Hydroxymethyl Group in sugars and related substances III. Kinetics of the acid and base catalyzed degradation of the Trioses	Speck/Chemistry
Dewey, Lovell J. (1954)	PhD	Studies on the biosynthesis of Nicotine and Lignin	Byerrum/Chemistry
Hamill, Robert L. (1955)	PhD	Methylation Studies in higher plants and animals	Byerrum/Chemistry
Sato, Clifford S. (1955)	PhD	Methyl Group synthesis in plant metabolism I. Utilization of Glycine-Betaine as a Methyl Group Precursor II. The Biosynthesis of Pectin Methyl Esters	Byerrum/Chemistry
Christensen, John (1956)	PhD	The Mechanism of Periodate Oxidation of Simple Sugars	Speck/Chemistry
Dull, Gerald G. (1956)	PhD	The invesitgation of certain antibacterials in *Populus Tacamahaca* Mill and *Hypericum Prolificum*	Fairley/Chemistry
Le Duc, Henrietta M. (1956)	PhD	Equilibrium dialysis, moving boundary and Paper Electrophoresis studies on the binding of Human Serum Proteins with Calcium, Mgnesium, Iron, and Copper Ions	Ewing, Lillevik/Chemistry
Weller, Lowell E. (1956)	PhD	Biochemical effects of Maleic Hydrazide (1,2- Dihydropyridazine-3, 6-Dione) on *Raphanus Sativus*	Ball, Sell/Chemistry
Rebstock, Theodore L. (1956)	PhD	The Synthesis of some Acid Analogs of 2-Thiobenzimidazole and Biological Assay as inhibitors of the Growth of Plants	Ball, Sell/Chemistry

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Relevant PhD Degrees granted 1930-1965

Name	Degree	Thesis Title / PhD Degree	Major Professor/Department
Herrman, Robert L. (1956)	PhD	Some studies concerning Pyrimidine Biosynthesis	Fairley/Chemistry
Boll, Per M. (1957)	PhD	Isolation, identification and Chemistry of the Antibacterial Alkaloid Solanocapsine from *Solanum Pseudocapsicum L*	Lillevik/Chemistry
Anwar, Rashid Ahmad (1957)	PhD	Physical and chemical changes produced by the chymotryptic proteolysis of caseins	Lillevik/Chemistry
Nielsen, Harald Christian (1957)	PhD	Molecular weight studies on acid precipitated, calcium precipitated, alpha, and beta caseins by osmotic pressure measurements in 6.66 M urea	Lillevik/Chemistry
Boyd, Jessie M. (1958)	PhD	Aliphatic precursors of Pyrimidines in Neurospora Crassa	Fairley/Chemistry
Broomfield, Clarence A. (1958)	PhD	Studies on the mechanism of the clotting of Casein by the action of Rennin	Lillevik/Chemistry
Lamberts, Burton L. (1958)	PhD	Studies on the Biogenesis of the Pyrrolidine Ring of Nicotine in the Tobacco Plant	Byerrum/Chemistry
Griffith, Thomas (1958)	PhD	A Study of Ribose Metabolism in the Tobacco Plant	Byerrum/Chemistry
Evard, Rene (1959)	PhD	An investigation of active fragments and the active site of sweet potato *B* -amylase	Speck/Chemistry
Mootse, Gerda (1959)	PhD	Studies on the isolation, purfication, and characterization of plasminogen from human plasma fraction III.	Lillevik/Chemistry
Foy, Robert B. (1960)	PhD	The binding of metal ions by proteins in normal and abnormal Human Blood Serum	Lillevik/Chemistry
Barr, Charles Richard (1960)	PhD	The synthesis and biological activity of some allyl, acetic acid and ethyl acetate ethers of fluorene and fluorenone	Byerrum/Chemistry

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Relevant PhD Degrees granted 1930-1965

Name	Degree	Thesis Title / PhD Degree	Major Professor/Department
Bloss, Ronald E. (1960)	PhD	Certain nutrient relationships involved in the supplementation of diets for swine and rats.	Luecke/Animal Husbandry
Fuscaldo, Kathryn E. (1960)	PhD	An immunogenetic analysis of white variegated position effects in *Drosophila melangaster*	Fox/Agricultural Chemistry
Mead, Charles G. (1960)	PhD	Isolation and characterization of the deoxyribonucleic acids of *Drosophila melanogaster.*	Fox/Genetics
Wilken, David R. (1960)	PhD	A nucleotide peptide isolated from bovine liver.	Hansen/Agricultural Chemistry
Yoon, Sei Byung (1960)	PhD	Studies on the effects of X and Y chromosomes on protein synthesis and spermatozoal development in Drosophila melanogaster	Fox/Agricultural Chemistry
Krampl, Victor (1961)	PhD	The Role of Delta-1-Pyrroline-5-Carboxylic Acid in the Biosynthesis of Pyrrolidine Ring of Nicotine	Byerrum/Chemistry
Griffith, Gail D. (1961)	PhD	The Biological Oxidation of Nicotine: I. Nicotine degradation by *Nicotiana Rustica*; II. Nicotine degradation by an Arthrobacter species	Byerrum/Chemistry
Riehm, John P. (1961)	PhD	Proteolysis and inhibition of *B* -amylase	Speck/Chemistry
Ahuja, Jagan N. (1961)	PhD	Studies on the biosynthesis of phytic acid	Kilgour/Chemistry
Loerch, John D. (1961)	PhD	Ribonucleic acid metabolism and beta-galactosidase induction in non-growing *E. coli* .	Fairley/Chemistry
Long, Mary Jean (1961)	MS	Metal Ion Analysis by Emission Spectroscopy of Starch Block Electrophoretically Separated Human Serum Proteins	Lillevik/Chemistry
Wampler, Donald E. (1961)	MS	Studies on Transcarbamylase Enzymes of *Neurospora Crassa* 1298	Fairley/Chemistry

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Relevant PhD Degrees granted 1930-1965

Name	Degree	Thesis Title / PhD Degree	Major Professor/Department
Hellman, Kenneth P. (1962)	PhD	Studies on the Biosynthesis of the Pyridine Ring of Nicotine	Byerrum/Chemistry
Correll, David L. (1961)	PhD	A Study of the Ribonucleic acid-polyphosphate complexes isolated from Anabaena Variabilis and synchronized *Chlorella Pyrenoidosa*	Ball, R. C./Fisheries and Wildlife Tolbert/Agricultural Chemistry
Walker, Glenn A. (1963)	PhD	The Oxidation of reduced Nicotinamide Adenine Dinucleotide by enzymes from *Lactobacillus Casei*	Kilgour/Chemistry
Gallick, Harold (1965)	PhD	The development of an assay and method of purification for Human Blood Clotting Factor XI (Plasma Thromboplastin Antecedent)	Lillevik/Chemistry

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Appendix 6.2

Graduate Degees Awarded
to
Biochemistry
and
Biochemistry and Molecular Biology

Students

1961-2010

This listing includes the student, year of publication in chronological order, thesis title, and graduate advisor. Note that several advisors are not members of the Department of Biochemistry and Molecular Biology as permitted under the umbrella recruiting program. See Appendix 6.3 for a list of graduate degrees granted to students listed in alphabetical order.

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Bretthauer, Roger Keith	PhD	1961	Carbohydrate Metabolism: I. Accessing Heterozygosity For Galactosemia By Enzymatic Means II. Metabolism of Mannose By *Hansenula holstii*	Hansen
Carlson, Don Marvin	PhD	1961	The Isolation And Synthesis of Guanosine Diphosphate Glucose	Hansen
Kuczmak, Myron	PhD	1961	Metabolism of Glycolic Acid	Tolbert
Nordin, John Hoffman	PhD	1961	Heterogeneity of Glycogen	Hansen
Ritzert, Roger William	MS	1961	Synthesis And Biological Activity of Several Ethyl 1-Acylindole-3-Acetates	Sell
Mayes, Jary S.	MS	1963	Mucopolysaccharide Excretion In Dwarf Cattle And In Patients With Hurler's Disease	Hansen
Parzen, Sheldon D.	MS	1963	A Study of The Enzyme Xanthine Dehydrognase From *Drosophila melanogaster*	Fox
Singleton Jr., Rivers	MS	1963	Studies On The Activation of Pyruvate Kinase By Monovalent Cations	Suelter
Steinman, Gary	MS	1963	Protobiochemistry-Theoretical And Experimental Considerations Concerning Primordial Biochemical Development	Lillevik
Yu, Ya-Shiou L.	MS	1963	Phosphoglycolic Acid Phosphatase	Tolbert
Kakade, Madhusudan L.	PhD	1964	Growth Inhibition of Rats Fed Raw Navy Beans	Evans
Madson, Willard Loye	PhD	1964	Synthesis And Kinetics of Hydrolysis of Some Glycoside-Glycosidase Models	Speck
Nah, Keng C.	MS	1964	Photoelectric Emission Spectrometric Analysis of The Metal Element Content In Starch Block Electrophoretically Separated Human Serum Proteins	Lillevik

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Phillips, Allen Thurman	PhD	1964	The Mechanism of Threonine Dehydrase of *Escherichia coli*	Wood
Baum, Stephen W.	MS	1965	The Effect of Crude Cottonseed Oil And Vitamin E On The Absorption of Fatty Acids From The Gastroentestinal Tract of The Laying Hen	Evans
Fleeker, James R.	PhD	1965	The Role of Glycerol In The Biosynthesis of The Pyridine Ring of Nicotine	Byerrum
Ingram, Jordan M.	PhD	1965	The Mechanism of Action of 2-Keto-3-Deoxy-6-Phosphogluconate Aldolase of *Pseudomonas fluorescens*	Wood
Jackanicz, Theodore M.	PhD	1965	The Incorporation of Aspartate And Malate Into The Pyridine Ring of Nicotine	Byerrum
Kamel, Mamdouh Yehia	PhD	1965	New Reactions Instrumental In The Metabolism of Common Hexoses	Anderson
Mayes, Jary S.	PhD	1965	Inborn Errors of Metabolism: I. The Presence of An Inactive Enzyme And In Utero Toxicity In Galactosemia II. Urinary Mucopolysaccharides In Patients With Hurler's Syndrome, Their Families And Normal Man	Hansen
Richards, Morris	MS	1965	A Study of The Lipids of Birds-Foot Trefoil (*Lotus corniculatus*)	Sell
Wampler, Donald E.	PhD	1965	The Effect of Alpha-Aminobutyric Acid And Propionic Acid On The Synthesis of Pyrimidines And Arginine In *Neurospora crassa*	Fairley
Winely, Carl L.	MS	1965	The Purification of 5'-Adenylic Acid Deaminase From Frozen Rabbit Skeletal Muscle	Suelter

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Armstrong, Robert Lee	PhD	1966	Studies of *Escherichia coli* RNA-DNA Hybrid And of Methylation of RNA In T-4 Infected Cells	Boezi
Berry, Arnold J.	MS	1966	Some Biological And Kinetic Properties of 5'-Adenylic Acid Deaminase	Suelter
Fathipour, Amir	MS	1966	A Study of The Lipid Fractions In The Pollen of *Zea mays*	Sell
Gawarecki, Patricia A.	MS	1966	Studies On The Peptides of Raw And Heated Soybean Protein	Evans
Hess, John L.	PhD	1966	A Study And Comparison of Glycolic Acid Metabolism In Tobacco And Green Algae	Tolbert
Holleman, William H.	PhD	1966	Reversible Dissociation And Characterization of Rabbit Muscle α-Glycerophosphate Dehydrogenase	Deal
Hunsley, James	MS	1966	The Purification And Properties of Pyruvate Kinase From Baker's Yeast	Suelter
Kayne, Fredrick J.	PhD	1966	A Physical Analysis of The Effects of Temperature, Substrates And Cofactors On The Structural And Catalytic Properties of Rabbit Muscle Pyruvate Kinase	Suelter
Liang, Katherine	MS	1966	Biosynthesis of Hemoglobin: Attachment of Heme To Globin	Morris
Mitchell, Earl D.	PhD	1966	Isolation And Characterization of A Germination Inhibitor From Sugar Beet Fruit	Tolbert
Nunez-Arellano, Hernan	MS	1966	An Examination of The Quantitative Amino Acid Chromatography of S-Cysteinosuccinic Acid As A Means of Determining The Extent of The Reaction of N-Ethylmaleimide With Protein Thiol Groups	Speck

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Pusobha, Suparb	MS	1966	The Biological Value of Raw And Heated Soybean Proteins	Evans
Ritzert, Roger William	PhD	1966	The Biochemistry And Physiological Implications of Indole-3-Acetic Acid In The Developing Peach (*Prunus persica*) Seed	Sell
Schlender, Keith K.	PhD	1966	Involvement of Protein Synthesis In Auxin-Induced Elongation	Sell
Steinmetz-Kayne, Marlene	PhD	1966	Reversible Dissociation And Characterization of Rabbit Muscle Pyruvate Kinase	Deal
Beitz, Donald C.	PhD	1967	Characteristics of A Cell-Free Protein Synthesizing System Isolated From Lactating Bovine Mammary Glands	Wood/Thomas
Casjens, Sherwood Reid	MS	1967	The Selective Inhibition of Protein Assembly By Gougerotin	Morris
Chang, Wei-Hsien	PhD	1967	Excretion of Organic Acids During Photosynthesis By Synchronized Algae	Tolbert
Chasin, Mark	PhD	1967	The Isolation And Characterization of A New Class of Lactic Dehydrogenase Inhibitors: Substituted Phenols	Deal
Franklin, Robert Louis	PhD	1967	Synthesis And Physiological Activity of Several 1-Substituted Indole-3-Acetic Acids And Esters	Sell
Fuchs, Morton S.	PhD	1967	Studies of The Multiple Forms of Tyrosinase In *Neurospora cassa* And Their Relationship To Genetic Differences In Thermostability	Fox
Johnson, James Carl	MS	1967	Purification And Characterization of DNA-Dependent RNA Polymerase From *Pseudomonas putida* A.3.12	Boezi

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Kochevar, Irene H.	MS	1967	The Metal Ion Catalysis of The Mutarotation of α-D-Glucose	Speck
Lee, Lucy Fang	PhD	1967	Characterization of Bacteriophage Gh-1 For *Pseudomonas putida*	Boezi
MacDonald, Alex Bruce	PhD	1967	Guanosine Triphosphate Metabolism In Rabbit Reticulocytes	Morris
McCabe, Edward Mathew	PhD	1967	Isolation And Properties of Kappa-Casein, Glycomacropeptide And Para_Kappa_Casein Involved In Reaction With The Enzyme Rennin	Lillivek/Brunner
Neal, Donna L.	MS	1967	Apiose Reductase From *Aerobacter aerogenes*	Kindel
Rhinehart, Barry L.	MS	1967	A Method For The Degradation of Hamamelose	Kindel
Rynbrandt, Donald	PhD	1967	Glycosidase-Substrate Interactions: Glycoside Model Hydrolysis Rates And Lysozyme-Substrate Reactions	Speck
Sellers, Larry G.	MS	1967	Plan B Masters	Bieber
Yeh, Ren Homer	PhD	1967	The Oxidation of Indole-3-Acetaldehyde And Its 1-Methyl Derivative By Horseradish Peroxidase	Sell
Blatti, Stanley P.	PhD	1968	Characterization of The 3.5S Aldolase Intermediate As A Dimer And Analysis For Dimer Catalytic Activity	Deal
DeFazio, Karen	MS	1968	Determination of The Equilibrium Constant For An Enzyme Catalyzed Reaction	Hansen
Ginzburg, Irith	MS	1968	Repair of *E. coli* B130 DNA, Damaged By Mitomycin-C	Zimmerman
Hanson, Douglas M.	PhD	1968	The Purification And Partial Characterization of Associated Deoxyribonuclease, Ribonuclease, And 3'-Nucleotidase Activities of Wheat Seedlings	Fairley
Hsia, Min-Gee	MS	1968	A Study of The Carbohydrates of Bird's-Foot Trefoil (*Lotus corniculatus*)	Sell

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Jagger, Richard	MS	1968	An Investigation of Phosphodiesterase Activities In Plant Sources	Fairley
Mayo, Joseph William	PhD	1968	Metabolism of L-Mannose In *Aerobacter aerogenes*	Anderson
Owicki, John Callaghan	MS	1968	Studies On The Isolation of β-Casein And The Inactivation of Crystalline Rennin	Lillevik
Ruksan, Bruna E.	MS	1968	Tissue Distribution of Zinc In The Rat As Related To Dietary Zinc Requirement	Luecke
Zielke, Horst Ronald	PhD	1968	The Incorporation of Carbon Dioxide And Acetate Into Nicotine	Byerrum
Anderson, Donald E.	PhD	1969	P-Glycolate Phosphatase And Aconitase From Tobacco Leaves	Tolbert
Barran, Leslie Rohit	PhD	1969	An Investigation Into The Structure And Function of 2-Keto-3-Deoxy-6-Phosphogluconate Aldolase of *Pseudomonas putida* Using 1-Fluoro 2,4-Dinitrobenzene	Wood
Baumann, Sandra Lee	MS	1969	Studies On Terpenes: Biosynthesis And Occurrence	Sweeley
Bruin, William J.	PhD	1969	An Examination of Glycolate Metabolism In Plants	Tolbert
Dahms, A. Stephen	PhD	1969	Metabolism of D-Fucose And L-Arabinose In A Pseudomonad	Anderson
Gustine, David L.	PhD	1969	Biosynthesis of D-Apiose By An Enzyme System Isolated From *Lemna minor* L.	Kindel
Hanson, Thomas Earl	PhD	1969	The Metabolism of D-Fructose In *Aerobacter aerogenes*	Anderson
Hart, David A.	PhD	1969	Apiogalacturonans From The Cell Wall of *Lemna minor* L.	Kindel
Hengesh, Edmund	MS	1969	Synthesis of Cytidylyl Puromycin	Morris
Johnson, George Samuel	PhD	1969	Rabbit Muscle Pyruvate Kinase: Structural And Catalytic Studies	Deal

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Knop, Janice K.	MS	1969	Purification, Crystallization, And Properties of UDP-Glucose Pyrophosphorylase From Human Liver	Hansen
LaRue, John Nelson	PhD	1969	The Preparation And Amino Acid Sequence of Crystalline Turkey Egg White Lysozyme	Speck
Levine, Steven	PhD	1969	Chemical And Physical Characterization of UDP-Glucose Pyrophosphorylase From Calf Liver	Hansen
Millay, Robert Harry	MS	1969	Studies On Iodine And Phospholipid Metabolism In The Housefly *Musca domestica*	Bieber
O'Neal, Fredrick Oliver	MS	1969	Studies On The Resolution of Microsomal Membrane Proteins	Aust
Payne, Kenneth John	PhD	1969	The Purification And Characterization of ATP: RNA Adenylyltransferase From *Pseudomonas putida*	Boezi
Pederson, Thomas	MS	1969	Aminopyrine Demethylase: Kinetic Evidence For Multiple Microsomal Enzymes	Aust
Rose, Kathleen M.	MS	1969	Unprimed Interdependent Polymerization of ITP And CTP By RNA Polymerase of *Pseudomonas putida*	Boezi
Sapico, Virginia L.	PhD	1969	Properties And Functions of Three Bacterial Kinases Part I: A Hexokinase Specific For D-Mannose And D-Fructose From *Leuconostoc mesenteroides* Part II: 1-Phosphofructokinase And 6-Phosphofructokinase From *Aerobacter aerogenes*	Anderson
Schneider, Donald L.	PhD	1969	The Conversion of Lactyl CoA to Acrylyl CoA In *Peptostreptococcus eldenii*: A New α-Phospholactyl CoA Intermediate	Wood
Spike, Thomas E.	MS	1969	The Bioactivation of Slaframine	Aust

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Tuttle, John P.	MS	1969	Rat Brain Hexokinase: A Kinetic Comparison of Soluble And Particulate Forms	Wilson
Yamazaki, Russell K.	PhD	1969	A Study of The Enzymes In Leaf Peroxisomes	Tolbert
Chern, Ching Jer	PhD	1970	A Nucleoside Triphosphate Pyrophosphohydrolase From Red Blood Cells of The Rabbit	Morris
Deupree, Jean Duley	PhD	1970	An Analysis of The Mechanism of L-Ribose-5-Phosphate Epimerase From *Aerobacter aerogenes*	Wood
Evins, Warren	PhD	1970	Hormonal Regulation of Protein Synthesis In Barley Aleurone Layers	Varner
Granett, Sandra Spieker	MS	1970	Energy Metabolism In Phenylketonuric Models: Relevance As A Mechanism For Phenylalanine Toxicity	Wells
Haviland, Randolph T.	MS	1970	Scintillation Counting of 32P Without Added Scintillator In Aqueous Solutions And Organic Solvents, And On Dry Chromatographic Media	Bieber
Heimer, Yair	PhD	1970	Control of Nitrate Assimilation In Cultured Tobacco Cells	Filner
Hiles, Richard	PhD	1970	The Chemistry And Biochemistry of Ricinine And Some Related Pyridine Compounds	Byerrum
Hunsley, James	PhD	1970	Kinetic, Binding, And Conformational Studies of Yeast Pyruvate Kinase	Suelter
Kuczenski, Ronald	PhD	1970	Effects of Temperature, Substrates, Cations, And Fructose 1,6-Diphosphate On The Conformations, Subunit Structure, And Stability of Yeast Pyruvate Kinase	Suelter
Melcher, Ulrich	PhD	1970	Protein Release By Barley Aleurone Layers And Metabolism of Puromycin By Yeast Cells	Varner

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Mohrenweiser, Harvey	PhD	1970	Role of Hormones In Controlling Ribonucleic Acid Syntheses Druing Lactogenesis	Wood/Emery
Muschek, Lawrence	PhD	1970	The Purification And Characterization of A Nuclease From The Seeds of Muskmelon	Fairley
Nelson, Edward	PhD	1970	Glycolate Metabolism In Green Algae	Tolbert
Nunez-Arellano, Hernan	PhD	1970	Lysozyme-Substrate Reactions And Hydrolysis of Glycosidase-Glycoside Models	Speck
Rabinowitz, Kenneth W.	PhD	1970	Mechanism of Allosteric Control of L-Threonine Dehydrase of *Escherichia coli* By Adenosine-5'-Monophosphate	Wood
Randall, Douglas	PhD	1970	3-P-Glycerate Phosphatase In Leaves	Tolbert
Roseman, Mark	PhD	1970	A Model System Analysis of The Mechanism of 2-Keto-3-Deoxy-6 Phosphogluconic Acid Aldolase: The Catalytic Role of The Schiff Base Intermediate	Wood
Slabaugh, Ronald	PhD	1970	The Purification of Peptidyl-tRNA From Rabbit Reticulocyte Ribosomes	Morris
Snyder, Paul D.	MS	1970	The Anomeric Configuration of Fabry Trihesoxyl Cermide And The Recognition of An Exceptional Case of Tay-Sachs Diseases With Visceral Involvement	Sweeley
Stancel, George	PhD	1970	Reversible Dissociation of Yeast Glyceraldehyde-3-Phosphate Dehydrogenase In The Presence of Adenosine Triphosphate	Deal
Stevens, Jeffery B.	MS	1970	Sudies On The Multiplicity of Microsomal Mixed-Function Oxidase	Aust

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Zielke, Carol	PhD	1970	Rabbit Skeletal Muscle 5'-AMP Aminohydrolase: Some Physiochemical Properties And Characterization As A Zinc Metalloenzyme	Suelter
Abbate, Joseph	PhD	1971	The Determination of 2-0-Methylation In RNA	Rottman
Abbate, Mary	MS	1971	Variations In 3-Phosphoglycerate Phosphatase And Phosphoglycolate Phosphatase Activities With Physiological Changes	Tolbert
Brockman, Howard	PhD	1971	Electron Transport Flavoproteins In The Lactate Fermentation of *Peptostreptococcus elsdenii*	Wood
Donaldson, Robert	PhD	1971	Biochemical Studies On The Membranes of Peroxisomes And Glyoxysomes	Tolbert
Dunlap, Brian	PhD	1971	Studies On The Influence of Secondary Structure And 2'-0-Methylation On The Translation of Ribosomal RNA	Rottman
Feliss, Norbert	MS	1971	A Mechanism For The Inactivation of Yeast Pyruvate Kinase Formulated From Theoretical Analysis of Kinetic Data	Suelter
Hageman, Thomas	MS	1971	The Relationship of Chemical Structure And Plant Growth Regulator Activity In Indol-3-Ylacetamides	Sell
Hemphill, Delbert	PhD	1971	Isolation, Identification, And Relationship To Sex Expression of The Gibberellins of *Cucumis melo* And *Cucumis sativus*	Sell
Hemphill, Rosa Maria	MS	1971	The Effect of Protein And Hydrogen Ion Concentration On The Activity of Rabbit Muscle 5'-AMP Aminohydrolase	Suelter
Hengesh, Edmund	PhD	1971	Inhibition of Peptide Bond Formation By Nucleotidyl Derivatives of Puromycin	Morris

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Hildenbrandt, George	PhD	1971	Studies On Housefly Phosphodiesterase Acting On Various Biological Glycerophosphodiesters	Bieber
Jagger, Richard	PhD	1971	Purification And Properties of An Exonuclease (Phosphodiesterase I) From *Cucumis melo*	Fairley
Lin, Paul P.	PhD	1971	Enzymes of Cyclic Nucleoside Monophosphate Metabolism In Pea Seedlings	Varner
Lui, Edwin C.	PhD	1971	The Isozymic Forms of Peroxidase Found In The Hoseradish Plant (*Armoracia lapathifolia*)	Varner
Mascaro,Leonard Jr.	MS	1971	Studies On Microsomal Electron Transport	Aust
Palmer, Richard E.	PhD	1971	Metabolism of Cellobiose, Gentiobiose, And Cellobiitol In *Aerobacter aerogenes*	Anderson
Pike, Lee M.	MS	1971	A Rapid And Sensitive Technique For The Determination of The 2'-O-Methyl-Nucleoside Ratio of An RNA Molecule	Rottman
Qureshi, Shahida	PhD	1971	Studies On The Isolation And Purification of Acetyl CoA Synthetase From Mitochondria of Lactating Bovine Mammary Gland	Wells/Cook
Rehfeld, Dwayne W.	PhD	1971	Aminotransferases In Peroxisomes And Distribution of Peroxisomal Enzymes Among Leaf Cells	Tolbert
Watson, Ronald R.	PhD	1971	Biosynthesis of UDP-Apiose And Apiin	Kindel
Wu, Judy Y.	MS	1971	Studies On The Development of The Mixed-Function Oxidase of Rat Liver Endoplasmic Reticulum	Aust
Blosser, James	PhD	1972	Studies On The Turnover of Protein, Glycoprotein And Gangliosides In The Brains of Galactose Intoxicated Chicks	Wells
Bynum, John	PhD	1972	RNA And Protein Synthesis During Cytodifferentiation In Fetal Rat Pancreas	Ronzio

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Gerald, Cary F.	PhD	1972	Deoxyribonucleic Acid-Dependant Ribonucleic Acid Polymerase of *Pseudomonas putida*: Studies On The Mechanism of Action	Boezi
Granett, Sandra	PhD	1972	Perturbations of Energy Metabolism In Chick Brain Induced By Hyperphenylalanemia And Galactosemia	Wells
Koehler, Don	PhD	1972	Hormonal Control of Phospholipid Synthses In Barley Aleurone Layers	Varner
Lorimer, George	PhD	1972	The Role of Oxygen In Photorespiration	Tolbert
Mann, David	PhD	1972	Quinolinic Acid Phosphoribosyltransferase In Castor Beans	Byerrum
Mapes, Carol	PhD	1972	Studies On The α-Galactosidases of Normal And Fabry Plasma	Sweeley
Summary, James	PhD	1972	Studies On Angiotensin Converting Enzyme	Lillevik
Walter, Richard	PhD	1972	Purification And Role of The Inducible Soluble Protein Component of The Phosphoenolpyruvate: D-Fructose 1-Phosphotransferase System of *Aerobacter aerogenes*	Anderson
Behnke, James	PhD	1973	Purification And Characterization of Pig Liver L-α-Glycerol Phosphate Dehydrogenase	Deal
Bieber, Mark	PhD	1973	Studies On The Biochemistry of Juvenile Hormone And Other Insect Lipids	Sweeley
Chou, Albert Chung-Ho	PhD	1973	Purification And Characterization of Rat Brain Hexokinase	Wilson
Filner, Diana	MS	1973	Studies On Messenger RNA In *Artemia alina* Cysts	Rottman
Makri, Mary	MS	1973	Hybrid Formation Between Heavy IgG Chains And A Bence-Jones Protein	Speck
Mann, Dorothy	MS	1973	Aspects of NAD Biosynthesis In Castor Bean Endosperm	Byerrum

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Patrick II, Dan	MS	1973	Raman And Infrared Investigation of The Carbonyl Frequency of NAD	Wilson/Leroi
Pederson, Thomas	PhD	1973	Rat Liver Microsomal Electron Transport: Mechanism of NADPH-Dependent Lipid Peroxidation	Aust
Protzel, Alberto	PhD	1973	Non Uniformities In The Size Distribution of The Nascent Chains of Globin From Rabbit Reticulocytes	Morris
Schroeder, Friedhelm	PhD	1973	Studies On The Mechanism of Action of Filipin And Its Effects On Insects	Bieber
Stamoudis, Vassiliki	MS	1973	Acetyl-CoA Synthetase: A Glycoprotein	Speck/Cook
Tao, Robert	PhD	1973	Biochemistry And Metabolism of Mamalian Blood Gycosphingolipds	Sweeley
Wang, Janet	PhD	1973	A Nucleoside Triphosphate Pyrophosphohydrolase From Rabbit Liver	Morris
Blakesley. Robert W.	PhD	1974	A Kinetic And Structural Characterization of Adenosine 5'-Triphosphate: Ribonucleic Acid Adenlyltransferase From *Pseudomonas putida*	Boezi
Christeller, John T.	PhD	1974	Phosphoglycolate Phosphatase: Purification And Properties	Tolbert
Friderici, Karen H.	MS	1974	Determination of 2'-O-Methyl Levels And Distribution In Ribosomal RNA From Fat Tissues	Rottman
Ho, Berlin H.	PhD	1974	A Glyoxylate Specific Aminotransferase in Rat Liver Peroxisomes	Tolbert
Krisnagkura, Kanit	PhD	1974	Studies On The Biosynthesis of Sphingolipid Bases	Sweeley

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Kroeker, Warren D.	PhD	1974	A Study of Wheat Seedling Nuclease And It's Properties Relating To The Catalytic Mechanisms Involved In The Hydrolysis of DNA, RNA And The 3'-Nucleoside Monophosphates	Fairley
MacDonald, Raymond J.	PhD	1974	Studies On The Intracellular Membranes of Mammalian Exocrine Pancreas	Ronzio
Markwell, Mary Ann K.	PhD	1974	The Discovery And Partial Characterization of Carnitine Acetyltransferase Activity From Rat Liver Peroxisomes And Microsomes	Bieber
Mascaro, Kathryn D.	MS	1974	Reversible Dissociation of Pig Liver Glyceraldehyde 3-Phosphate Dehydrogenase By Adenosine Triphosphate	Deal
Musick, William D.L.	PhD	1974	Studies On Phosphorylative Pathways of Galactose Metabolism In Rat Heart And Brain	Wells
Pike, Lee M.	PhD	1974	Distribution of 2'-O-Methylnucleosides In RNA	Rottman
Prohaska, Joseph R.	PhD	1974	Effects of Copper Deficiency And Hyperphenylalanine On The Developing Rat Brain	Wells
Towle, Howard C.	PhD	1974	Purification And Characterization of Bacteriophage Gh-1 Induced Deoxyribonucleic Acid-Dependent Ribonucleic Acid Polymerase From *Pseudomonas putida*	Boezi
Welton, Ann F.	PhD	1974	Rat Liver Microsomal Structure And The Mixed-Function Oxidases	Aust
Aust, Ann E.	PhD	1975	Purification And Characterization of A Higher Molecular Weight Form of Yeast Pyruvate Kinase	Suelter

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Bissett, Donald L.	PhD	1975	Lactose And D-Galactose Metabolism In *Staphylococcus aureus*: Elucidation of The Pathway of D-Galactose 6-Phosphate Degradation And Purification And Characterization of The Enzymes Involved	Anderson
Chaney, Linda C.	MS	1975	Antibody Specificity For Cytochrome P450 In The Microsomal Electron Transport System	Aust
Dean, Kenneth J.	MS	1975	The Isolation of Ceramide Trihexosidases From Normal Plasma	Sweeley
Desrosiers, Ronald C.	PhD	1975	The Synthesis And Methylation of Messenger RNA In Novikoff Hepatoma Cells	Rottman
Felgner, Philip L.	MS	1975	Characterization of The Hexokinase Membrane Interaction: Rapid Photolysis of Dansyl Tyrosine; Partial Characterization of Bindable And Non-Bindable Hexokinase Isozymes	Wilson
Ko, Man P.	MS	1975	Enzymes For Oxidation of Alpha-Hydroxyacids In Roots of Green Plants	Tolbert
Kronquist, Kathryn E.	PhD	1975	Sulfated Glycopolypeptides of The Exocrine Rat Pancreas	Ronzio
Leinbach, Edwin	PhD	1975	Characterization of A Particulate UDP-Galacturonate: Acceptor D-Galacturonosyltransferase From *Lemna minor* And Studies On The Physical Properties of The Product	Kindel
Mascaro Jr., Leonard	PhD	1975	Characterization of Apiogalacturonans Formed By A Cell-Free System From *Lemna minor*	Kindel

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Meinert, Maureen C.	MS	1975	Biochemical Changes In Cell Wall Composition Associated With In Vivo And In Vitro Fiber Development In *Gossypium hirsutum*	Delmer
Reuveny, Ziva	PhD	1975	Regulation of ATP Sulfurylase In Cultured Tobacco Cells	Delmer
Shimamoto, Grant T.	MS	1975	Initiation of Galactitol Metabolism In *Aerobacter aerogennes*	Anderson
Simkins, Ronald A.	PhD	1975	L-Sorbose 1-Phosphate Reductase From *Aerobacter aerogenes*: It's Purification, Characterization, And Role In The Metabolism of L-Sorbose And D-Fructose	Anderson
Troisi, Catherine	MS	1975	Biochemical Effects of Polycrominated Biphenyls On Microsomal Enzymes	Aust
Tsay, David D.	PhD	1975	Structure of 2-Keto-3-Deoxy-6-Phoshogluconate Aldolase: Sequence of An Active Site Peptide of 50 Amino Acids	Wood
Bishop, David	PhD	1976	Differential Properties And Control of [Delta]-Aminolevulinic Acid Synthetase Isozymes From Erythriod And Non-Erythriod Tissue	Wood
Buege, John A.	PhD	1976	Lipid Peroxidation: Enzyme-Catalyzed Peroxidation of Membrane Lipids And The Role of Chelated Iron	Aust
Burton, Louis E.	PhD	1976	Myo- Inositol Metabolism During Development And Lactation In The Rat	Wells
Ho, Tuan-hua D.	PhD	1976	On The Mechanism of Hormone Controlled Enzyme Formation In Barley Aleurone Layers	Varner
Jolly, James F.	PhD	1976	The Control of RNA Transcription In Bacteriophage Gh-1-Infected *Pseudomonas putida*	Boezi

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Kuo, Chao-Hen	MS	1976	The Purification And Characterization of β-Galactosidase From Rat Mammary Gland	Wells
Leinbach, Susan S.	PhD	1976	DNA Polymerases of Marek's Disease Herpevirus And Herpesvirus of Turkeys: Characterization And Mechanism of Inhibition By Phosphonoacetate	Boezi
Litchfield, William J.	PhD	1976	Metabolic And Functional Activities of Phagocytic Cells During Galactosemia	Wells
Markwell, John P.	PhD	1976	Pathway of Galactitol Catabolism In *Klebsiella pneumoniae*	Anderson
Menson, Robert C.	PhD	1976	Active Species And Quaternary Structure of Biodegradative L-Threonine Dehydrase From *Escherichia coli*	Wood
Brody, Mark S.	PhD	1977	AMP Aminohydrolase From Normal And Dystrophic Chicken Breast Muscle	Suelter
Campbell Jr., John C. W.	MS	1977	The Role of H+ In The K+ Activation of Rabbit Muscle 5' AMP Aminohydrolase	Suelter
Cook, Douglas I.	MS	1977	Structure of 2-Keto-3-Deoxy-6-Phosphogluconate Aldolase: Partial Sequence of An Anomalous Tryptic Peptide of 20 Amino Acids	Wood
DaGue, Beverly B.	MS	1977	Glycoprotein Synthesis in The Rat Exocrine Pancreas During The Secondary Transition Period of Pancreatic Differentiation	Ronzio
Gates, Stephen C.	PhD	1977	Automated Metabolic Profiling of Organic Acids in Human Urine By Gas Chromatography-Mass Spectrometry	Sweeley
Haas, Suzanne M.	MS	1977	The Effects of Dietary Zinc Deficiency On The Humoral Immune Response of The Young Adult A/J Mouse	Fraker

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Lewis, Douglas S.	PhD	1977	Zymogen Granule Membrane Phosphorylation And Glycoprotein Topology in The Exocrine Pancreas	Ronzio
Mak, Ivan I.T.	MS	1977	The Participation of Lysosomes in Enzyme induction in Rat Liver	Wells
O'Donnell Jr., John J.	MS	1977	Studies of Exocytosis in Acinar Cells of Adult Rat Pancreas	Ronzio
Sabourin, Carol L. K.	MS	1977	Inhibition of Eukaryotic DNA Polymerases By Phoshonoacetate And Phosphonoformate	Boezi
Sung, Sun-Sang J.	PhD	1977	Structure of Dog Intestinal Forssman Hapten And Purification And Partial Characterization of Forssman Hapten Hydrolase (A-N-Acetylgalactosaminidase EC. 3.2.1.49) From Porcine Liver	Sweeley
Dannan, Ghazi	MS	1978	Studies On The in Vitro Metabolism of Polybrominated Biphenyls And The induction of Rat-Neonatal Drug Metabolizing Enzymes	Aust
Dean, Kenneth J.	PhD	1978	The Purification And Partial Characterization of α-Galactosidases A And B From Human Liver	Sweeley
Felgner, Philip L.	PhD	1978	Lyotropic Salts And The Hexokinase Membrane Interaction: Purification, Reconstitution And Characteristics of The Outer Mitochondrial Membrane Binding Site For Hexokinase	Wilson
Josef, Nancy A.	MS	1978	Galactose Oxidation in Rat Liver Microsomes	Wells
Kaehler, Marian M.	PhD	1978	Novikoff Messenger RNA Methylation: Implications of Methylation in Processing	Rottman
Moore, Robert W.	PhD	1978	Chemistry And Biochemical Pharmacology of Polybrominated Biphenyl Congeners	Aust

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Mort, Andrew J.	PhD	1978	Partial Characterization of Extensin By Selective Degradation of Cell Walls	Lamport
O'Neal, Fredrick O.	PhD	1978	Carbon Tetrachloride Metabolism: The Role of Hepatic Microsomal Mixed-Function Oxidase Components in Carbon-Halogen Bond Cleavage	Aust
Patterson Jr., James M.	MS	1978	Studies On The Relative Affinities of Polyene Antibiotics For Cholesterol And Stigmasterol	Bieber
Rancour, Thomas P.	MS	1978	In Vivo Metabolite Regulation of Myo-Inositol Biosynthesis	Wells
Riebow, John F.	MS	1978	Evidence For The Formation of Pyridoxamine-5-Phosphate By The Biodegradative L-Threonine Dehydrase of *Escherichia coli*	Wood
Saxe, Stephen A.	MS	1978	The Non-Specific DNA Binding Activity of Catabolite Activating Protien of E.Coli	Revzin
Thomason, Arlen R.	PhD	1978	Methylation of Feline Leukemia Virus Virion And Intracellular RNA	Rottman
Verhoef, Vernon L.	PhD	1978	The Role of Nucleoside Triphosphate Pyrophosphohydrolase, A Genetically Variable Enzyme, in Inosine Triposphate Metabolism in Human Erythrocytes	Morris
Akiyama, Yukio	MS	1979	Deglycosylation of Arabinogalactan Proteins From Suspension-Cultured Sycamore Cells Via Hydrogen Fluoride in Pyridine	Delmer
Chaney, William G.	PhD	1979	The Role of Messenger RNA in Nascent Peptide Chain Accumulations	Morris
Huslig, Richard L.	MS	1979	The Prostaglandin-Forming Cyclooxygenase of Ovine Uterus	Smith

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Author	**Degree**	**Year**	**Thesis**	**Professor**
June, David S.	PhD	1979	Studies On The Mechanism of Tryptophanase Catalysis	Suelter
McCurry, Stephen D.	PhD	1979	Investigations On The Mechanism of Ribulose-1, 5-Bisphosphate Carboxylase/Oxygenase	Tolbert
Serianni, Anthony S.	PhD	1979	The Cyanohydrin (Kiliani) Reaction: Mechanism Studies By 13C NMR Spectroscopy And Application To The Synthesis of Isotopically-Enriched Carbohydrates	Barker
Wenger, William C.	MS	1979	The Substrates of D-Galactose 6-Phosphate Isomerase: An Analysis of D-Galactose 6-Phosphate And D-Tagatose 6-Phosphate	Anderson
Zator, Roselyn	MS	1979	Hormonal Control of Tubulin Content And Polymerization in Rat Liver	Wells
DePasquale-Jardieu, Paula	MS	1980	The Role of Corticosterone in The Loss of Immune Function in The Zinc Deficient A/J Mouse	Fraker
Hauswald, Charles	MS	1980	Mutational Acquisition of D-Fuconate Catabolism in *Klebsiella pneumoniae*: Elucidation of The Pathway And Characterization of D-Galactonate (D-Funcate) Dehydratase	Anderson
Kurtz, James W.	PhD	1980	Hormonal And Dietary Regulation of Enzyme Induction In Rat Liver	Wells
Lockney, Michael W	PhD	1980	Characterization of A Glycolipid N-Acetylgalactosaminyltransferase Activity in NIL And 3T3 Cell Lines : Effect of Viral Transformation	Sweeley
Marvel, Christopher	PhD	1980	Studies of The Functional Role And Partial Characterization of A UDP-Galactose : Glycoprotein Galactosyltransferase	Sweeley

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Pierce, John	PhD	1980	Part 1, Carbon-13 Nuclear Magnetic Resonance Studies On The Solution Behavior of Sugar Phosphates. Part 2, Ribulose Bisphosphate Carboxylase/Oxygenase: Catalysis And Activation	Tolbert/Barker
Reno, John	PhD	1980	Inhibition of Herpesvirus Replication, Herpesvirus-Induced DNA Polymerase, And Retrovirus Reverse Transcriptase By Phosphonoacetic Acid And Phosphonoformic Acid	Boezi
Rosevear, Paul	PhD	1980	Enzyme-Mediated Synthesis of The Antigenic Portion of The Blood Group O Substance With Specific Carbon-13 Enrichment	Barker
Szabo, Leslie	MS	1980	Identification And Partial Characterization of Actin From Glycine Max And *Trifolium repens*	Schubert
Wong, Clifford	PhD	1980	Biochemical And Immunological Studies On Familial Erythrophagocytic Lymphohistiocytosis	Sweeley
LeBlond, David	PhD	1980	Importance of Dimerization in The Adenosine 5' Monophosphate Activation of Biodegradative L-Threonine Dehydrase From *Escherichia coli* And Determination of Enzyme Kinetic Parameters By Continuous Addition of Substrate To A Single Reaction Mixture And Analysis By A Tangent-Slope Procedure	Wood
Vary, Calvin	PhD	1980	Determination of The Rabbit Alpha And Beta Globin Nascent Polypeptide Size Distribution: Correlation of Nascent Peptide Accumulations With mRNA Secondary Structure	Morris

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Clarke, Peter	PhD	1981	A Search For Mitochondrial Carnitine Octanoyltransferase: An Investigation of Carnitine Acyltransferase Activities In Beef Heart Mitochondria	Bieber
Coffin, Claude	MS	1981	Development of A Growing Drop Fluorescence Detector	Rottman
Dannan, Ghazi	PhD	1981	Studies On The Relationships Between The Chemical And Pharmacological Properties of Polybrominated Biphenyls	Aust
Fung, Yuen-Kia	PhD	1981	Involvement of Cellular Oncongenes in Avian Leukosis Virus induced Neoplastic Diseases: Lymphoid Leukosis And Erythroleukemia	Kung
Grenier, Frank	PhD	1981	Prostaglandin Metabolism in Papillary Collecting Tubule Cells From Rabbit Kidney	Smith
Hershey, Howard	PhD	1981	The Relationship Between Messenger RNA And Nascent Peptide Size Distribution : The Role of Messenger RNA Integrity	Morris
Klein, Anita S.	PhD	1981	Glucan Synthesis in Soybean Cells : The Enzymes involved in Deposition of Glucans During Cell Wall Regeneration	Delmer
Metcalf, Thomas	MS	1981	Lectin Receptors And Cytoskeletal Structures in Soybean Cells	Wang
Rollins, Thomas	MS	1981	Subcellular Localization of PGH Synthase	Smith
Sabourin, Patrick	PhD	1981	Purification And Characterization of An -Ga-S-Ketoisocaproate Oxidase From Rat Liver	Bieber
Sasavage, Nancy	PhD	1981	Sequence Analysis of Bovine Prolactin Messenger RNA	Rottman
Steck, Petter	PhD	1981	Molecular Analysis of Density-Dependent Inhibition of Growth In 3T3 Fibroblasts	Wang

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Svingen, Bruce	PhD	1981	The Role of Chelated Iron in The Mechanism of Enzymatic Promotion of Lipid Peroxidation	Aust
Tien, Ming	PhD	1981	The involvement of Chelated Iron And Activated Oxygen in Radical-Mediated Peroxidation of Lipid	Aust
Uhlig, John	PhD	1981	Isolation And Characterization of The Glyoxysomal -Gb-S-Oxidation System From Germinating Castor Bean Endosperm	Tolbert
Valkner, Kim	MS	1981	Changes in Tissue And Body Fluid Acylcarnitines in Response To Different Physiological States	Bieber
Weideman, Mary	MS	1981	The Catalytic Role of Sulfhydryl Group(S) In The Mechanism of Nucleoside Triphosphate Pyrophosphohydrolase Activity	Morris
Broderick, Wanda	MS	1982	The Partial Purification of Para-Nitrophenol: UDP-Glucuronyltransferase From Rabbit Small Intestinal Microsomes	Aust
Carlson, Thomas	MS	1982	Gas Chromatography-Mass Spectrometry of Urinary And Plasma Organic Acids From Patients With Duchenne's Muscular Dystrophy And Age Matched Controls	Suelter
Coker, George	PhD	1982	Dark CO2 Fixation And Amino Acid Metabolism in Symbiotic N2-Fixing Systems: Labeling Studies With 14C And 13N-Labeled Tracers	Schubert
DeWitt, David	PhD	1982	The Purification, Quantitation And Immunofluorscent Localization of The PGI2 Forming Enzymes, PGH Synthase And PGI2 Synthase, With Monoclonal Antibodies	Smith

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Emaus, Ronald	PhD	1982	The Metabolic Role of Carnitine in The Yeast, *Torulopsis bovina*	Bieber
Fink, Patricia	MS	1982	Developmentally Regulated Changes in Prolactin mRNA And Growth Hormone mRNA Levels And Their Respective Cell Types in The Fetal Bovine Pituitary Gland	Rottman
Hanks, Joanna	PhD	1982	Localization of Enzymes of Purine Degradation in Plants And Animals	Tolbert
Hildebrandt, Kim	MS	1982	The Effects of Maternal Dietary Zinc Deficiency On The Growth And Immunocompetence of Suckling A/J Mice	Bieber/Fraker
Husic, Harold David	PhD	1982	Circulatory Clearance of Muscle Enzymes in Normal And Dystrophic Chickens	Suelter
Needels, Dwight	PhD	1982	Purification of Cytoplasmic Hexokinase From Rat Brain And Comparison With The Mitochondrial Enzyme	Wilson
Neudahl, Gary	MS	1982	Isolation And Partial Characterization of An inactivating Factor For Fatty Acid Synthetase. Isoelectric Focusing in Density Gradients in Thirty-Five Minutes	Deal
Sabularse, Dario	PhD	1982	Inorganic Pyrophosphate:D-Fructose-6-Phosphate 1-Phosphotransferase In Plants And Its Regulation By A Naturally Occurring Activator, D-Fructose 2,6-Bisphosphate	Anderson
Bennett-Hershey, Vickie	PhD	1983	Mitochondrial Creatine Kinase In Normal And Dystrophic Chicken Skeletal Muscle : Function In The Creatine Phosphate Shuttle, Purification And Expression In Muscle Cell Cultures	Suelter

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Blenis, John	PhD	1983	Biochemical Analysis of Transformation-Sensitive Alterations in The Substratum Associated Material of Chicken Embryo Fibroblasts	Hawkes/Wang
Camper, Sally Ann	PhD	1983	Studies On Messenger RNA Methylation	Rottman
Christensen, Alan H.	PhD	1983	Studies On The Plasmid-Coding of Nodulation And Nitrogen Fixation Genes in Two Strains of *Rhizobium trifolii*	Schubert
Collins, Christine	PhD	1983	Phosphorylation of Lysosomal Membrane Components	Wells
Garner, Mark	PhD	1983	Studies On The Mechanism of Action of Cataolite Activator Protein From *Escherichia coli*	Revzin
Kohnken, Russell	PhD	1983	Studies On The GTP-Binding Protein Activator of Cyclic GMP Phosphodiesterase in Bovine Retinal Outer Segments	McConnell
Lapenson, David	PhD	1983	Studies On Mammalian Metaphase Chromosomes And Characterization of Phosphofructokinase Membrane Binding And Activity Inhibition By Hexacyanoferrate (Ii)	Deal
Mulligan, Robert M.	PhD	1983	The Enzymatic Mechanism of Ribulose Bisphosphate Carboxylase/Oxygenase	Tolbert
Polayes, Deborah	PhD	1983	Nitrogen Metabolism in Soybeans : The Biosynthesis of Ureides in Seedlings And The Partitioning of N into Vegetative And Reproductive Tissue	Schubert
Roff, Calvin	PhD	1983	Isolation And Characterization of Lectins From Mammalian Fibroblasts	Wang
Runk, Bruce	MS	1983	Chloroplast Membrane Adaption And Repair In Response To Environmental Stress In Maize Seedlings (*Zea mays* L.)	Arntzen

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Selph, Nicola	PhD	1983	Enzymes of Glycolate Metabolism in *Chlamydomonas reinhardtii*	Tolbert
Spellman, Michael	PhD	1983	Structural Studies of Rhamnogalacturonan II, A Plant Cell Wall Pectic Polysaccharide	Tolbert
Trinity, Philip M.	PhD	1983	Regulation of NADH Nitrate Reductase of Tobacco XD Cells By Suboptimal Concentrations of Nitrate And Sulfate	Filner
Baxter, Jeffrey	PhD	1984	Acid Phosphatases And Lysosomes in Dystrophic Avian Pectoralis Muscle	Suelter
Burczack, John	PhD	1984	Studies On The Regulation of Glycosphingoliped Biosynthesis	Sweeley
Farrell, Shawn	PhD	1984	Carnitine Octanoyltransferase And Carnitine Acetyltransferase of Mouse Liver Peroxisomes	Bieber
Garcia-Perez, Arlyn	PhD	1984	Prostaglandin Metabolism And Function in Canine Cortical Collecting Tubule Cells Isolated Using A Monoclonal Antibody	Smith
Hochman, Jerome	PhD	1984	Diffusion In The Mitochondrial Inner Membrane : Implications For The Mechanism of Electron Transfer And Hexaammineruthenium, An Effective Electron Donor To Cytochrome Oxidase	Ferguson-Miller
Millis, Cynthia	MS	1984	Studies On The Chemical And Pharmacotoxicological Properties of Polybrominated Biphenyls	Aust
Polakis, Paul	PhD	1984	Proteolytic Dissection of Rat Brain Hexokinase Function	Wilson
Seyfred, Mark	PhD	1984	Regulation And Mechanism of Phosphoinositide And Inositol Polyphosphate Metabolism In Rat Hepatocytes	Wells

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Smith, Charles	PhD	1984	Polyphosphoinositide Metabolism in Rat Liver Nuclear Envelopes And Its Role in Regulating Nucleoside	Wells
Thompson, Debra	PhD	1984	Cytochrome C Oxidase Purified By Affinity Chromatography in Laurylmaltoside: The Effects of Detergent, Lipid Depletion, And Subunit III Removal On Function	Ferguson-Miller
Villanueva-Mendez, Marco	MS	1984	Characterization of A Monoclonal Antibody Reactive With The Plasma Membrane of Soybean Protoplasts	Wang
Bates, Paul	PhD	1985	Part I. Studies On The Hamster Ribonucleotide Reductase Genes. Part II. Construction of Mutations in The Chicken Adult Alpha Globin Genes	Dodgson
Brush, David	MS	1985	Characterization of A Chicken H3.3 Replacement Variant Histone Gene	Dodgson
Cherniack, Judith	PhD	1985	Studies On Flagellar Shortening in *Chlamydomonas reinhardtii*	Filner
Chia, Catherine	PhD	1985	Instability of Photosystem II Complexes In A Chloroplast-Encoded Tobacco Mutant	Arntzen
Clark, Edward	PhD	1985	On The Study of Cellular Metabolism Using Carbohydrates Enriched With Stable Isotopes	Barker Sweeley
Darr, Sylvia	PhD	1985	Structure And Function of The Light Harvesting Chlorophyll A/B Complex: Investigations Using Reconstitution And Monoclonal Antibodies	Arntzen
Domoradzki, Jeanne	PhD	1985	Correlation Between O_P6_S-Methylguanine-DNA Methyltransferase Activity And Resistance of Human Cells To The Cytotoxic And Mutagenic Effect of N-Methyl-N'-Nitro-N-Nitrosoguanidine	Maher

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Hsu, Yen-Ming	PhD	1985	Isolation And Characterization of A Growth Regulatory Polypeptide From Cultured 3T3 Fibroblasts	Wang
Metcalf, Thomas III	PhD	1985	The Lateral Mobility of Protein And Lipid Components of The Plasma Membrane of Soybean Cells	Wang
Nickerson, Jeffrey	PhD	1985	A Microtubule Associated Nucleoside Diphosphate Kinase	Wells
Suarez, Maria	PhD	1985	Determination of The Physical And Functional Size of Mammalian Cytochrome Oxidase	Ferguson-Miller
Swift, Robert Alan	PhD	1985	Retroviral Induced Lymphoma : Promoter-Insertional Activation of The Cellular Myc Gene By Reticuloendotheliosis Virus	Kung
Wilkinson, Francis	PhD	1985	Purification And Structural And Kinetic Characterizations of α-Galactosidases A And B From Human Liver	Sweeley
Bell, Erin	PhD	1986	A Molecular Analysis of Ribulose 1,5-Bisphosphate Carboxylase Small Subunit Transit Peptide Function	McIntosh
Brauker, James	PhD	1986	Turnover of Cell Surface Proteoglycands in Cultured Fibroblasts	Wang
Brooks, Stephen	PhD	1986	The Kinetic Effects of The Binding of Mitochondrial Creatine Kinase To Chicken Heart Inner Mitochondrial Membranes	Suelter
Carlson, Todd	PhD	1986	Characterization of The Genes Encoding Glutamine Synthetase I And Glutamine Synthetase II From *Bradyrhizobium japonicum*	Chelm Plant Biology
Fiol, Carol	PhD	1986	A Study of The Kinetics, Specificity, And Regulation of Heart Mitochondrial Carnitine Palmitoyl Transferase	Bieber

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Husic, Diane White	PhD	1986	The Metabolism of D-Lactate And Structurally Related Organic Acids In *Chlamydomonas reindardtii*	Tolbert
Morehouse, Lee A	PhD	1986	Role of Cytochrome P450 In Hepatic Microsomal Mixed Function Oxidase-Dependent Superoxide Production And Lipid Peroxidation	Aust
Moutsatsos, Ioannis	PhD	1986	Proliferation Dependent Expression And Nuclear Localization of Carbohydrate-Binding Protein 35 In Cultured Fibroblasts	Wang
Schirch, Douglas	PhD	1986	Location And Structure of The Substrate Hexose Binding Site of Rat Brain Hexokinse	Wilson
Thomas, Craig	PhD	1986	Mechanisms For The Release of Iron From Ferritin And Their Relationship To Lipid Peroxidation And Toxicity	Aust
Ashbaugh,William	MS	1987	Production And Purificaton of The Ligninases	Anderson
Ceglarek, John	MS	1987	The Nature of DNA-Protein Interactions Studied By Polyacrylamide Gel Electrophoresis	Revzin
Chen, Chun-Nan	PhD	1987	Molecular Analysis of The DUNCE Gene of *Drosophila melanogaster*, A Gene involved in cAMP Metabolism And Behavioral Plasticity	Davis
Cook-Mills, Joan	PhD	1987	Functional Capacity of The Residual Leukocytes From Zinc Deficient Mice	Fraker
Dietrich, Stephen	MS	1987	Oxidative Photosynthetic Carbon Cycle in Green Algae	Tolbert
Federspiel, Mark	PhD	1987	The Isolation And Characterization of Erythroid-Expressed Clones From A Chicken Reticulocyte cDNA Library	Dodgson

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Gan, Zhong-Ru	PhD	1987	Purification, Characterization, Primary Structure And Catalytic Mechanism Studies of Pig Liver Thioltransferase	Wells
Powers, Robert	PhD	1987	Studies On The Relationships of TCDD Toxicity And Vitamin A	Aust
Raines, Maribeth A	PhD	1987	C-Erb B Activation And Avian Leukosis Virus Induced Erythroblastosis	Kung
Rajarathnam, Krishnakumar	MS	1987	The Location And Mobility of Fluorescently Labeled Ubiquinone In Mitochondrial Membranes And Unilamellar Phospholipid Vesicles	Ferguson-Miller
Sonnenburg, William	PhD	1987	Regulation of Cyclic AMP Metabolism By Prostaglandins in Rabbit Cortical Collecting Tubule Cells	Smith
Sullivan, Barbara	PhD	1987	Alpha-N-Acetylgalactosaminidase: Enzyme Purification And Isolation of Putative cDNA Clones	Sweeley
Swaisgood, Mark	PhD	1987	Studies On The Consequences of Cell Shape For Membrane Dynamics: Relationship To Cytoskeletal Organization	Schindler
Tillotson, Joanne Kivela	PhD	1987	Search For A Chicken Major Histocompatibility Complex Class II Alpha Gene : Transformation-Related Viral Transcripts in Marek's Disease Virus-Transformed Cell Lines	Kung
Voorman, Richard	PhD	1987	Influence of Polyhalogenated Aromatic Hydrocarbons On The Induction, Activity, And Stabilization of Cytochrome P450	Aust

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Wilson, Barbara Jean	PhD	1987	The Transport And Metabolism of Glycolic Acid By *Chlamydomonas reinhardtii*	Tolbert
Boyer, Paul	PhD	1988	Analysis of The Chicken Erythroid-Specific H5 Histone Gene	Dodgson
Friderici, Karen	PhD	1988	RNA Metabolism In Bovine Pituitary Cells	Rottman
Gehm, Barry	PhD	1988	Studies On Phosphoinositide Metabolism In Retinal Rod Outer Segments	McConnell
Gibbons, Joseph	MS	1988	Effects of A Marginal Deficiency of Zinc in Utero On Growth And Immune Development in The Mouse: A Possible Model For Normal Term Low Birth-Weight infants	Fraker
Gregory, Linda	PhD	1988	Clarification of The Roles of Subunit III And Phospholipid In Cytochrome C Oxidase Activity	Ferguson-Miller
Hurlin, Peter	PhD	1988	Malignant Transformation Induced in Human Fibroblasts By Expression of A Transfected T24 H-RAS Oncogene: Requirement For An Infinite Lifespan	McCormick
Hwang, Deog Su	PhD	1988	dnaA46 Protein in Initiation of in Vitro oriC Plasmid Replication	J. Kaguni
Malek-Hedayat, Shanaz	PhD	1988	Characterization And Functional Analysis of SB-1 Lectin From Cultured Soybean Root Cells	Schindler/Wang
Roth, William	PhD	1988	Effects of Ah-Inducers On The Activity of Thyroid-Regulated Enzymes And Control of Thyroid Hormone Metabolism	Jump

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Schilz, Robert	PhD	1988	Expression of Growth Factor Genes in Transformed Human Fibroblasts And Cells Derived From Human Fibrosarcomas: A Possible Mechanism For Replication in The Absence of Exogenous Growth Factors	McCormick
Sithole, Idah	PhD	1988	The Marek's Disease Herpesvirus B Antigen Glycoprotein Complex: Characterization And Processing of Its Precursor Polypeptide And Identification And Characterization of The	Velicer/Dodgson
Toth, Peter Paul	PhD	1988	Characterization of The Factors Regulating The Coupling And Respiratory Control of Isolated Chick Heart Mitochondria	Suelter
Villanueva-Mendez, Marco	PhD	1988	Actin and Microfilaments in Cultured Soybean Cells	Wang
Ward, Sherry	PhD	1988	Isolation And Characterization of A PGH-PGE Isomerase From Sheep Vesicular Gland Microsomes	Smith
Wernette, Catherine	PhD	1988	Mitochondrial DNA Polymerase From *Drosophila melanogaster* Embryos: Purification, Subunit Structure And Template-Primer Utilization Studies	L. Kaguni
Wilson, Daniel M.	PhD	1988	Biochemical And Biological Analysis of Human Fibroblasts Transformed With N-ras Oncogenes	McCormick
Yang, Jia-Ling	PhD	1988	Kinds And Spectra of Mutations Formed When A Shuttle Vector Containing Adducts of Benzo [A] Pyrene-7,8-Diol-9,10-Epoxide Or 1-Nitrosopyrene Replicates in Mammalian Cells	Maher
Yun, Yungdae	PhD	1988	Isolation And Characterization of Genes Regulated By Cyclic AMP In *Drosophila melanogaster* And Differentially Expressed In DUNCE Mutants	Davis

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Rivera, Mildred	MS	1988	Characterization of The Physical And Chemical Structure of *Pseudomonas aeruginosa* Lipopolysaccharide	McGroarty
Wang, Qingping	PhD	1989	Identification of Genes Regulated By dnaA Protein in *Escherichia coli*	Kaguni
Cress, Andrea	MS	1989	Carnitine involvement in Fuel Utilization By Human Peripheral Blood Mononuclear Cells	Fraker
Kieliszewski, Marcia	PhD	1989	Isolation And Characterization of Extensins From The Graminaceous Monocot *Zea mays*	Lamport
Lee, Chanyong	PhD	1989	Biochemical And Molecular Characterization of Glucose Isomerase From Thermoanaerobes	Zeikus
Lorimer, Donald	PhD	1989	Studies On The Interaction of *E.coli* RNA Polymerases With Lactose Promoter DNA	Revzin
Pittler, Steven	PhD	1989	Molecular Characterization of Bovine And Human Retinal Rod cGMP Phospodiesterase And Chromosamal Localization of The Human Gene	Preiss
White, Tracy	PhD	1989	Domain Structure And Structure-Function Relationships in Rat Brain Hexokinase	Wilson
Browne, David	PhD	1990	Chicken Chromosomal Protein Genes	Dodgson
Cao, Jianli	PhD	1990	Conversion of The Mitochondrial Gene For Mammalian Cytochrome Oxidase Subunit II To A Universal Equivalent And Expression in *E. coli*, in Vitro, And in Xenopus Oocytes	Ferguson-Miller
Cowles, Elizabeth	PhD	1990	Carbohydrate Binding Protein 35: Characterization, Expression And Localization of Isoelectric Variants in Cultured Cells	Wang

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Hamann, Kimberly	MS	1990	Serum Responsiveness of Carbohydrate Binding Protein 35 Expression: Comparison Between Human Fibroblasts of Different Replicative Capacities	Wang
Hupp, Theodore	PhD	1990	The Interaction of *Escherichia coli* Gene Products With Mutant Forms of dnaA Protein	J. Kaguni
Ito, Moriko	PhD	1990	G1/S Phase Regulation of Thymidine Kinase Following Serum Induction of Quiescent Cells	Conrad
Lilly, Kathleen	PhD	1990	Characterization of A Medium/Long-Chain Carnitine Acyltransferase Associated With Rat Liver Endoplasmic Reticulum	Bieber
Mulrooney, Scott B.	PhD	1990	Cloning, Sequence, And Characterization of The *Klebsiella aerogenes* Urease Operon	Hausinger
Rocque, Warren	PhD	1990	Characterization of OmpC And OmpF Porins From *Escherichia coli* K-12	McGroarty
Taha, Taha S.M.	PhD	1990	The Use of Monoclonal Antibodies And A Protein Modifying Reagent To Study The Interaction of Cytochrome C With Cytochrome C Oxidase	Ferguson-Miller
Xie, Guochun	PhD	1990	Molecular Basis For The Interaction of Rat Brain Hexokinase With Mitochondria	Wilson
Yang, Yanfeng	PhD	1990	Molecular Cloning, cDNA Sequencing, Expression In *E. coli* , Active Site Identification And Catalytic Mechanism of Pig Liver Thioltransferase	Hausinger
Jia, Shizhe	PhD	1990	Identification And Characterization of Carbohydrate Binding Protein 35 Gene Structure	Wang
Cress, William	PhD	1991	Critical Structural Elements of The VP16 Transcriptional Activation Domain	Triezenberg

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Benbow, Laurence	MS	1991	Isolation And Characterization of Extensins From The Non-Graminaceous Monocot, Asparagus	Lamport
Betancourt, Monica	MS	1991	Characterization of A Common Antigen Lipopoly-saccharide From *Pseudomonas aeruginosa* AK1401	McGroarty
Chen, Ruey-Hwa	PhD	1991	Effect of Strand-Specific Excision Repair On The Spectra of Mutations induced By Benzo[A]Pyrene-Diol Epoxide And Ultraviolet Radiation in Diploid Human Cells	Maher
Cheng, Liang	MS	1991	Isolation And Characterization of Pectic Polysaccharides From *Lemma minor*	Kindel
Garvy, Beth	PhD	1991	Alteration of Murine Bone Marrow B-Cell Development And Function By Physiological Concentrations of Glucocorticoids: A Role For Programmed Cell Death	Fraker
Hiser, Carrie	PhD	1991	Molecular And Developmental Aspects of Respiratory Complexes in Higher Plant Mitochondria	McIntosh
Lu, Hui-Jane	MS	1991	An Approach To Probe The Glucose-6-Phosphate Binding Site of Rat Brain Hexokinase By Photoaffinity Labeling	Wilson
Mathupala, Saroj	PhD	1991	Biochemical Characterization of Amylopullulanase From *Clostridium thermohydrosulfuricum* 39E	Zeikus
Meiners, Sally Ann	PhD	1991	Characterization of Gap Junction-Like Polypeptides In Plant Cells	Schindler
Melkerson-Watson, Lyla	PhD	1991	Studies On The Purification And Regulation of CMP-Sialic Acid: Lactosylceramide A2-3 Sialyltransferase	Sweeley
Morford, Gerald	PhD	1991	Status of Murine Resident Peritoneal Macrophage Antigen Presentation And Microbicidal Capacity After Dietary Zinc Deprivation Or Chronic Treatment With Physiological	Fraker

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Olson, Matthew	PhD	1991	3'-5' Exonuclease In Drosophila Mitochondrial DNA Polymerase: Kinetic And Mechanistic Studies	L. Kaguni
Semancik, Monica	MS	1991	C-Signal Dependent Developmental Gene Expression in *Myxococcus xanthus*	Kroos
Smith, Allen	PhD	1991	Structure-Function Relationships in Rat Brain Hexokinase: A Study Using Monoclonal Antibodies	Wilson
Todd, Matthew	PhD	1991	Active Site Studies On *Klebsiella aerogenes* Urease, A Nickel- Containing Enzyme	Hausinger
Yao, Eveline	MS	1991	Characterization of The Interaction of TCDD: Ah Receptor Complexes With A Dioxin-Responsive Transcriptional Enhancer	Denison
Agrwal, Neera	PhD	1992	Carbohydrate Binding Protein 35: In Vivo And In Vitro Expression Properties of The Polypeptides	Wang
Beconi-Barker, Maria	PhD	1992	Role of Rhizobium Cell Surface Carbohydrates in Infection	Hollingsworth
Beltran del Rio, Hector	PhD	1992	The Role of Hexokinase in The Regulation of Glucose Metabolism in Rat Brain	Wilson
Laing, James	PhD	1992	Characterization of A Nuclear Carbohydrate-Binding Protein 35 Ribonucleoprotein Complex	Wang
Lill-Elghanian, Deb	PhD	1992	Dissection of Endotoxin Biological Activities Using Variant Lipid A And Synthetic Antagonists	Hollingsworth
Meeley, Robert	PhD	1992	A Biochemical Basis For Heritable Resistance of Maize To The Fungal Pathogen *Cochliobolus carbonum*	McIntosh

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Peiffer, Wendy	PhD	1992	Volume 1: Assessment of The Role of Plant Mitochondrial Respiratory Complexes in Cytoplasmic Male Sterility And Volume 2: Structural Analysis of Plant Cytochrome C Oxidase	Ferguson-Miller
Rhoads, David	PhD	1992	Developmental And Salicylic Acid Regulated Expression of The Alternative Oxidase of Higher Plants	McIntosh
Thelen, Annette	PhD	1992	Type II Hexokinase: Molecular Cloning, Sequence,And Promoter Analysis	Wilson
Economides, Aristides	PhD	1993	Recombinant Nucleases As Probes For DNA Conformation In Vitro And In Vivo	Panayotatos MBI
Black, Todd	PhD	1993	Analysis of Pattern Formation In The Heterocyst-Forming Filamentous *Cyanobacterium anabaena* Sp. Pcc 7120	Wolk Plant Biology
Burdette, Douglas	MS	1993	Biochemistry of Ethanol Fermentation By *Thermoanaerobacter ethanolicus*	Zeikus
Chavez, David	MS	1993	Purification of The Human Basal Transcription Factor TFIIE Produced In Bacteria	Burton
Jung, Seunho	PhD	1993	A Structural And Computational Analysis of Molecular Mechanisms For Membrane Adaptation To Extreme Stress	Hollingsworth
Leipprandt, Jeffrey	MS	1993	Studies of cGMP Phosphodiesterase And Phosphoinositide-Specific Phospholipases C in Bovine Retinal Rod Outer Segment	McConnell
Regier, Jeffrey	PhD	1993	Site-Specific And Random Mutagenesis Studies of The VP16 Transcriptional Activation Domain	Triezenberg
Shi, Ping	PhD	1993	Ca++ Mobilization Induced By Prostaglandin E2 In Rabbit Collecting Tubule Cells And Swiss 3T3 Cells	Smith

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Shyong, Bao-Jen	MS	1993	Sialic Acid Analogues And Their Biological Application	Hollingsworth
Sinton, Mark	PhD	1993	Activator Protein And RNA Polymerase When They Interact With Promoter DNA	Revzin
Todt, Jill	PhD	1993	The Effect of Environmental Factors On The Function And Structure of Porins From *Escherichia coli* K-12	McGroarty
Wiesner, Douglas	PhD	1993	Serum Gangliosides: Analytical Methods And Analysis of Sera From Breast Cancer Patients	Sweeley
Carr, Kevin	MS	1994	Effects of Isolated Missense Mutations From The DNAa5 And DNAa46 Alleles In Initiation of *Escherichia coli* oriC Replication	J. Kaguni
Charng, Yee-yung	PhD	1994	Structure-Function Study On Allosteric Regulation of ADP-Glucose Pyrophosphorylase From *Cyangobacterium anabaena* PCC 7210	Preiss
Halberg, Richard	PhD	1994	Characterization of The Role of The Spoiiid Switch Protein During *Bacillus subtilis* Sporulation	Kroos
Lewis, David	PhD	1994	A + T Regulatory Region of The *Drosophila melanogaster* Mitochondrial Genome: Organization, Evolution And Protein:DNA Interactions	L. Kaguni
Loh, John	PhD	1994	Carbohydrate Binding Activities of *Bradyrhizobium japonicum*: Localization And Expression of The Lectin BJ38	Wang
Lu, Sijie	PhD	1994	Processing of A Mother-Cell-Specific Sigma Factor During Development of *Bacillus subtilis*	Kroos

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Ortquist, Lisa	MS	1994	Evidence From The Frequency And Spectrum of Mutations That Human Fibroblasts Can Remove Potentially Mutagenic Lesions Induced By N-Ethyl-N-Nitrosources Using Nucleotide Excision Repair O-6 Alkylguanine-DNA Alkyltransferase Or Both Kinds of Repair	Maher
Otto, James	PhD	1994	Examination of The N-Glycosylation And Membrane Association of The Prostaglandin Endoperoxide Synthase Isozymes	DeWitt
Schwab, David	PhD	1994	The Cloning of cDNAs Coding For Types I And III Rat Brain Hexokinases And Sequence Comparisons To Other Hexokinases	Wilson
VonTom, Andrea	PhD	1994	Processivity of Mitochondrial DNA Polymerase From Drosophila Embryos: Effects of Reaction Conditions, DNA-Binding Proteins, And Enzyme Purity	L. Kaguni
Wang, Bo Qing	PhD	1994	Production And Functional Study of Human RNA Ploymerase Ii General Transcription Factor Rap74	Burton
Berube, Luc	PhD	1995	Studies On The Dynamics of Lipid Alkyl Chains In Biological Membranes Subjected To Environmental Stress	Hollingsworth
Chang, Chun-hsiang	PhD	1995	Functions of Transcription Factor IIF In Initiation And Elongation By RNA Polymerase	Burton
Fetter, John	PhD	1995	Search For Residues Critical To Proton Pumping In Cytochrome C Oxidase	Ferguson-Miller

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Hsi, Linda	PhD	1995	Mechanistic And Functional Studies Involving The Active-Sites of Prostaglandin Endoperoxide H Synthase-1 And -2	Smith
Regier, Martha Kay	PhD	1995	Subcellular Localization of PGH Synthase -1 And -2 And Cytosolic Phospholipase A	Smith
Shen, Fan	PhD	1995	Mutational And Fluorescences Studies of The VP16 Transcriptional Activation Domain	Triezenberg
Wang, Sung Yuan	PhD	1995	Evidence For An Association Between Splicing Components: Galectin-3 And Polypeptide(S) of snRNP	Wang
Bariola, Pauline	PhD	1996	The RNS Family of S-Like Ribonucleases of *Arabidopsis thaliana*: Structures, Expression And Function	Green
Burdette, Douglas	PhD	1996	*Thermoanaerobacter ethanolicus* 30E Secondary Alcohol Dehydrogenase: Molecular Basis For Stability And Catalysis	Zeikus
Cedergren, Robert	PhD	1996	Investigations of The Molecular Mechanisms For Host Specificity And Infection in The Rhizobium/Legume Symbiosis	Hollingsworth
Chen, Rujin	PhD	1996	Structure, Function, And Regulation of Early Nodulin ENOD2 Genes From Legume Plants	Green
Cheng, Liang	PhD	1996	Isolation And Characterization of 22ºC Chelator-Soluble Pectic Polysaccharides of *Lemna minor*	Kindel
Fang, Shi-Min	PhD	1996	Mutagenic Analysis of Human RAP30, The Small Unit of General Transcription Factor Tfiie	Burton

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Hollenbeck-Petersen, Cynthia	PhD	1996	Molecular Biochemistry of *Thermoanaerobacter ethanolicus* 39E Amylopullulanase: Analysis of Substrate Cleavage Specificity And Thermophilicity By Site-Directed And Deletion Mutagenesis	Zeikus
Howard, Christie	PhD	1996	Identification and Characterization of Ribonucleases in *Arabidopsis thaliana*	Green
Kraemer, Stacey	PhD	1996	The Transcriptional Regulation of Prostaglandin Endoperoxide Synthases-1 And -2 By 2,3,7,8-Tetrachlorodibenzo-P-Dioxin	Dewitt
Krishnaswamy, Rajashree	MS	1996	Studies On The Role of Protein Disulfide Reaction I in The Prolyl 4 Hydroxylase Reaction	Wells
Moncrief, Mary	PhD	1996	Urease Metallocenter Assembly in *Klebsiella aerogenes*	Hausinger
Pichyankura, Rath	PhD	1996	The Effect of Deletion Mutations of The Activation Domain of VP16 Upon Herpes Simplex Virus Type I Lytic Infection	Triezenberg
Reiser, Stephen	PhD	1996	Genetic Analysis of Wax Ester And Triacyglycerol Biosynthesis in *Acinetobacter calcoaceticus* Strain BD413	Green
Sutton, Mark	PhD	1996	Mutants of The *E. coli* DNAa Gene: Genetic And Biochemical Analysis of Its Replication Activity	J. Kaguni
Tsai, Henry	PhD	1996	Functional Organization And Evolution of Mammalian Hexokinases	Wilson
Vyakarnam, Anandita	PhD	1996	Galectin-1 in The Cell Nucleus: Evidence For A Role in Pre-mRNA Splicing	Wang
White, Rhonda	PhD	1996	Cytokinin And Nitrate Regulation of Nitrate Reductase in *Agrostemma githago*	Green

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Zhang, Wenge	MS	1996	Epitope Mapping And Functional Analysis of Monoclonal Antibodies To DNAa Protein	J. Kaguni
Dou, Chun-zhi	MS	1997	The Function And Mechanism of Ascorbic Acid In The Release of Insulin From Scorbutic Guinea Pig Pancreatic Islets	Wells
Farr, Carol	MS	1997	Drosophila Pol Y And Its Recombinant Catalytic And Accessory Subunits: Effects of Reaction Conditions And Drosophila Mitochondrial Single-Stranded-Binding Protein	L. Kaguni
Hummel, Bernard	PhD	1997	Examination of The Role of Membrane Dynamics And Order In Potentiating The Physiological Effects of Lipopolysaccharides	Hollingsworth
Jones, Joy	MS	1997	Cloning, Sequencing, And Expression of Two Bovine Retinal Isoforms of 14-3-3 Protein Which Copurify With A Phophoinositide-Specific Phospholipase C	McConnell
Li, Bing	MS	1997	Molecular Cloning of Maize Endosperm Soluble Starch Synthase 1	Preiss
Liu, Wenjing	PhD	1997	Identification And Characterization of The Promoter Regions of The Gene For Rat Type I Hexokinase	Wilson
Margulies, Carla	PhD	1997	The Influence of IHF And FIS On The Binding of DNAa Protein In oriC, The *E. coli* Chromosomal Origin	J. Kaguni
McManus, Terry	MS	1997	Plan B Masters Degree	Maher
Sheng, Jun	PhD	1997	The Allosteric Regulation Sites of ADP-Glucose Pyprophosphorylase From *Cyanobacterium anabaena* PCC 7120	Preiss
Tang, Yin	PhD	1997	The Roles of Rhizobial Surface And Membrane Components In Symbiosis	Hollingsworth

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Tsay, Yeou-Guang	PhD	1997	Nuclear Export of A Pre-mRNA Splicing Factor,Galectin-3	Wilson
Vicente, Matias	PhD	1997	Proteins That Interact With *E. coli* DNAa Protein And Modulation of Chromosomal DNA Replication	J. Kaguni
Wang, Jianjun	PhD	1997	Characterization of Biochemical Elements Important For Host-Pathogen Interaction In The Rhizobium-Legume System: A Paradigm For Infection	Hollingsworth
Zhang, Bin	PhD	1997	Developmental Gene Expression Regulated By A Cascade of Sigma Factors in *Bacillus subtilis*	Kroos
Meyer, Elizabeta Borer	PhD	1998	Increased Multidrug Resistance In Adiramycin Sensitive mcf-7 Breast Tumor Cells Overexpressing Human Placental Thioltransferase	Wells
Arnoys, Eric	PhD	1998	The Use of Optical Displacemnt Microviscometry (ODM) And Reconstituted Model Systems To Measure Aluminum Induced Changes In The Organization And Viscosity of Actin	Schindler
Arthur, Karen	MS	1998	Plan B Masters Degree	DeWitt
Boley, Scott	PhD	1998	Mechanisms of Malignant Transformation of Human Fibroblasts By Methylnitrosourea	Maher
Fu, Yingbin	PhD	1998	Glucose-1-Phosphate Site And Reductive Activation Mechanism of Potato Tuber ADP-Glucose Pyrophosphorylase	Preiss
Lei, Lei	PhD	1998	Functional Dissection of Human RAP74 In Transcriptional Initiation, Elongation, And Recycling	Burton
Qian, Jie	PhD	1998	Study of The Electron Transfer And Proton Pump Ion Mechanisms in Cytochrome Oxidase	Ferguson-Miller

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Ren, Bing	PhD	1998	Involvement of Peroxisome Proliferator Activated Receptor (alpha) In Polyunsaturated Fatty Acid Regulation of Hepatic S14 Gene Transcription	Jump
Roundtree, John	MS	1998	An investigation of The Structural Components involved in The Mechanism of The pH induced Switch in The Channel Size of OmpF Porin From *E. coli* K-12	McGroarty
Saari, Ruth	PhD	1998	Substrate Specificity And Spectroscopic Properties of 2,4-Dichlorophenoxyacetic Acid α-Ketoglutarate Dioxygenase	Hausinger
Spencer, Andrew	PhD	1998	Subcellular Localization And Membrane Association of The Aspirin Targets, Prostaglandin Endoperoxide H Synthases-1 And -2	Smith
Sullivan, Susan	PhD	1998	Mutational And Fluorescence Analysis of A Transcriptional Activation Domain of The VP16 Protein of Herpes Simplex Virus	Triezenberg
Wang, Lincong	PhD	1998	Biochemical And NMR Studies of Human Cellular Retinoic Acid Binding Proteins	Yan
Washburn, Michael	PhD	1998	Characterization of The Catalytic Mechanism of Thioltranferase Toward The Non-Disulfide Substrates, Dehydroascorbic Acid And Alloxan: The Potential To Protect And The Potential To Harm	Wells
Wilkins (Mindock), Carol	PhD	1998	General Principles of Membrane Functions In Adaptation And Adptability of Bacteria To Extreme Environments	Hollingsworth
Zhen, Yuejun	PhD	1998	The Role of Subunit II in Cytochrome C Oxidase On Cytochrome C Binding And Electron Transfer	Ferguson-Miller
Gao, Jinhai	MS	1999	NMR Studies of Human Annexin I And Yeast Guanylate Kinase	Yan

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Horn, Peter	PhD	1999	Structural And Functional Comparison of The Transcriptional Activating Domains of VP16 And RELA	Triezenberg
Kadrofske, Mark	PhD	1999	Galectin-3: Gene Structure, Regulation of Expression And Subcellular Localization	Wang
Reimers, Stephan	MS	1999	Interactions of TFIIF in The Preinitiation Complex	Burton
Rieke, Jill	MS	1999	Studies Involving The Cyclooxygenase Active Sites of Prostaglandin Endoperoxide H Synthase-1 And -2	Smith
Binderup, Kim	PhD	2000	Structural Analysis of Branching Enzymes And ADP-Glucose Pyrophosphorylase	Preiss
Fan, Li	PhD	2000	Homology Modeling of The Accessory Subunit of Drosophila Mitochondrial DNA Polymerase And Subunit Interaction Studies	L. Kaguni
Ichikawa, Hiroshi	PhD	2000	Transcriptional Regularion of Genes Encoding Spore Coat Proteins By Mother-Cell Specific Sigma-K RNA Polymerase During Sporulation	Kroos
Laakko Train, Tonya	PhD	2000	The Negative Effect of Corticosterone On Murine Bone Marrow B Lymphocytes: Modulation By IL-7 And Stromal Cells	Fraker
Lakkides, Karen	MS	2000	Characterization of Several Cyclooxygenase Active Site Mutants of Ovine Prostaglandin H Synthase-1	Smith
Mao, Yifan	PhD	2000	Analysis of A Transcriptional Repressor in *Drosophila melanogaster*	Arnosti
Thuresson, Elizabeth	PhD	2000	Substrate interactions in The Cyclooxygenase Site of Ovine Prostaglandin Endoperoxide H Synthase-1	Smith
Tonukari, Nyerhovwo John	PhD	2000	The Role of The Cell Wall Degrading Enzymes *Cochliobolus carbonum* Pathogenicity	Green

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Franklin, Prashanti-Bachu	MS	2001	Plan B Masters Degree	DeWitt
Frueaf, Jeremiah	PhD	2001	From Regulation To Catalysis: A Study of The ADP-Glucose Pyrophosphorylase Enzyme	Preiss
Hao, Tong	PhD	2001	Characterization of Regulatory Mechanisms of Cell-Cell Interaction-Dependent Genes of *Myxococcus xanthus*	Kroos
Kastenmayer, James	PhD	2001	The Xrn-Family of 5'-3' Exoribonucleases in *Arabidopsis thaliana*	Green
Li, Su-Yin	MS	2001	Studies On The Nuclear Repeat Signal of Galectin-3	Wang
Liang, Hongyan	PhD	2001	Role of Hepatocyte Growth Factor And Its Receptor met In The Malignant Transformtion of Human Fibroblasts	McCormick
Matthews, Jason	PhD	2001	Molecular Basis of Estrogenic Endocrine Disruptor-Estrogen Receptor Interactions: A Comparison Among Species	Zacharewski
Sanschagrin, Paul	PhD	2001	Computational Techniques For Modeling Protein-Ligand Interactions And Their Application To Serine Proteases And Asparaginyl-TRNA Synthetase	Kuhn
Theisen, Michael	PhD	2001	Crystallographic Studies of Lipid Metabolism Proteins: The Enzymes SQD1 And PGHS-1	Garavito
Vacratis, Panayiotis Orestes	PhD	2001	Molecular Mechanisms Regulating The Mixed Lineage Kinase MLK3	Gallo
Varma, Hemant	PhD	2001	The Role of Retinoblastoma Protein And Insulin Like Growth Factor Signaling In Antiestrogen Resistance	Conrad Genetics
Venkataraman, Sridhar	PhD	2001	Vacuolar Transport of ctVSS-bearing Proteins: A Genetic Approach	Raikhel

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Yang, Yi	MS	2001	Study of Methionine S-Methyl Transferase And S-Methyl Methionine Cycle	Gage
Dao, Kim-Hien	PhD	2002	The Role of The Two RHO GTPases, CDC42 And RAC1, in The Malignant Transformation of Human Fibroblasts	McCormick
Fielden, Mark	PhD	2002	Reproductive And Genomic Effects of Gestational And Lactational Exposure To Estrogenic Endocrine Disruptors	Zacharewski
Hespenheide, Brandon	PhD	2002	An Analysis of Protein Folding By Decoding The Hierarchy of Native-State Structural Interactions	Kuhn/Thorpe
Hicks, Wayne	PhD	2002	The Biosynthesis of Dimethylsulfoniopropionate (MDSP) in Marine Dinoflagellates	Gage
Kilanowski-Doroh, Philip Otto	MS	2002	Plan B Masters Degree	McCormick
Rader, Andrew J	PhD	2002	Protein Rigidity And Flexibility: Applications To Folding And Thermostability	Kuhn/Thorpe
Yang, Jun	MS	2002	Electron Transfer in Cytochrome C Oxidase: Cytochrome C Docking & Electron/Proton Coupling	Ferguson-Miller
Chao, Mary	MS	2003	The Rgulation of The Mixed Lineage Kinase 3 By Subcellular Localiztion	Gallo
Fertuck, Kirsten	PhD	2003	In Vitro And In Vivo Evaluation of The Potential Estrogenic Effects of Polycyclic Aromatic Hydrocarbons	Zacharewski
Gutierrez, Rodrigo	PhD	2003	Inherent And Regulated mRNA Stability in *A. thaliana*	Green
Kulkarni, Meghana	PhD	2003	The Function And Design of CIS-Acting Enhancer Elements Regulated By Short-Range Transcriptional Repressors: Grammar Studies From *Drosophila melanogaster*	Arnosti

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Mirafzali, Zahra	PhD	2003	Examination of The Membrane Binding Domain of Human Cyclooxygenase-2 Enzyme Using Site Directed Spin Labeling And Electron Paramagnetic Resonance Spectroscopy	DeWitt/McCracken
Ottosen, Soren	PhD	2003	Phosphorylation of The Transcriptional Activator VP16 During Lytic Infection By Herpes Simplex Type 1	Triezenberg
Schmidt, Bryan	PhD	2003	Proton And Water Exit in Cytochrome C Oxidase	Ferguson-Miller Babcock
Simmons, Lyle	PhD	2003	Regulation of Chromosomal Replication in *E. coli*: I. Function of N-Terminal Domain in DNAa Oligomer Formation. II. Biochemical And Genetic Studies of Hyperactive Cells	J. Kaguni
Zavodszky, Maria	PhD	2003	Modeling Flexibility in Protein-Ligand Recognition	Kuhn
Riekhof, Wayne	PhD	2004	Lipid Metabolism Under Nutrient Stress in Rhodobacter And Chlamydomonas	Benning
Herrera, Francisco	PhD	2004	VP16-Dependent Association of Chromatin-Modifying Coactivators And Under-Representation of Histones At Ie Gene Promoters During Hsv-1 Infection	Triezenberg
Lou, Zhenjun	PhD	2004	Role of Overexpression of The Sp1 And Sp3 Transcription Factors in The Malignant Transformation of Human Fibroblasts	McCormick
Struffi, Paolo	PhD	2004	Transcriptional Repression Mediated By The Drosophila Knirps Protein: Contributions of CtBP And RPD3	Arnosti
Yu, Bin	PhD	2004	Chloroplast Anionic Lipid Biosynthesis And Function	Benning
Codrea, Felicia	MS	2005	Implementation And Evaluation of A Molecular Strategy For Delivery of Nucleic Acid Based Therapeutics	Hollingsworth

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Boverhof, Farrell	PhD	2005	In Vivo Examination of The Inhibitory Effects of 2,3,7,8-Tetrachlorodibenzo-P-Dioxin On Estrogen-Mediated Gene Expression Responses	Zacharewski
Gridasova, Anastasia	PhD	2005	Regulation of Human Small Nuclear RNA Gene Transcription By The Tumor Suppressor Protein P53	Henry
Gu, Liping	PhD	2005	Regulation of Human Small Nuclear RNA Gene Transcription By The Oncogenic Protein Kinase CK2	Henry
Harman, Christine	PhD	2005	A Crystallographic Investigation of Ligand Binding To Ovine Prostaglandin Endoperoxide H Synthase-1	Smith/Garavito
Mingler, Melissa	MS	2005	Isolation And Characterization of *Tryypansoma brucei* PPR Proteins, Putative Mitochondrial RNA Metabolism Proteins	Koslowsky Microbiology and Molecular Genetics
Qin, Ling	PhD	2005	X-Ray Crystallographic Studies of Cytochrome C Oxidase From *Rhodobacter sphaeroides*	Ferguson-Miller
Schilmiller, Anthony	PhD	2005	Biochemical And Physiological Studies On Plant Oxylipins	Howe
Webb, Nicole	PhD	2005	Structural And Functional Studies of The Enzymes Involved In A Bacterial GDP-D-Rhamnose Biosynthetic Pathway	Garavito
Almy, David	MS	2006	Analysis of Gcn5 Function in His3 Expression in *Saccharomyces cerevisiae*	Kuo
Bejar, Clarisa	PhD	2006	Structure Function Relationship Studies of *Escherichia coli* ADP-Glucose Pyrophosphorylase	Preiss
Gray, Richard	PhD	2006	Galectin-1, Galectin-3, And TFII-I in Pre-mRNA Splicing	Wang

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Lito, Piro	PhD	2006	The Role of Sprouty-2 in The Malignant Transformation of Human Fibroblasts By H-RAS Oncogene	McCormick
Schachter, Karen	PhD	2006	Dynamic Regulation of Mixed-Lineage Kinase 3 By C-Jun N Terminal Kinase-Mediated Phosphorylation	Gallo
Shooltz, Dean	PhD	2006	The Role of The VP16AD:TBP Interaction in Transcriptional Activation	Triezenberg
Tamot, Banita	MS	2006	Construction And Characterization of A Cardiolipin-Deficient Mutant in *Rhodobacter sphaeroides*	C. Benning
Wang, Yi	PhD	2006	Structure And Function Relationships of Dihyroneopterin Aldolases From *Eschericihia coli* And *Staphylococcus aureus*	Maher
Xu, Jinghua	PhD	2006	Glucose N-3 Polyunsaturated Fatty Acids And Peroxisome Proliferator Activated Recepter-[Alpha] Agonist Regulate Rat Liver Pyruvate Kinase Gene Transcription	Jump
Yao, Lishan	PhD	2006	The Dynamics of Enzymatic Reactions: Computational And Experimental Studies	Cukier Chemistry
Zhang, Jie	PhD	2006	By Participating in The TGF-[Beta]/Smad Signaling Pathway, LRP12 Regulates The Tumorigenicity of Human Fibrosarcoma-Derived Cell Line SHAC	McCormick
Ziebarth, Tawn	MS	2006	Modular Architecture And Dynamic Oligomeric Structure of The Human Mitochondrial Replicative DNA Helicase	L. Kaguni
Bray Speth, Elena	PhD	2007	Subcellular Localization And Function of The *Arabidopsis thaliana* Small GTPase RabE, A Host ineracting Protein of The *Pseudomans syringae* Virulence Effector Avrpto	Howe

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	Graduate		Degrees Awarded in Chronological Order	
Author	**Degree**	**Year**	**Thesis**	**Professor**
Cnudde, Sara	PhD	2007	The X-Ray Crystallographic Structures of The Angiogenis Inhibitor Angiostatin Bound To A Pepetide From The Groupa Stroptococcal Surface Protein PAM And The Metal-Bound Conantokins Con-G And Con-T (K7 Gamma)	Geiger Chemistry
Fong, Cora	PhD	2007	Tissue-Specific in Vitro And in Vivo Evaluation of Tamoxifen-Meciated Gene Expression	Zacharewski
Haudek, Kevin	PhD	2007	Characterization of Galectin-3-snRNP Complexes And Mechanism of Galectin Entry into The Splicing Pathway	Wang
Liou, Geou-Yarh	PhD	2007	Study of Tyrosine Kinase Like Protein Kinases: I. A Novel Role For Mixed-Lineage Kinase 3 In Mitochondria Through Its Interaction Protein, Adenine Nucleotide Translocase 2.; II. Characterization of Roc Domain of Parkinson's Disease-Associated Kinase, Leucine Rich Repeat Kinase 2.	Gallo
Liu, Jiayan	PhD	2007	Hydroperoxide Substrate Specificty, Cyclooxygenase Activation And Partnering Between The Two Monomers of Prostaglandin Endoperoxide H Synthase	Smith
Mbonye, Uri	PhD	2007	Structural And Catalytic Determinants of Intracellular Cyclooxygenase Protein Degradation	Smith
Sukuru, Sai Chelan	PhD	2007	Structure-Based Ligand Screening And Design For Aminoacyl-TRNA Synthetase Inhibitors	Kuhn
Tang, Hui-Yuan	PhD	2007	Role of C-Terminal 18 Amino Acids For The Biological Activity of Prostaglandin Endoperoxide H Synthase-2	DeWitt

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	Graduate	Degrees Awarded in Chronological Order		
Author	**Degree**	**Year**	**Thesis**	**Professor**
Ziegelmann-Fjeld Karla	PhD	2007	Molecular Design And Characterization of *Thermoanaerobacter ethanolicus* 39E Secondary Alcohol Dehydrogenase For Chiral Aromatic Alcohol Sythesis And Cofactor Specificity Change	Zeikus
Achberger, Susan	MS	2008	Analysis of Alkali Metal-Cationized Pharmaceuticals Using Electrospray Ionization Tandem Mass Spectrometry	Jones
Bates, Phillip	PhD	2008	Re-Examining The Initial Steps of Membrane And Storage Lipid Assembly In Pea Leaves And Soybean Embryos: The Dominant Flux of Newly Synthesized Fatty Acid Incorporation Into Extra-Plastid Glycerolipids Is Through Phosphatidlycholine Acyl Editing	Ohlrogge Plant Biology
Deng, Xiaomin	PhD	2008	Neutrophils And Idiosyncratic Adverse Drug Reactions Resulting From Inflamation-Drug Interaction: Rantidine And Diclofenac As Examples	LaPres
Doherty, Colleen	PhD	2008	Transcriptional Networks involved in Response To Low Temperature Stress in *Arabidopsis thaliana*	Keegstra
Frentzel, Joseph	PhD	2008	Disruption of Apoptotic Signaling Pathways During Glucocorticoid Induced Survival of Human Neutrophils	Fraker
Higginbotham, Kate	MS	2008	The Photorhabdus Temperata sspAB Locus Is Required For Symbiont Transmission in *Heterorhabditis bacteriophora*	Ciche Microbiology and Molecular Genetics
Johnson, James	PhD	2008	Analysis of Ribose Dynamics in RNA Molecules Utilizing C13 NMR Spin Relaxation Techniques Determined With Novel Specific Isotope Labeling Scheme	Hoogstraten

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Katsir, Leron	PhD	2008	Biochemical Characterization of The COI1-JAZ Receptor For Jazmonate	Howe
Kim, Joonyul	PhD	2008	Functional And Evolutionary Characterization of Arabidopsis Carotenoid Hydroxylases	DellaPenna
Kwekel, Joshua	PhD	2008	Cross-Species Comparison of Estrogenic Endocrine Disruptor-induced, Uterotrophic Gene Expression in The Rodent	Zacharewski
Moon, Woo	MS	2008	Pyrophosphate As A Dynamic Probe of The Human RNA Polymerase II Mechanism	Burton
Murillo, Alec	MS	2008	Novel DNAa Alleles of *Escherichia coli* That Are Hyperactive in Initiation of Chromosomal DNA Replication	J. Kaguni
Neal, (Apostal) Jessica	PhD	2008	The Role of Human Rev7, The Accessory Subunit of Human DNA Polymerase Zeta, In Cell Survival And DNA Damage Induced Mutageneesis	Maher
Olson, Bradley	PhD	2008	Biochemical Analysis of The Chloroplast Division Proteins FtsZ1 And FtsZ2	Osteryoung Plant Biology
Tew, Jason	MS	2008	The Nematode *Caenorhabditis elegans*: A Model Organism For Study of Methyl Mercury Toxicity	Atchison Pharmacology and Toxicology
Valenzuela, Soledad	PhD	2008	New Insights In The Urease Activation Process Obtained By Characterization of Apourease Complexes And The Ureg Accessory Protein of *Klebsiella aerogenes*	Hausinger
Xiong, Yalin	PhD	2008	Downstream of NTP Effects On Human RNA Polymerase II Transcription Elongation	Burton

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Xu, Shujuan	PhD	2008	EPR Studies of Electron And Proton Transfer in Cytochrome C Oxidase	McCracken Chemistry
Barkham, Trevor	PhD	2009	A Real Time Bacterial Cell Detection System	Hollingsworth
Carvallo-Pinto, Marcela	PhD	2009	Conservation of The Low Temperature Transcriptomes And CBF Regulons in Solanum Species And Arabidopsis	Keegstra
Chung, Hoo Sun	PhD	2009	Role of JAZ Proteins in The Regulation of JA Signaling in Arabidopsis	Howe
Decker-Alkawaas, Dima	PhD	2009	Cross-Inhibition Between P2X And nAChR Ligand-Gated Ion Channels In The Enteric Nervous System	Galligan Pharmacology and Toxicology
Green, Christopher	PhD	2009	Pancreatic Beta-Cell Fatty Acid Metabolism And Modulation of Function in Response To Glucolipotoxicity	Olson Physiology
Kim, Namjoon	PhD	2009	Proton Movement in Cytochrome C Oxidase of *Rhodobacter sphaeroides*	Ferguson-Miller
Lu, Binbin	PhD	2009	Functional Analysis of A Phosphatidic Acid Transporter in *Arabidopsis thaliana*	Benning
Phillips, Jennifer	PhD	2009	Identification of Genes Involved in Tumorigenesis That Are Deregulated, With An Emphasis On Altered DNA Methylation	Goodman Pharmacology and Toxicology
Singh, Vijay R.	PhD	2009	Experimental And Computational Investigation of Early Events In Protein Folding	Lapidus Wedemeyer
Moellering, Eric	PhD	2010	Regulation of Lipid Metabolism in Response to Environmental Stress in Plants and Algae	C. Benning
Lwande, Joel S.	PhD	2010	Understanding the Structure of YscF, the Type III Secretion Protein from Yersinia and How it Forms Pili	Wedemeyer

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Author	**Degree**	**Year**	**Thesis**	**Professor**
Ruckle, Michael E.	PhD	2010	The Integration of Light and Plastid Signals	Larkin
Dere, Edward	PhD	2010	Integration of Genome-wide Computation DRE Search, AhR Chip-Chip and Gene Expression Analyses of TCDD-elicted Responses in the Mouse Liver	Zacharewski
Simmons, Jana	PhD	2010	Characterization of Four Members of the Ferrous Ion and a-Ketoglutarate Dependent Hydroxylase Family from Trypanosoma brucei: Two Thymine Hydroxylast-like Proteins, J-binding Protein 1, and an AlkB Homolog	Hausinger
Lee, Chih-Shia	PhD	2010	Necessity and Sufficiency of Mitogen-activated Protein Kinase Kinase Signaling Pathways for Melanoma Cell Proliferation	Duesbery Van Andel Res. Inst
Tappenden, Dorothy	PhD	2010	Identification and Functional Characterization of the Aryl Hydrocarbon Receptor Protein Interaction Network	LaPres
Kopec, Anna	PhD	2010	Hepatic Toxicity and Polychlorinated Biphenyls: Toxicogenomic Examination of Single Congener and Mixture Effects in C57BL/6 Mice	Zacharewski
Luo, Jianjun	PhD	2010	investigating A Novel Function of Histone H3 in Mitotic Checkpoint Control in *Saccharomyces cerevisiae*	Kuo
Spotts, Susan	MS	2010	Molecular Mechanism for CD82 Suppression of HGF-Induced Met Activation and Invasion	Miranti Physiology

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Appendix 6.3

Recipients of MS and PhD degrees

Biochemistry
and
Biochemistry and Molecular Biology

in

Alphabetical Order

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Abbate, Joseph	PhD	1971	Rottman
Abbate, Mary	MS	1971	Tolbert
Achberger, Susan	MS	2008	Jones
Agrwal, Neera	PhD	1992	Wang
Akiyama, Yukio	MS	1979	Delmer
Almy, David	MS	2006	Kuo
Anderson, Donald E.	PhD	1969	Tolbert
Armstrong, Robert Lee	PhD	1966	Boezi
Arnoys, Eric	PhD	1998	Schindler
Arthur, Karen	MS	1998	DeWitt
Ashbaugh,William	MS	1987	Anderson
Aust, ann E.	PhD	1975	Suelter
Bariola, Pauline	PhD	1996	Green
Barkham, Trevor	PhD	2009	Hollingsworth
Barran, Leslie Rohit	PhD	1969	Wood
Bates, Paul	PhD	1985	Dodgson
Bates, Phillip	PhD	2008	Ohlrogge
Baum, Stephen W.	MS	1965	Evans
Baumann, Sandra Lee	MS	1969	Sweeley
Baxter, Jeffrey	PhD	1984	Suelter
Beconi-Barker, Maria	PhD	1992	Hollingsworth
Behnke, James	PhD	1973	Deal
Beitz, Donald C.	PhD	1967	Wood/Thomas
Bejar, Clarisa	PhD	2006	Preiss
Bell, Erin	PhD	1986	Mcintosh
Beltran del Rio, Hector	PhD	1992	Wilson

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Benbow, Laurence	MS	1991	Lamport
Bennett-Hershey, Vickie	PhD	1983	Suelter
Berry, Arnold J.	MS	1966	Suelter
Berube, Luc	PhD	1995	Hollingsworth
Betancourt, Monica	MS	1991	McGroarty
Bieber, Mark	PhD	1973	Sweeley
Binderup, Kim	PhD	2000	Preiss
Bishop, David	PhD	1976	Wood
Bissett, Donald L.	PhD	1975	Anderson
Black, Todd	PhD	1993	Wolk
Blakesley. Robert W.	PhD	1974	Boezi
Blatti, Stanley P.	PhD	1968	Deal
Blenis, John	PhD	1983	Hawkes/Wang
Blosser, James	PhD	1972	Wells
Boley, Scott	PhD	1998	Maher
Boverhof, Farrell	PhD	2005	Zacharewski
Boyer, Paul	PhD	1988	Dodgson
Brauker, James	PhD	1986	Wang
Bray Speth, Elena	PhD	2007	Howe
Bretthauer, Roger Keith	PhD	1961	Hansen
Brockman, Howard	PhD	1971	Wood
Broderick, Wanda	MS	1982	Aust
Brody, Mark S.	PhD	1977	Suelter
Brooks, Stephen	PhD	1986	Suelter
Browne, David	PhD	1990	Dodgson
Bruin, William J.	PhD	1969	Tolbert

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Brush, David	MS	1985	Dodgson
Buege, John A.	PhD	1976	Aust
Burczack, John	PhD	1984	Sweeley
Burdette, Douglas	PhD	1996	Zeikus
Burdette, Douglas	MS	1993	Zeikus
Burton, Louis E.	PhD	1976	Wells
Bynum, John	PhD	1972	Ronzio
Campbell Jr., John C. W.	MS	1977	Suelter
Camper, Sally Ann	PhD	1983	Rottman
Cao, Jianli	PhD	1990	Ferguson-Miller
Carlson, Don Marvin	PhD	1961	Hansen
Carlson, Thomas	MS	1982	Suelter
Carlson, Todd	PhD	1986	Chelm
Carr, Kevin	MS	1994	J. Kaguni
Carvallo-Pinto, Marcela	PhD	2009	Keegstra
Casjens, Sherwood Reid	MS	1967	Morris
Cedergren, Robert	PhD	1996	Hollingsworth
Ceglarek, John	MS	1987	Revzin
Chaney, Linda C.	MS	1975	Aust
Chaney, William G.	PhD	1979	Morris
Chang, Chun-hsiang	PhD	1995	Burton
Chang, Wei-Hsien	PhD	1967	Tolbert
Chao, Mary	MS	2003	Gallo
Charng, Yee-yung	PhD	1994	Preiss
Chasin, Mark	PhD	1967	Deal
Chavez, David	MS	1993	Burton

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Chen, Chun-Nan	PhD	1987	Davis
Chen, Ruey-Hwa	PhD	1991	Maher
Chen, Rujin	PhD	1996	Green
Cheng, Liang	MS	1991	Kindel
Cheng, Liang	PhD	1996	Kindel
Chern, Ching Jer	PhD	1970	Morris
Cherniack, Judith	PhD	1985	Filner
Chia, Catherine	PhD	1985	Arntzen
Chou, Albert Chung-Ho	PhD	1973	Wilson
Christeller, John T.	PhD	1974	Tolbert
Christensen, Alan H.	PhD	1983	Schubert
Chung, Hoo Sun	PhD	2009	Howe
Clark, Edward	PhD	1985	Barker Sweeley
Clarke, Peter	PhD	1981	Bieber
Cnudde, Sara	PhD	2007	Geiger
Codrea, Felicia	MS	2004	Hollingsworth
Coffin, Claude	MS	1981	Rottman
Coker, George	PhD	1982	Schubert
Collins, Christine	PhD	1983	Wells
Cook, Douglas I.	MS	1977	Wood
Cook-Mills, Joan	PhD	1987	Fraker
Cowles, Elizabeth	PhD	1990	Wang
Cress, Andrea	MS	1989	Fraker
Cress, William	PhD	1989	Triezenberg
DaGue, Beverly B.	MS	1977	Ronzio

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Dahms, A. Stephen	PhD	1969	Anderson
Dannan, Ghazi	MS	1978	Aust
Dannan, Ghazi	PhD	1981	Aust
Dao, Kim-Hien	PhD	2002	McCormick
Darr, Sylvia	PhD	1985	Arntzen
Dean, Kenneth J.	MS	1975	Sweeley
Dean, Kenneth J.	PhD	1978	Sweeley
Decker-Alkawaas, Dima	PhD	2009	Galligan
DeFazio, Karen	MS	1968	Hansen
Deng, Xiaomin	PhD	2008	LaPres
DePasquale-Jardieu, Paula	MS	1980	Fraker
Dere, Edward	PhD	2010	Zacharewski
Desrosiers, Ronald C.	PhD	1975	Rottman
Deupree, Jean Duley	PhD	1970	Wood
DeWitt, David	PhD	1982	Smith
Dietrich, Stephen	MS	1987	Tolbert
Doherty, Colleen	PhD	2008	Keegstra
Domoradzki, Jeanne	PhD	1985	Maher
Donaldson, Robert	PhD	1971	Tolbert
Dou, Chun-zhi	MS	1997	Wells
Dunlap, Brian	PhD	1971	Rottman
Economides, Aries	PhD	1992	Panayotatos
Emaus, Ronald	PhD	1982	Bieber
Evins, Warren	PhD	1970	Varner
Fan, Li	PhD	2000	L. Kaguni
Fang, Shi-Min	PhD	1996	Burton

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Farr, Carol	MS	1997	L. Kaguni
Farrell, Shawn	PhD	1984	Bieber
Fathipour, Amir	MS	1966	Sell
Federspiel, Mark	PhD	1987	Dodgson
Felgner, Philip L.	MS	1975	Wilson
Felgner, Philip L.	PhD	1978	Wilson
Feliss, Norbert	MS	1971	Suelter
Fertuck, Kirsten	PhD	2003	Zacharewski
Fetter, John	PhD	1995	Ferguson-Miller
Fielden, Mark	PhD	2002	Zacharewski
Filner, Diana	MS	1973	Rottman
Fink, Patricia	MS	1982	Rottman
Fiol, Carol	PhD	1986	Bieber
Fleeker, James R.	PhD	1965	Byerrum
Fong, Cora	PhD	2007	Zacharewski
Franklin, Prashanti-Bachu	MS	2001	DeWitt
Franklin, Robert Louis	PhD	1967	Sell
Frentzel, Joseph	PhD	2008	Fraker
Friderici, Karen	PhD	1988	Rottman
Friderici, Karen H.	MS	1974	Rottman
Frueaf, Jeremiah	PhD	2001	Preiss
Fu, Yingbin	PhD	1998	Preiss
Fuchs, Morton S.	PhD	1967	Fox
Fung, Yuen-Kia	PhD	1981	Kung
Gan, Zhong-Ru	PhD	1987	Wells
Gao, Jinhai	MS	1999	Yan

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Garcia-Perez, Arlyn	PhD	1984	Smith
Garner, Mark	PhD	1983	Revzin
Garvy, Beth	PhD	1991	Fraker
Gates, Stephen C.	PhD	1977	Sweeley
Gawarecki, Patricia A.	MS	1966	Evans
Gehm, Barry	PhD	1988	McConnell
Gerald, Cary F.	PhD	1972	Boezi
Gibbons, Joseph	MS	1988	Fraker
Ginzburg, Irith	MS	1968	Zimmerman
Granett, Sandra	PhD	1972	Wells
anett, Sandra Elizabeth Spie	MS	1970	Wells
Gray, Richard	PhD	2006	Wang
Green, Christopher	PhD	2009	Olson
Gregory, Linda	PhD	1988	Ferguson-Miller
Grenier, Frank	PhD	1981	Smith
Gridasova, Anastasia	PhD	2005	Henry
Gu, Liping	PhD	2005	Henry
Gustine, David L.	PhD	1969	Kindel
Gutierrez, Rodrigo	PhD	2003	Green
Haas, Suzanne M.	MS	1977	Fraker
Hageman, Thomas	MS	1971	Sell
Halberg, Richard	PhD	1994	Kroos
Hamann, Kimberly	MS	1990	Wang
Hanks, Joanna	PhD	1982	Tolbert
Hanson, Douglas M.	PhD	1968	Fairley
Hanson, Thomas Earl	PhD	1969	Anderson

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Hao, Tong	PhD	2001	Kroos
Harman, Christine	PhD	2005	Smith/Garavito
Hart, David A.	PhD	1969	Kindel
Haudek, Kevin	PhD	2007	Wang
Hauswald, Charles	MS	1980	Anderson
Haviland, Randolph T.	MS	1970	Bieber
Heimer, Yair	PhD	1970	Filner
Hemphill, Delbert	PhD	1971	Sell
Hemphill, Rosa Maria	MS	1971	Suelter
Hengesh, Edmund	MS	1969	Morris
Hengesh, Edmund	PhD	1971	Morris
Herrera, Francisco	PhD	2004	Triezenberg
Hershey, Howard	PhD	1981	Morris
Hespenheide, Brandon	PhD	2002	Kuhn
Hess, John L.	PhD	1966	Tolbert
Hicks, Wayne	PhD	2002	Gage
Higginbotham, Kate	MS	2008	Ciche
Hildebrandt, Kim	MS	1982	Bieber/Fraker
Hildenbrandt, George	PhD	1971	Bieber
Hiles, Richard	PhD	1970	Byerrum
Hiser, Carrie	PhD	1991	Mcintosh
Ho, Berlin H.	PhD	1974	Tolbert
Ho, Tuan-hua D.	PhD	1976	Varner
Hochman, Jerome	PhD	1984	Ferguson-Miller
Holleman, William H.	PhD	1966	Deal
Hollenbeck-Petersen, Cynthi	PhD	1996	Zeikus

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Horn, Peter	PhD	1999	Triezenberg
Howard, Christie	PhD	1996	Green
Hsi, Linda	PhD	1995	Smith
Hsia, Min-Gee	MS	1968	Sell
Hsu, Yen-Ming	PhD	1985	Wang
Hummel, Bernard	PhD	1997	Hollingsworth
Hunsley, James	MS	1966	Suelter
Hunsley, James	PhD	1970	Suelter
Hupp, Theodore	PhD	1990	J. Kaguni
Hurlin, Peter	PhD	1988	McCormick
Husic, Diane White	PhD	1986	Tolbert
Husic, Harold David	PhD	1982	Suelter
Huslig, Richard L.	MS	1979	Smith
Hwang, Deog Su	PhD	1988	Kaguni J
Ichikawa, Hiroshi	PhD	2000	Kroos
Ingram, Jordan M.	PhD	1965	Wood
Ito, Moriko	PhD	1990	Conrad
Jackanicz, Theodore M.	PhD	1965	Byerrum
Jagger, Richard	MS	1968	Fairley
Jagger, Richard	PhD	1971	Fairley
Jia, Shizhe	PhD	1991	Wang
Johnson, George Samuel	PhD	1969	Deal
Johnson, James	PhD	2008	Hoogstraten
Johnson, James C.	MS	1967	Boezi
Jolly, James F.	PhD	1976	Boezi
Jones, Joy	MS	1997	McConnell

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Josef, Nancy A.	MS	1978	Wells
June, David S.	PhD	1979	Suelter
Jung, Seunho	PhD	1993	Hollingsworth
Kadrofske, Mark	PhD	1999	Wang
Kaehler, Marian M.	PhD	1978	Rottman
Kakade, Madhusudan L.	PhD	1964	Evans
Kamel, Mamdouh Yehia	PhD	1965	Anderson
Kastenmayer, James	PhD	2001	Green
Katsir, Leron	PhD	2008	Howe
Kayne, Fredrick J.	PhD	1966	Suelter
Kieliszewski, Marcia	PhD	1989	Lamport
Kilanowski-Doroh, Philip Otto	MS	2002	McCormick
Kim, Joonyul	PhD	2008	DellaPenna
Kim, Namjoon	PhD	2009	Ferguson-Miller
Klein, Anita S.	PhD	1981	Delmer
Knop, Janice K.	MS	1969	Hansen
Ko, Man P.	MS	1975	Tolbert
Kochevar, Irene H.	MS	1967	Speck
Koehler, Don	PhD	1972	Varner
Kohnken, Russell	PhD	1983	McConnell
Kopec, Anna	PhD	2010	Zacharewski
Kraemer, Stacey	PhD	1996	Dewitt
Krishnaswamy, Rajashree	MS	1996	Wells
Krisnagkura, Kanit	PhD	1974	Sweeley
Kroeker, Warren D.	PhD	1974	Fairley
Kronquist, Kathryn E.	PhD	1975	Ronzio

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Kuczenski, Ronald	PhD	1970	Suelter
Kuczmak, Myron	PhD	1961	Tolbert
Kulkarni, Meghana	PhD	2003	Arnosti
Kuo, Chao-Hen	MS	1976	Wells
Kurtz, James W.	PhD	1980	Wells
Kwekel, Joshua	PhD	2008	Zacharewski
Laakko Train, Tonya	PhD	2000	Fraker
Laing, James	PhD	1992	Wang
Lakkides, Karen	MS	2000	Smith
Lapenson, David	PhD	1983	Deal
LaRue, John Nelson	PhD	1969	Speck
LeBlond, David	PhD	1981	Wood
Lee, Chanyong	PhD	1989	Zeikus
Lee, Chih-Shia	PhD	2010	Duesbery
Lee, Lucy Fang	PhD	1967	Boezi
Lei, Lei	PhD	1998	Burton
Leinbach, Susan S.	PhD	1976	Boezi
Leinbach, Edwin	PhD	1975	Kindel
Leipprandt, Jeffrey	MS	1993	McConnell
Levine, Steven	PhD	1969	Hansen
Lewis, David	PhD	1994	L. Kaguni
Lewis, Douglas S.	PhD	1977	Ronzio
Li, Bing	MS	1997	Preiss
Li, Su-Yin	MS	2001	Wang
Liang, Hongyan	PhD	2001	McCormick
Liang, Katherine	MS	1966	Morris

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Lill-Elghanian, Deb	PhD	1992	Hollingsworth
Lilly, Kathleen	PhD	1990	Bieber
Lin, Paul P.	PhD	1971	Varner
Liou, Geou-Yarh	PhD	2007	Gallo
Litchfield, William J.	PhD	1976	Wells
Lito, Piro	PhD	2006	McCormick
Liu, Jiayan	PhD	2007	Smith
Liu, Wenjing	PhD	1997	Wilson
Lockney, Michael W	PhD	1980	Sweeley
Loh, John	PhD	1994	Wang
Lorimer, Donald	PhD	1989	Revzin
Lorimer, George	PhD	1972	Tolbert
Lou, Zhenjun	PhD	2004	McCormick
Lu, Binbin	PhD	2009	Benning
Lu, Hui-Jane	MS	1991	Wilson
Lu, Sijie	PhD	1994	Kroos
Lui, Edwin C.	PhD	1971	Varner
Luo, Jianjun	PhD	2010	Kuo
Lwande, Joel S.	PhD	2010	Wedemeyer
MacDonald, Alex Bruce	PhD	1967	Morris
MacDonald, Raymond J.	PhD	1974	Ronzio
Madson, Willard Loye	PhD	1964	Speck
Mak, Ivan I.T.	MS	1977	Wells
Makri, Mary	MS	1973	Speck
Malek-Hedayat, Shanaz	PhD	1988	Schindler/Wang
Mann, David	PhD	1972	Byerrum

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Mann, Dorothy	MS	1973	Byerrum
Mao, Yifan	PhD	2000	Arnosti
Mapes, Carol	PhD	1972	Sweeley
Margulies, Carla	PhD	1997	J. Kaguni
Markwell, John P.	PhD	1976	Anderson
Markwell, Mary Ann K.	PhD	1974	Bieber
Marvel, Christopher	PhD	1980	Sweeley
Mascaro Jr., Leonard	PhD	1975	Kindel
Mascaro, Kathryn D.	MS	1974	Deal
Mascaro,Leonard Jr.	MS	1971	Aust
Mathupala, Saroj	PhD	1991	Zeikus
Matthews, Jason	PhD	2001	Zacharewski
Mayes, Jary S.	MS	1963	Hansen
Mayes, Jary S.	PhD	1965	Hansen
Mayo, Joseph William	PhD	1968	Anderson
Mbonye, Uri	PhD	2007	Smith
McCabe, Edward Mathew	PhD	1967	Lillivek/Brunner
McCurry, Stephen D.	PhD	1979	Tolbert
McManus, Terry	MS	1997	Maher
Meeley, Robert	PhD	1992	Mcintosh
Meiners, Sally ann	PhD	1991	Schindler
Meinert, Maureen C.	MS	1975	Delmer
Melcher, Ulrich	PhD	1970	Varner
Melkerson-Watson, Lyla	PhD	1991	Sweeley
Menson, Robert C.	PhD	1976	Wood
Metcalf, Thomas	MS	1981	Wang

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Metcalf, Thomas III	PhD	1985	Wang
Meyer, Elizabeta Borer	PhD	1998	Wells
Millay, Robert Harry	MS	1969	Bieber
Millis, Cynthia	MS	1984	Aust
Mingler, Melissa	MS	2005	Koslowsky
Mirafzali, Zahra	PhD	2003	DeWitt/McCracken
Mitchell, Earl D.	PhD	1966	Tolbert
Moellering, Eric	PhD	2010	C. Benning
Mohrenweiser, Harvey	PhD	1970	Wood/Emery
Moncrief, Mary	PhD	1996	Hausinger
Moon, Woo	MS	2008	Burton
Moore, Robert W.	PhD	1978	Aust
Morehouse, Lee A	PhD	1986	Aust
Morford, Gerald	PhD	1991	Fraker
Mort, Andrew J.	PhD	1978	Lamport
Moutsatsos, Ioannis	PhD	1986	Wang
Mulligan, Robert M.	PhD	1983	Tolbert
Mulrooney, Scott B.	PhD	1990	Hausinger
Murillo, Alec	MS	2008	J. Kaguni
Muschek, Lawrence	PhD	1970	Fairley
Musick, William D.L.	PhD	1974	Wells
Nah, Keng C.	MS	1964	Lillevik
Neal, (Apostal) Jessica	PhD	2008	Maher
Neal, Donna L.	MS	1967	Kindel
Needels, Dwight	PhD	1982	Wilson
Nelson, Edward	PhD	1970	Tolbert

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Neudahl, Gary	MS	1982	Deal
Nickerson, Jeffrey	PhD	1985	Wells
Nordin, John Hoffman	PhD	1961	Hansen
Nunez-Arellano, Hernan	MS	1966	Speck
Nunez-Arellano, Hernan	PhD	1970	Speck
O'Donnell Jr., John J.	MS	1977	Ronzio
Olson, Bradley	PhD	2008	Osteryoung
Olson, Matthew	PhD	1991	L. Kaguni
O'Neal, Fredrick O.	PhD	1978	Aust
O'Neal, Fredrick Oliver	MS	1969	Aust
Ortquist, Lisa	MS	1994	Maher
Otto, James	PhD	1994	DeWitt
Ottosen, Soren	PhD	2003	Triezenberg
Owicki, John Callaghan	MS	1968	Lillevik
Palmer, Richard E.	PhD	1971	Anderson
Parzen, Sheldon D.	MS	1963	Fox
Patrick II, Dan	MS	1973	Wilson/Leroi
Patterson Jr., James M.	MS	1978	Bieber
Payne, Kenneth John	PhD	1969	Boezi
Pederson, Thomas	MS	1969	Aust
Pederson, Thomas	PhD	1973	Aust
Peiffer, Wendy	PhD	1992	Ferguson-Miller
Phillips, Allen Thurman	PhD	1964	Wood
Phillips, Jennifer	PhD	2009	Goodman
Pichyankura, Rath	PhD	1996	Triezenberg
Pierce, John	PhD	1980	Tolbert/Barker

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Pike, Lee M.	MS	1971	Rottman
Pike, Lee M.	PhD	1974	Rottman
Pittler, Steven	PhD	1989	Preiss
Polakis, Paul	PhD	1984	Wilson
Polayes, Deborah	PhD	1983	Schubert
Powers, Robert	PhD	1987	Aust
Prohaska, Joseph R.	PhD	1974	Wells
Protzel, Alberto	PhD	1973	Morris
Pusobha, Suparb	MS	1966	Evans
Qian, Jie	PhD	1998	Ferguson-Miller
Qin, Ling	PhD	2005	Ferguson-Miller
Qureshi, Shahida	PhD	1971	Wells/Cook
Rabinowitz, kenneth W.	PhD	1970	Wood
Rader, Andrew J	PhD	2002	Kuhn
Raines, Maribeth A	PhD	1987	Hsing-Jien Kung
Rajarathnam, Krishnakumar	MS	1987	Ferguson-Miller
Rancour, Thomas P.	MS	1978	Wells
Randall, Douglas	PhD	1970	Tolbert
Regier, Jeffrey	PhD	1993	Triezenberg
Regier, Martha Kay	PhD	1995	Smith
Rehfeld, Dwayne W.	PhD	1971	Tolbert
Reimers, Stephan	MS	1999	Burton
Reiser, Stephen	PhD	1996	Green
Ren, Bing	PhD	1998	Jump
Reno, John	PhD	1980	Boezi
Reuveny, Ziva	PhD	1975	Delmer

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Rhinehart, Barry L.	MS	1967	Kindel
Rhoads, David	PhD	1992	Mcintosh
Richards, Morris	MS	1965	Sell
Riebow, John F.	MS	1978	Wood
Rieke, Jill	MS	1999	Smith
Riekhof, Wayne	PhD	2004	Benning
Ritzert, Roger William	MS	1961	Sell
Ritzert, Roger William	PhD	1966	Sell
Rivera, Mildred	MS	1989	McGroarty
Rocque, Warren	PhD	1990	McGroarty
Roff, Calvin	PhD	1983	Wang
Rollins, Thomas	MS	1981	Smith
Rose, Kathleen M.	MS	1969	Boezi
Roseman, Mark	PhD	1970	Wood
Rosevear, Paul	PhD	1980	Barker
Roth, William	PhD	1988	Jump
Roundtree, John	MS	1998	McGroarty
Ruckle, Michael E.	PhD	2010	Larkin
Ruksan, Bruna E.	MS	1968	Luecke
Runk, Bruce	MS	1983	Arntzen
Rynbrandt, Donald	PhD	1967	Speck
Saari, Ruth	PhD	1998	Hausinger
Sabourin, Carol L. K.	MS	1977	Boezi
Sabourin, Patrick	PhD	1981	Bieber
Sabularse, Dario	PhD	1982	Anderson
Sanschagrin, Paul	PhD	2001	Kuhn

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Sapico, Virginia L.	PhD	1969	Anderson
Sasavage, Nancy	PhD	1981	Rottman
Saxe, Stephen A.	MS	1978	Revzin
Schachter, Karen	PhD	2006	Gallo
Schilmiller, Anthony	PhD	2005	Howe
Schilz, Robert	PhD	1988	McCormick
Schirch, Douglas	PhD	1986	Wilson
Schlender, Keith K.	PhD	1966	Sell
Schmidt, Bryan	PhD	2003	Ferguson-Miller Babcock
Schneider, Donald L.	PhD	1969	Wood
Schroeder, Friedhelm	PhD	1973	Bieber
Schwab, David	PhD	1994	Wilson
Sellers, Larry G.	MS	1967	Bieber
Selph, Nicola	PhD	1983	Tolbert
Semancik, Monica	MS	1991	Kroos
Serianni, Anthony S.	PhD	1979	Barker
Seyfred, Mark	PhD	1984	Wells
Shen, Fan	PhD	1995	Triesenberg
Sheng, Jun	PhD	1997	Preiss
Shi, Ping	PhD	1993	Smith
Shimamoto, Grant T.	MS	1975	Anderson
Shooltz, Dean	PhD	2006	Triezenberg
Shyong, Bao-Jen	MS	1993	Hollingsworth
Simkins, Ronald A.	PhD	1975	Anderson
Simmons, Jana	PhD	2010	Hausinger

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Simmons, Lyle	PhD	2003	J. Kaguni
Singh, Vijay R.	PhD	2009	Lapidus/Wedemeye
Singleton Jr., Rivers	MS	1963	Suelter
Sinton, Mark	PhD	1993	Revzin
Sithole, Idah	PhD	1988	Velicer/Dodgson
Slabaugh, Ronald	PhD	1970	Morris
Smith, Allen	PhD	1991	Wilson
Smith, Charles	PhD	1984	Wells
Snyder, Paul D.	MS	1970	Sweeley
Sonnenburg, William	PhD	1987	Smith
Spellman, Michael	PhD	1983	Tolbert
Spencer, Andrew	PhD	1998	Smith
Spike, Thomas E.	MS	1969	Aust
Spotts, Susan	PhD	2010	Miranti
Stamoudis, Vassiliki	MS	1973	Speck/Cook
Stancel, George	PhD	1970	Deal
Steck, Petter	PhD	1981	Wang
Steinman, Gary	MS	1963	Lillevik
Steinmetz-Kayne, Marlene	PhD	1966	Deal
Stevens, Jeffery B.	MS	1970	Aust
Struffi, Paolo	PhD	2004	Arnosti
Suarez, Maria	PhD	1985	Ferguson-Miller
Sukuru, Sai Chelan	PhD	2007	Kuhn
Sullivan, Barbara	PhD	1987	Sweeley
Sullivan, Susan	PhD	1998	Triezenberg
Summary, James	PhD	1972	Lillevik

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Sung, Sun-Sang J.	PhD	1977	Sweeley
Sutton, Mark	PhD	1996	J. Kaguni
Svingen, Bruce	PhD	1981	Aust
Swaisgood, Mark	PhD	1987	Schindler
Swift, Robert Alan	PhD	1985	Kung
Szabo, Leslie	MS	1980	Schubert
Taha, Taha S.M.	PhD	1990	Ferguson-Miller
Tamot, Banita	MS	2006	Benning
Tang, Hui-Yuan	PhD	2007	DeWitt
Tang, Yin	PhD	1997	Hollingsworth
Tao, Robert	PhD	1973	Sweeley
Tappenden, Dorothy	PhD	2010	LaPres
Tew, Jason	MS	2008	Atchison
Theisen, Michael	PhD	2001	Garavito
Thelen, Annette	PhD	1992	Wilson
Thomas, Craig	PhD	1986	Aust
Thomason, Arlen R.	PhD	1978	Rottman
Thompson, Debra	PhD	1984	Ferguson-Miller
Thuresson, Elizabeth	PhD	2000	Smith
Tien, Ming	PhD	1981	Aust
Tillotson, Joanne Kivela	PhD	1987	Kung
Todd, Matthew	PhD	1991	Hausinger
Todt, Jill	PhD	1993	McGroarty
Tonukari, Nyerhovwo John	PhD	2000	Green
Toth, Peter Paul	PhD	1988	Suelter
Towle, Howard C.	PhD	1974	Boezi

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Trinity, Philip M.	PhD	1983	Filner
Troisi, Catherine	MS	1975	Aust
Tsai, Henry	PhD	1996	Wilson
Tsay, David D.	PhD	1975	Wood
Tsay, Yeou-Guang	PhD	1997	Wilson
Tuttle, John P.	MS	1969	Wilson
Uhlig, John	PhD	1981	Tolbert
Vacratis, Panayiotis Orestes	PhD	2001	Gallo
Valenzuela, Soledad	PhD	2008	Hausinger
Valkner, Kim	MS	1981	Bieber
Varma, Hemant	PhD	2001	Conrad
Vary, Calvin	PhD	1981	Morris
Venkataraman, Sridhar	PhD	2001	Raikhel
Verhoef, Vernon L.	PhD	1978	Morris
Vicente, Matias	PhD	1997	J. Kaguni
Villanueva-Mendez, Marco	MS	1984	Wang
Villanueva-Mendez, Marco	PhD	1988	Wang
VonTom, Andrea	PhD	1994	L. Kaguni
Voorman, Richard	PhD	1987	Aust
Vyakarnam, Anandita	PhD	1996	Wang
Walter, Richard	PhD	1972	Anderson
Wampler, Donald E.	PhD	1965	Fairley
Wang, Bo Qing	PhD	1994	Burton
Wang, Janet	PhD	1973	Morris
Wang, Jianjun	PhD	1997	Hollingsworth
Wang, Lincong	PhD	1998	Yan

Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Wang, Qingping	PhD	1989	Kaguni
Wang, Sung Yuan	PhD	1995	Wang
Wang, Yi	PhD	2006	Maher
Ward, Sherry	PhD	1988	Smith
Washburn, Michael	PhD	1998	Wells
Watson, Ronald R.	PhD	1971	Kindel
Webb, Nicole	PhD	2005	Garavito
Weideman, Mary	MS	1981	Morris
Welton, Ann F.	PhD	1974	Aust
Wenger, William C.	MS	1979	Anderson
Wernette, Catherine	PhD	1988	L. Kaguni
White, Rhonda	PhD	1996	Green
White, Tracy	PhD	1989	Wilson
Wiesner, Douglas	PhD	1993	Sweeley
Wilkins (Mindock), Carol	PhD	1998	Hollingsworth
Wilkinson, Francis	PhD	1985	Sweeley
Wilson Daniel M.	PhD	1988	McCormick
Wilson, Barbara Jean	PhD	1987	Tolbert
Winely, Carl L.	MS	1965	Suelter
Wong, Clifford	PhD	1980	Sweeley
Wu, Judy Y.	MS	1971	Aust
Xie, Guochun	PhD	1990	Wilson
Xiong, Yalin	PhD	2008	Burton
Xu, Jinghua	PhD	2006	Jump
Xu, Shujuan	PhD	2008	McCracken
Yamazaki, Russell K.	PhD	1969	Tolbert

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Graduate Degrees Awarded in Alphabetical Order			
Thesis Author	**Degree**	**Year**	**Professor**
Yang, Jia-Ling	PhD	1988	Maher
Yang, Jun	MS	2002	Ferguson-Miller
Yang, Yanfeng	PhD	1990	Hausinger
Yang, Yi	MS	2001	Gage
Yao, Eveline	MS	1991	Denison
Yao, Lishan	PhD	2006	Cukier
Yeh, Ren Homer	PhD	1967	Sell
Yu, Bin	PhD	2004	Benning
Yu, Ya-Shiou L.	MS	1963	Tolbert
Yun, Yungdae	PhD	1988	Davis
Zator, Roselyn	MS	1979	Wells
Zavodszky, Maria	PhD	2003	Kuhn
Zhang, Bin	PhD	1997	Kroos
Zhang, Jie	PhD	2006	McCormick
Zhang, Wenge	MS	1996	J. Kaguni
Zhen, Yuejun	PhD	1998	Ferguson-Miller
Ziebarth, Tawn	MS	2006	L. Kaguni
Ziegelmann-Fjeld Karla	PhD	2007	Zeikus
Zielke, Carol	PhD	1970	Suelter
Zielke, Horst Ronald	PhD	1968	Byerrum

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Appendix 6.4

Graduate Theses

published by

Biochemistry
and
Biochemistry and Molecular Biology
Students

The theses are listed under the graduate advisor. The student and the degree are not identified in this listing. Note that several advisors are not members of the Department of Biochemistry and Molecular Biology as permitted under the umbrella recruiting program. See Appendix 6.2 for a chronological listing of publication and appendix 6.3 for an alphabetical listing by students.

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Year	**Academic Advisor/Thesis Title**
	R. Gaurth Hansen (1961-1968)
1961	Carbohydrate Metabolism: I. Accessing Heterozygosity For Galactosemia By Enzymatic Means II. Metabolism of Mannose By *Hansenula holstii*
1961	The Isolation And Synthesis of Guanosine Diphosphate Glucose
1963	Mucopolysaccharide Excretion In Dwarf Cattle And In Patients With Hurler's Disease
1965	Inborn Errors of Metabolism: I. The Presence of An Inactive Enzyme And In Utero Toxicity In Galactosemia II. Urinary Mucopolysaccharides In Patients With Hurler's Syndrome, Their Families And Normal Man
1968	Determination of The Equilibrium Constant For An Enzyme Catalyzed Reaction
1969	Purification, Crystallization, And Properties of UDP-Glucose Pyrophosphorylase From Human Liver
	James L. Fairley (1961-1987)
1965	The Effect of Alpha-Aminobutyric Acid And Propionic Acid On The Synthesis of Pyrimidines And Arginine In *Neurospora crassa*
1968	The Purification And Partial Characterization of Associated Deoxyribonuclease, Ribonuclease, And 3'-Nucleotidase Activities of Wheat Seedlings
1968	An Investigation of Phosphodiesterase Activities In Plant Sources
1970	The Purification And Characterization of A Nuclease From The Seeds of Muskmelon
1971	Purification And Properties of An Exonuclease (Phosphodiesterase I) From *Cucumis melo*
1974	A Study of Wheat Seedling Nuclease And It's Properties Relating To The Catalytic Mechanisms Involved In The Hydrolysis of DNA, RNA And The 3'-Nucleoside Monophosphates
	N. Ed Tolbert (1961-1990)
1961	Metabolism of Glycolic Acid
1963	Phosphoglycolic Acid Phosphatase
1966	A Study And Comparison of Glycolic Acid Metabolism In Tobacco And Green Algae

Year	Academic Advisor/Thesis Title
1966	Isolation And Characterization of A Germination Inhibitor From Sugar Beet Fruit
1967	Excretion of Organic Acids During Photosynthesis By Synchronized Algae
1969	P-Glycolate Phosphatase And Aconitase From Tobacco Leaves
1969	An Examination of Glycolate Metabolism In Plants
1969	A Study of The Enzymes In Leaf Peroxisomes
1970	Glycolate Metabolism In Green Algae
1970	3-P-Glycerate Phosphatase In Leaves
1971	Variations In 3-Phosphoglycerate Phosphatase And Phosphoglycolate Phosphatase Activities With Physiological Changes
1971	Biochemical Studies On The Membranes of Peroxisomes And Glyoxysomes
1971	Aminotransferases In Peroxisomes And Distribution of Peroxisomal Enzymes Among Leaf Cells
1972	The Role of Oxygen In Photorespiration
1974	Phosphoglycolate Phosphatase: Purification And Properties
1974	A Glyoxylate Specific Aminotransferase in Rat Liver Peroxisomes
1975	Enzymes For Oxidation of Alpha-Hydroxyacids In Roots of Green Plants
1979	Investigations On The Mechanism of Ribulose-1, 5-Bisphosphate Carboxylase/Oxygenase
1980	Part 1, Carbon-13 Nuclear Magnetic Resonance Studies On The Solution Behavior of Sugar Phosphates. Part 2, Ribulose Bisphosphate Carboxylase/Oxygenase: Catalysis And Activation
1982	Localization of Enzymes of Purine Degradation in Plants And Animals
1983	The Enzymatic Mechanism of Ribulose Bisphosphate Carboxylase/Oxygenase
1983	Enzymes of Glycolate Metabolism in *Chlamydomonas reinhardtii*
1983	Structural Studies of Rhamnogalacturonan II, A Plant Cell Wall Pectic Polysaccharide
1986	The Metabolism of D-Lactate And Structurally Related Organic Acids In *Chlamydomonas reindardtii*
1987	Oxidative Photosynthetic Carbon Cycle in Green Algae
1987	The Transport And Metabolism of Glycolic Acid By *Chlamydomonas reinhardtii*
	Harold E. Sell (1961-1974)
1961	Synthesis And Biological Activity of Several Ethyl 1-Acylindole-3-Acetates

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Year	Academic Advisor/Thesis Title
1965	A Study of The Lipids of Birds-Foot Trefoil (*Lotus corniculatus*)
1966	A Study of The Lipid Fractions In The Pollen of *Zea mays*
1966	The Biochemistry And Physiological Implications of Indole-3-Acetic Acid In The Developing Peach (*Prunus persica*) Seed
1966	Involvement of Protein Synthesis In Auxin-Induced Elongation
1967	Synthesis And Physiological Activity of Several 1-Substituted Indole-3-Acetic Acids And Esters
1967	The Oxidation of Indole-3-Acetaldehyde And Its 1-Methyl Derivative By Horseradish Peroxidase
1968	A Study of The Carbohydrates of Bird's-Foot Trefoil (*Lotus corniculatus*)
1971	The Relationship of Chemical Structure And Plant Growth Regulator Activity In Indol-3-Ylacetamides
1971	Isolation, Identification, And Relationship To Sex Expression of The Gibberellins of *Cucumis melo* And *Cucumis sativus*
	Allen S. Fox (1961-1963)
1963	A Study of The Enzyme Xanthine Dehydrognase From *Drosophila melanogaster*
1967	Studies of The Multiple Forms of Tyrosinase In *Neurospora cassa* And Their Relationship To Genetic Differences In Thermostability
	Clarence H. Suelter (1961-1994)
1963	Studies On The Activation of Pyruvate Kinase By Monovalent Cations
1965	The Purification of 5'-Adenylic Acid Deaminase From Frozen Rabbit Skeletal Muscle
1966	Some Biological And Kinetic Properties of 5'-Adenylic Acid Deaminase
1966	The Purification And Properties of Pyruvate Kinase From Baker's Yeast
1966	A Physical Analysis of The Effects of Temperature, Substrates And Cofactors On The Structural And Catalytic Properties of Rabbit Muscle Pyruvate Kinase
1970	Kinetic, Binding, And Conformational Studies of Yeast Pyruvate Kinase
1970	Effects of Temperature, Substrates, Cations, And Fructose 1,6-Diphosphate On The Conformations, Subunit Structure, And Stability of Yeast Pyruvate Kinase

Year	Academic Advisor/Thesis Title
1970	Rabbit Skeletal Muscle 5'-AMP Aminohydrolase: Some Physiochemical Properties And Characterization As A Zinc Metalloenzyme
1971	The Effect of Protein And Hydrogen Ion Concentration On The Activity of Rabbit Muscle 5'-AMP Aminohydrolase
1975	Purification And Characterization of A Higher Molecular Weight Form of Yeast Pyruvate Kinase
1977	AMP Aminohydrolase From Normal And Dystrophic Chicken Breast Muscle
1977	The Role of H+ In The K+ Activation of Rabbit Muscle 5' AMP Aminohydrolase
1979	Studies On The Mechanism of Tryptophanase Catalysis
1982	Gas Chromatography-Mass Spectrometry of Urinary And Plasma Organic Acids From Patients With Duchenne's Muscular Dystrophy And Age Matched Controls
1982	Circulatory Clearance of Muscle Enzymes in Normal And Dystrophic Chickens
1983	Mitochondrial Creatine Kinase In Normal And Dystrophic Chicken Skeletal Muscle : Function In The Creatine Phosphate Shuttle, Purification And Expression In Muscle Cell Cultures
1984	Acid Phosphatases And Lysosomes in Dystrophic Avian Pectoralis Muscle
1986	The Kinetic Effects of The Binding of Mitochondrial Creatine Kinase To Chicken Heart Inner Mitochondrial Membranes
1988	Characterization of The Factors Regulating The Coupling And Respiratory Control of Isolated Chick Heart Mitochondria
	Hans Lillevik (1961-1986)
1963	Protobiochemistry-Theoretical And Experimental Considerations Concerning Primordial Biochemical Development
1964	Photoelectric Emission Spectrometric Analysis of The Metal Element Content In Starch Block Electrophoretically Separated Human Serum Proteins
1967	Isolation And Properties of Kappa-Casein, Glycomacropeptide And Para_Kappa_Casein Involved In Reaction With The Enzyme Rennin
1968	Studies On The Isolation of β-Casein And The Inactivation of Crystalline Rennin
1972	Studies On Angiotensin Converting Enzyme

Year	Academic Advisor/Thesis Title
	Robert J. Evans (1961-1977)
1964	Growth Inhibition of Rats Fed Raw Navy Beans
1965	The Effect of Crude Cottonseed Oil And Vitamin E On The Absorption of Fatty Acids From The Gastroentestinal Tract of The Laying Hen
1966	Studies On The Peptides of Raw And Heated Soybean Protein
1966	The Biological Value of Raw And Heated Soybean Proteins
	John C. Speck (1961-1988)
1964	Synthesis And Kinetics of Hydrolysis of Some Glycoside-Glycosidase Models
1966	An Examination of The Quantitative Amino Acid Chromatography of S-Cysteinosuccinic Acid As A Means of Determining The Extent of The Reaction of N-Ethylmaleimide With Protein Thiol Groups
1967	The Metal Ion Catalysis of The Mutarotation of α-D-Glucose
1967	Glycosidase-Substrate Interactions: Glycoside Model Hydrolysis Rates And Lysozyme-Substrate Reactions
1969	The Preparation And Amino Acid Sequence of Crystalline Turkey Egg White Lysozyme
1970	Lysozyme-Substrate Reactions And Hydrolysis of Glycosidase-Glycoside Models
1973	Hybrid Formation Between Heavy IgG Chains And A Bence-Jones Protein
1973	Acetyl-CoA Synthetase: A Glycoprotein
	Willis A. Wood (1961-1982)
1964	The Mechanism of Threonine Dehydrase of *Escherichia coli*
1965	The Mechanism of Action of 2-Keto-3-Deoxy-6-Phosphogluconate Aldolase of *Pseudomonas fluorescens*
1967	Characteristics of A Cell-Free Protein Synthesizing System Isolated From Lactating Bovine Mammary Glands
1969	An Investigation Into The Structure And Function of 2-Keto-3-Deoxy-6-Phosphogluconate Aldolase of *Pseudomonas putida* Using 1-Fluoro 2,4-Dinitrobenzene

Year	Academic Advisor/Thesis Title
1969	The Conversion of Lactyl CoA to Acrylyl CoA In *Peptostreptococcus eldenii* : A New α-Phospholactyl CoA Intermediate
1970	An Analysis of The Mechanism of L-Ribose-5-Phosphate Epimerase From *Aerobacter aerogenes*
1970	Role of Hormones In Controlling Ribonucleic Acid Syntheses Druing Lactogenesis
1970	Mechanism of Allosteric Control of L-Threonine Dehydrase of *Escherichia coli* By Adenosine-5'-Monophosphate
1970	A Model System Analysis of The Mechanism of 2-Keto-3-Deoxy-6 Phosphogluconic Acid Aldolase: The Catalytic Role of The Schiff Base Intermediate
1971	Electron Transport Flavoproteins In The Lactate Fermentation of *Peptostreptococcus elsdenii*
1975	Structure of 2-Keto-3-Deoxy-6-Phoshogluconate Aldolase: Sequence of An Active Site Peptide of 50 Amino Acids
1976	Differential Properties And Control of [Delta]-Aminolevulinic Acid Synthetase Isozymes From Erythriod And Non-Erythriod Tissue
1976	Active Species And Quaternary Structure of Biodegradative L-Threonine Dehydrase From *Escherichia coli*
1977	Structure of 2-Keto-3-Deoxy-6-Phosphogluconate Aldolase: Partial Sequence of An Anomalous Tryptic Peptide of 20 Amino Acids
1978	Evidence For The Formation of Pyridoxamine-5-Phosphate By The Biodegradative L-Threonine Dehydrase of *Escherichia coli*
1980	Importance of Dimerization in The Adenosine 5' Monophosphate Activation of Biodegradative L-Threonine Dehydrase From *Escherichia coli* And Determination of Enzyme Kinetic Parameters By Continuous Addition of Substrate To A Single Reaction Mixture And Analysis By A Tangent-Slope Procedure
	Richard J. Byerrum (1961-1991)
1965	The Role of Glycerol In The Biosynthesis of The Pyridine Ring of Nicotine
1965	The Incorporation of Aspartate And Malate Into The Pyridine Ring of Nicotine
1968	The Incorporation of Carbon Dioxide And Acetate Into Nicotine
1970	The Chemistry And Biochemistry of Ricinine And Some Related Pyridine Compounds
1972	Quinolinic Acid Phosphoribosyltransferase In Castor Beans

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Year	Academic Advisor/Thesis Title
1973	Aspects of NAD Biosynthesis In Castor Bean Endosperm
	Richard Anderson (1961-1996)
1965	New Reactions Instrumental In The Metabolism of Common Hexoses
1968	Metabolism of L-Mannose In *Aerobacter aerogenes*
1969	Metabolism of D-Fucose And L-Arabinose In A Pseudomonad
1969	Properties And Functions of Three Bacterial Kinases Part I: A Hexokinase Specific For D-Mannose And D-Fructose From *Leuconostoc mesenteroides* Part II: 1-Phosphofructokinase And 6-Phosphofructokinase From *Aerobacter aerogenes*
1971	Metabolism of Cellobiose, Gentiobiose, And Cellobiitol In *Aerobacter aerogenes*
1972	Purification And Role of The Inducible Soluble Protein Component of The Phosphoenolpyruvate: D-Fructose 1-Phosphotransferase System of *Aerobacter aerogenes*
1975	Lactose And D-Galactose Metabolism In *Staphylococcus aureus* : Elucidation of The Pathway of D-Galactose 6-Phosphate Degradation And Purification And Characterization of The Enzymes Involved
1975	Initiation of Galactitol Metabolism In *Aerobacter aerogennes*
1975	L-Sorbose 1-Phosphate Reductase From *Aerobacter aerogenes* : It's Purification, Characterization, And Role In The Metabolism of L-Sorbose And D-Fructose
1976	Pathway of Galactitol Catabolism In *Klebsiella pneumoniae*
1979	The Substrates of D-Galactose 6-Phosphate Isomerase: An Analysis of D-Galactose 6-Phosphate And D-Tagatose 6-Phosphate
1980	Mutational Acquisition of D-Fuconate Catabolism in *Klebsiella pneumoniae* : Elucidation of The Pathway And Characterization of D-Galactonate (D-Funcate) Dehydratase
1982	Inorganic Pyrophosphate:D-Fructose-6-Phosphate 1-Phosphotransferase In Plants And Its Regulation By A Naturally Occurring Activator, D-Fructose 2,6-Bisphosphate
1987	Production And Purificaton of The Ligninases
	John Boezi (1963-1980)
1966	Studies of *Escherichia coli* RNA-DNA Hybrid And of Methylation of RNA In T-4 Infected Cells

Year	Academic Advisor/Thesis Title
1967	Purification And Characterization of DNA-Dependent RNA Polymerase From *Pseudomonas putida* A.3.12
1967	Characterization of Bacteriophage Gh-1 For *Pseudomonas putida*
1969	The Purification And Characterization of ATP: RNA Adenylyltransferase From *Pseudomonas putida*
1969	Unprimed Interdependent Polymerization of ITP And CTP By RNA Polymerase of *Pseudomonas putida*
1972	Deoxyribonucleic Acid-Dependant Ribonucleic Acid Polymerase of *Pseudomonas putida* : Studies On The Mechanism of Action
1974	A Kinetic And Structural Characterization of Adenosine 5'-Triphosphate: Ribonucleic Acid Adenlyltransferase From *Pseudomonas putida*
1974	Purification And Characterization of Bacteriophage Gh-1 Induced Deoxyribonucleic Acid-Dependent Ribonucleic Acid Polymerase From *Pseudomonas putida*
1976	The Control of RNA Transcription In Bacteriophage Gh-1-Infected *Pseudomonas putida*
1977	Inhibition of Eukaryotic DNA Polymerases By Phoshonoacetate And Phosphonoformate
1980	Inhibition of Herpesvirus Replication, Herpesvirus-Induced DNA Polymerase, And Retrovirus Reverse Transcriptase By Phosphonoacetic Acid And Phosphonoformic Acid
	William C. Deal (1962-1998)
1966	Reversible Dissociation And Characterization of Rabbit Muscle Pyruvate Kinase
1966	Reversible Dissociation And Characterization of Rabbit Muscle α-Glycerophosphate Dehydrogenase
1967	The Isolation And Characterization of A New Class of Lactic Dehydrogenase Inhibitors: Substituted Phenols
1968	Characterization of The 3.5S Aldolase Intermediate As A Dimer And Analysis For Dimer Catalytic Activity
1969	Rabbit Muscle Pyruvate Kinase: Structural And Catalytic Studies
1970	Reversible Dissociation of Yeast Glyceraldehyde-3-Phosphate Dehydrogenase In The Presence of Adenosine Triphosphate
1973	Purification And Characterization of Pig Liver L-α-Glycerol Phosphate Dehydrogenase
1974	Reversible Dissociation of Pig Liver Glyceraldehyde 3-Phosphate Dehydrogenase By Adenosine Triphosphate

Year	Academic Advisor/Thesis Title
1982	Isolation And Partial Characterization of An inactivating Factor For Fatty Acid Synthetase. Isoelectric Focusing in Density Gradients in Thirty-Five Minutes
1983	Studies On Mammalian Metaphase Chromosomes And Characterization of Phosphofructokinase Membrane Binding And Activity Inhibition By Hexacyanoferrate (II)
	Allan Morris (1963-1988)
1966	Biosynthesis of Hemoglobin: Attachment of Heme To Globin
1967	The Selective Inhibition of Protein Assembly By Gougerotin
1967	Guanosine Triphosphate Metabolism In Rabbit Reticulocytes
1969	Synthesis of Cytidylyl Puromycin
1970	A Nucleoside Triphosphate Pyrophosphohydrolase From Red Blood Cells of The Rabbit
1970	The Purification of Peptidyl-tRNA From Rabbit Reticulocyte Ribosomes
1971	Inhibition of Peptide Bond Formation By Nucleotidyl Derivatives of Puromycin
1973	Non Uniformities In The Size Distribution of The Nascent Chains of Globin From Rabbit Reticulocytes
1973	A Nucleoside Triphosphate Pyrophosphohydrolase From Rabbit Liver
1978	The Role of Nucleoside Triphosphate Pyrophosphohydrolase, A Genetically Variable Enzyme, in Inosine Triposphate Metabolism in Human Erythrocytes
1979	The Role of Messenger RNA in Nascent Peptide Chain Accumulations
1980	Determination of The Rabbit Alpha And Beta Globin Nascent Polypeptide Size Distribution: Correlation of Nascent Peptide Accumulations With mRNA Secondary Structure
1981	The Relationship Between Messenger RNA And Nascent Peptide Size Distribution : The Role of Messenger RNA Integrity
1981	The Catalytic Role of Sulfhydryl Group(S) In The Mechanism of Nucleoside Triphosphate Pyrophosphohydrolase Activity
	Paul Kindel (1963-2000)
1967	Apiose Reductase From *Aerobacter aerogenes*
1967	A Method For The Degradation of Hamamelose

Year	Academic Advisor/Thesis Title
1969	Biosynthesis of D-Apiose By An Enzyme System Isolated From *Lemna minor* L.
1969	Apiogalacturonans From The Cell Wall of *Lemna minor* L.
1971	Biosynthesis of UDP-Apiose And Apiin
1975	Characterization of A Particulate UDP-Galacturonate: Acceptor D-Galacturonosyltransferase From *Lemna minor* And Studies On The Physical Properties of The Product
1975	Characterization of Apiogalacturonans Formed By A Cell-Free System From *Lemna minor*
1991	Isolation And Characterization of Pectic Polysaccharides From *Lemma minor*
1996	Isolation And Characterization of 22ºC Chelator-Soluble Pectic Polysaccharides of *Lemna minor*
	Loran L. Bieber (1966-2002)
1967	Plan B Masters
1969	Studies On Iodine And Phospholipid Metabolism In The Housefly *Musca domestica*
1970	Scintillation Counting of 32P Without Added Scintillator In Aqueous Solutions And Organic Solvents, And On Dry Chromatographic Media
1971	Studies On Housefly Phosphodiesterase Acting On Various Biological Glycerophosphodiesters
1973	Studies On The Mechanism of Action of Filipin And Its Effects On Insects
1974	The Discovery And Partial Characterization of Carnitine Acetyltransferase Activity From Rat Liver Peroxisomes And Microsomes
1978	Studies On The Relative Affinities of Polyene Antibiotics For Cholesterol And Stigmasterol
1981	A Search For Mitochondrial Carnitine Octanoyltransferase: An Investigation of Carnitine Acyltransferase Activities In Beef Heart Mitochondria
1981	Purification And Characterization of An -Ga-S-Ketoisocaproate Oxidase From Rat Liver
1981	Changes in Tissue And Body Fluid Acylcarnitines in Response To Different Physiological States
1982	The Metabolic Role of Carnitine in The Yeast, *Torulopsis bovina*
1982	The Effects of Maternal Dietary Zinc Deficiency On The Growth And Immunocompetence of Suckling A/J Mice
1984	Carnitine Octanoyltransferase And Carnitine Acetyltransferase of Mouse Liver Peroxisomes
1986	A Study of The Kinetics, Specificity, And Regulation of Heart Mitochondrial Carnitine Palmitoyl Transferase

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Year	Academic Advisor/Thesis Title
1990	Characterization of A Medium/Long-Chain Carnitine Acyltransferase Associated With Rat Liver Endoplasmic Reticulum
	Burke K. Zimmerman (1966-1969)
1968	Repair of *E. coli* B130 DNA, Damaged By Mitomycin-C
	Richard W. Luecke (1961-1988)
1968	Tissue Distribution of Zinc In The Rat As Related To Dietary Zinc Requirement
	Charles C. Sweeley (1968-1992)
1969	Studies On Terpenes: Biosynthesis And Occurrence
1970	The Anomeric Configuration of Fabry Trihesoxyl Cermide And The Recognition of An Exceptional Case of Tay-Sachs Diseases With Visceral Involvement
1972	Studies On The α-Galactosidases of Normal And Fabry Plasma
1973	Studies On The Biochemistry of Juvenile Hormone And Other Insect Lipids
1973	Biochemistry And Metabolism of Mamalian Blood Gycosphingolipds
1974	Studies On The Biosynthesis of Sphingolipid Bases
1975	The Isolation of Ceramide Trihexosidases From Normal Plasma
1977	Automated Metabolic Profiling of Organic Acids in Human Urine By Gas Chromatography-Mass Spectrometry
1977	Structure of Dog Intestinal Forssman Hapten And Purification And Partial Characterization of Forssman Hapten Hydrolase (A-N-Acetylgalactosaminidase EC. 3.2.1.49) From Porcine Liver
1978	The Purification And Partial Characterization of α-Galactosidases A And B From Human Liver
1980	Characterization of A Glycolipid N-Acetylgalactosaminyltransferase Activity in NIL And 3T3 Cell Lines : Effect of Viral Transformation
1980	Studies of The Functional Role And Partial Characterization of A UDP-Galactose : Glycoprotein Galactosyltransferase

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1980	Biochemical And Immunological Studies On Familial Erythrophagocytic Lymphohistiocytosis
1984	Studies On The Regulation of Glycosphingoliped Biosynthesis
1985	On The Study of Cellular Metabolism Using Carbohydrates Enriched With Stable Isotopes
1985	Purification And Structural And Kinetic Characterizations of α-Galactosidases A And B From Human Liver
1987	Alpha-N-Acetylgalactosaminidase: Enzyme Purification And Isolation of Putative cDNA Clones
1991	Studies On The Purification And Regulation of CMP-Sialic Acid: Lactosylceramide A2-3 Sialyltransferase
	Steven D. Aust (1967-1986)
1969	Studies On The Resolution of Microsomal Membrane Proteins
1969	Aminopyrine Demethylase: Kinetic Evidence For Multiple Microsomal Enzymes
1969	The Bioactivation of Slaframine
1970	Sudies On The Multiplicity of Microsomal Mixed-Function Oxidase
1971	Studies On Microsomal Electron Transport
1971	Studies On The Development of The Mixed-Function Oxidase of Rat Liver Endoplasmic Reticulum
1973	Rat Liver Microsomal Electron Transport: Mechanism of NADPH-Dependent Lipid Peroxidation
1974	Rat Liver Microsomal Structure And The Mixed-Function Oxidases
1975	Antibody Specificity For Cytochrome P450 In The Microsomal Electron Transport System
1975	Biochemical Effects of Polycrominated Biphenyls On Microsomal Enzymes
1976	Lipid Peroxidation: Enzyme-Catalyzed Peroxidation of Membrane Lipids And The Role of Chelated Iron
1978	Studies On The in Vitro Metabolism of Polybrominated Biphenyls And The induction of Rat-Neonatal Drug Metabolizing Enzymes
1978	Chemistry And Biochemical Pharmacology of Polybrominated Biphenyl Congeners
1978	Carbon Tetrachloride Metabolism: The Role of Hepatic Microsomal Mixed-Function Oxidase Components in Carbon-Halogen Bond Cleavage
1981	Studies On The Relationships Between The Chemical And Pharmacological Properties of Polybrominated Biphenyls
1981	The Role of Chelated Iron in The Mechanism of Enzymatic Promotion of Lipid Peroxidation
1981	The involvement of Chelated Iron And Activated Oxygen in Radical-Mediated Peroxidation of Lipid

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1982	The Partial Purification of Para-Nitrophenol: UDP-Glucuronyltransferase From Rabbit Small Intestinal Microsomes
1984	Studies On The Chemical And Pharmacotoxicological Properties of Polybrominated Biphenyls
1986	Role of Cytochrome P450 In Hepatic Microsomal Mixed Function Oxidase-Dependent Superoxide Production And Lipid Peroxidation
1986	Mechanisms For The Release of Iron From Ferritin And Their Relationship To Lipid Peroxidation And Toxicity
1987	Studies On The Relationships of TCDD Toxicity And Vitamin A
1987	Influence of Polyhalogenated Aromatic Hydrocarbons On The Induction, Activity, And Stabilization of Cytochrome P450
	John E. Wilson (1967-2004)
1969	Rat Brain Hexokinase: A Kinetic Comparison of Soluble And Particulate Forms
1973	Purification And Characterization of Rat Brain Hexokinase
1973	Raman And Infrared Investigation of The Carbonyl Frequency of NAD
1975	Characterization of The Hexokinase Membrane Interaction: Rapid Photolysis of Dansyl Tyrosine; Partial Characterization of Bindable And Non-Bindable Hexokinase Isozymes
1978	Lyotropic Salts And The Hexokinase Membrane Interaction: Purification, Reconstitution And Characteristics of The Outer Mitochondrial Membrane Binding Site For Hexokinase
1982	Purification of Cytoplasmic Hexokinase From Rat Brain And Comparison With The Mitochondrial Enzyme
1984	Proteolytic Dissection of Rat Brain Hexokinase Function
1986	Location And Structure of The Substrate Hexose Binding Site of Rat Brain Hexokinse
1989	Domain Structure And Structure-Function Relationships in Rat Brain Hexokinase
1990	Molecular Basis For The Interaction of Rat Brain Hexokinase With Mitochondria
1991	An Approach To Probe The Glucose-6-Phosphate Binding Site of Rat Brain Hexokinase By Photoaffinity Labeling
1991	Structure-Function Relationships in Rat Brain Hexokinase: A Study Using Monoclonal Antibodies
1992	The Role of Hexokinase in The Regulation of Glucose Metabolism in Rat Brain

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1992	Type II Hexokinase: Molecular Cloning, Sequence,And Promoter Analysis
1994	The Cloning of cDNAs Coding For Types I And III Rat Brain Hexokinases And Sequence Comparisons To Other Hexokinases
1996	Functional Organization And Evolution of Mammalian Hexokinases
1997	Identification And Characterization of The Promoter Regions of The Gene For Rat Type I Hexokinase
1997	Nuclear Export of A Pre-mRNA Splicing Factor, Galectin-3
	Joseph Varner (1968-1973)
1970	Hormonal Regulation of Protein Synthesis In Barley Aleurone Layers
1970	Protein Release By Barley Aleurone Layers And Metabolism of Puromycin By Yeast Cells
1971	Enzymes of Cyclic Nucleoside Monophosphate Metabolism In Pea Seedlings
1971	The Isozymic Forms of Peroxidase Found In The Hoseradish Plant (*Armoracia lapathifolia*)
1972	Hormonal Control of Phospholipid Synthses In Barley Aleurone Layers
1976	On The Mechanism of Hormone Controlled Enzyme Formation In Barley Aleurone Layers
	Fritz M. Rottman (1965-1980)
1971	The Determination of 2-0-Methylation In RNA
1971	Studies On The Influence of Secondary Structure And 2'-0-Methylation On The Translation of Ribosomal RNA
1971	A Rapid And Sensitive Technique For The Determination of The 2'-O-Methyl-Nucleoside Ratio of An RNA Molecule
1973	Studies On Messenger RNA In *Artemia alina* Cysts
1974	Determination of 2'-O-Methyl Levels And Distribution In Ribosomal RNA From Fat Tissues
1974	Distribution of 2'-O-Methylnucleosides In RNA
1975	The Synthesis And Methylation of Messenger RNA In Novikoff Hepatoma Cells
1978	Novikoff Messenger RNA Methylation: Implications of Methylation in Processing
1978	Methylation of Feline Leukemia Virus Virion And Intracellular RNA

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1981	Development of A Growing Drop Fluorescence Detector
1981	Sequence Analysis of Bovine Prolactin Messenger RNA
1982	Developmentally Regulated Changes in Prolactin mRNA And Growth Hormone mRNA Levels And Their Respective Cell Types in The Fetal Bovine Pituitary Gland
1983	Studies On Messenger RNA Methylation
1988	RNA Metabolism In Bovine Pituitary Cells
	William W. Wells (1965-2001)
1970	Energy Metabolism In Phenylketonuric Models: Relevance As A Mechanism For Phenylalanine Toxicity
1971	Studies On The Isolation And Purification of Acetyl CoA Synthetase From Mitochondria of Lactating Bovine Mammary Gland
1972	Studies On The Turnover of Protein, Glycoprotein And Gangliosides In The Brains of Galactose Intoxicated Chicks
1972	Perturbations of Energy Metabolism In Chick Brain Induced By Hyperphenylalanemia And Galactosemia
1974	Studies On Phosphorylative Pathways of Galactose Metabolism In Rat Heart And Brain
1974	Effects of Copper Deficiency And Hyperphenylalanine On The Developing Rat Brain
1976	Myo- Inositol Metabolism During Development And Lactation In The Rat
1976	The Purification And Characterization of β-Galactosidase From Rat Mammary Gland
1976	Metabolic And Functional Activities of Phagocytic Cells During Galactosemia
1977	The Participation of Lysosomes in Enzyme induction in Rat Liver
1978	Galactose Oxidation in Rat Liver Microsomes
1978	In Vivo Metabolite Regulation of Myo-Inositol Biosynthesis
1979	Hormonal Control of Tubulin Content And Polymerization in Rat Liver
1980	Hormonal And Dietary Regulation of Enzyme Induction In Rat Liver
1983	Phosphorylation of Lysosomal Membrane Components
1984	Regulation And Mechanism of Phosphoinositide And Inositol Polyphosphate Metabolism In Rat Hepatocytes
1984	Polyphosphoinositide Metabolism in Rat Liver Nuclear Envelopes And Its Role in Regulating Nucleoside Triphosphatase Activity

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1985	A Microtubule Associated Nucleoside Diphosphate Kinase
1987	Purification, Characterization, Primary Structure And Catalytic Mechanism Studies of Pig Liver Thioltransferase
1996	Studies On The Role of Protein Disulfide Reaction I in The Prolyl 4 Hydroxylase Reaction
1997	The Function And Mechanism of Ascorbic Acid In The Release of Insulin From Scorbutic Guinea Pig Pancreatic Islets
1998	Increased Multidrug Resistance In Adiramycin Sensitive mcf-7 Breast Tumor Cells Overexpressing Human Placental Thioltransferase
1998	Characterization of The Catalytic Mechanism of Thioltranferase Toward The Non-Disulfide Substrates, Dehydroascorbic Acid And Alloxan: The Potential To Protect And The Potential To Harm
	Philip Filner (1968-1980)
1970	Control of Nitrate Assimilation In Cultured Tobacco Cells
1983	Regulation of NADH Nitrate Reductase of Tobacco XD Cells By Suboptimal Concentrations of Nitrate And Sulfate
1985	Studies On Flagellar Shortening in *Chlamydomonas reinhardtii*
	Robert A. Ronzio (1969-1977)
1972	RNA And Protein Synthesis During Cytodifferentiation In Fetal Rat Pancreas
1974	Studies On The Intracellular Membranes of Mammalian Exocrine Pancreas
1975	Sulfated Glycopolypeptides of The Exocrine Rat Pancreas
1977	Glycoprotein Synthesis in The Rat Exocrine Pancreas During The Secondary Transition Period of Pancreatic Differentiation
1977	Zymogen Granule Membrane Phosphorylation And Glycoprotein Topology in The Exocrine Pancreas
1977	Studies of Exocytosis in Acinar Cells of Adult Rat Pancreas
	Deborah P. Delmer (1974-1982)

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1975	Biochemical Changes In Cell Wall Composition Associated With In Vivo And In Vitro Fiber Development In *Gossypium hirsutum*
1975	Regulation of ATP Sulfurylase In Cultured Tobacco Cells
1979	Deglycosylation of Arabinogalactan Proteins From Suspension-Cultured Sycamore Cells Via Hydrogen Fluoride in Pyridine
1981	Glucan Synthesis in Soybean Cells : The Enzymes involved in Deposition of Glucans During Cell Wall Regeneration
	Pamela J. Fraker (1973-)
1977	The Effects of Dietary Zinc Deficiency On The Humoral Immune Response of The Young Adult A/J Mouse
1980	The Role of Corticosterone in The Loss of Immune Function in The Zinc Deficient A/J Mouse
1982	The Effects of Maternal Dietary Zinc Deficiency On The Growth And Immunocompetence of Suckling A/J Mice
1987	Functional Capacity of The Residual Leukocytes From Zinc Deficient Mice
1988	Model For Normal Term Low Birth-Weight infants
1989	Carnitine involvement in Fuel Utilization By Human Peripheral Blood Mononuclear Cells
1991	Alteration of Murine Bone Marrow B-Cell Development And Function By Physiological Concentrations of Glucocorticoids: A Role For Programmed Cell Death
1991	Status of Murine Resident Peritoneal Macrophage Antigen Presentation And Microbicidal Capacity After Dietary Zinc Deprivation Or Chronic Treatment With Physiological Levels of Glucocorticoids In Vivo And In Vitro
2000	The Negative Effect of Corticosterone On Murine Bone Marrow B Lymphocytes: Modulation By IL-7 And Stromal Cells
2008	Disruption of Apoptotic Signaling Pathways During Glucocorticoid Induced Survival of Human Neutrophils
	Derek Lamport (1986-1992)
1978	Partial Characterization of Extensin By Selective Degradation of Cell Walls
1989	Isolation And Characterization of Extensins From The Graminaceous Monocot *Zea mays*
1991	Isolation And Characterization of Extensins From The Non-Graminaceous Monocot, Asparagus

Year	Academic Advisor/Thesis Title
	Arnold Revzin (1974-1999)
1978	The Non-Specific DNA Binding Activity of Catabolite Activating Protien of E.Coli
1983	Studies On The Mechanism of Action of Cataolite Activator Protein From *Escherichia coli*
1987	The Nature of DNA-Protein Interactions Studied By Polyacrylamide Gel Electrophoresis
1989	Studies On The Interaction of *E.coli* RNA Polymerases With Lactose Promoter DNA
1993	Studies On The Conformation of *Eschericia coli* Catabolite Activator Protein And RNA Polymerase When They Interact With Promoter DNA
	William L. Smith (1974-2003)
1979	The Prostaglandin-Forming Cyclooxygenase of Ovine Uterus
1981	Prostaglandin Metabolism in Papillary Collecting Tubule Cells From Rabbit Kidney
1981	Subcellular Localization of PGH Synthase
1982	The Purification, Quantitation And Immunofluorscent Localization of The PGI2 Forming Enzymes, PGH Synthase And PGI2 Synthase, With Monoclonal Antibodies
1984	Prostaglandin Metabolism And Function in Canine Cortical Collecting Tubule Cells Isolated Using A Monoclonal Antibody
1987	Regulation of Cyclic AMP Metabolism By Prostaglandins in Rabbit Cortical Collecting Tubule Cells
1988	Isolation And Characterization of A PGH-PGE Isomerase From Sheep Vesicular Gland Microsomes
1993	Ca++ Mobilization Induced By Prostaglandin E2 In Rabbit Collecting Tubule Cells And Swiss 3T3 Cells
1995	Mechanistic And Functional Studies Involving The Active-Sites of Prostaglandin Endoperoxide H Synthase-1 And -2
1995	Subcellular Localization of PGH Synthase -1 And -2 And Cytosolic Phospholipase A
1998	Subcellular Localization And Membrane Association of The Aspirin Targets, Prostaglandin Endoperoxide H Synthases-1 And -2
1999	Studies Involving The Cyclooxygenase Active Sites of Prostaglandin Endoperoxide H Synthase-1 And -2
2000	Characterization of Several Cyclooxygenase Active Site Mutants of Ovine Prostaglandin H Synthase-1
2000	Substrate interactions in The Cyclooxygenase Site of Ovine Prostaglandin Endoperoxide H Synthase-1

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2005	A Crystallographic Investigation of Ligand Binding To Ovine Prostaglandin Endoperoxide H Synthase-1
2007	Hydroperoxide Substrate Specificty, Cyclooxygenase Activation And Partnering Between The Two Monomers of Prostaglandin Endoperoxide H Synthase
2007	Structural And Catalytic Determinants of Intracellular Cyclooxygenase Protein Degradation
	Robert Barker (1974-1979)
1979	The Cyanohydrin (Kiliani) Reaction: Mechanism Studies By 13C NMR Spectroscopy And Application To The Synthesis of Isotopically-Enriched Carbohydrates
1980	Part 1, Carbon-13 Nuclear Magnetic Resonance Studies On The Solution Behavior of Sugar Phosphates. Part 2, Ribulose Bisphosphate Carboxylase/Oxygenase: Catalysis And Activation
1980	Enzyme-Mediated Synthesis of The Antigenic Portion of The Blood Group O Substance With Specific Carbon-13 Enrichment
1985	On The Study of Cellular Metabolism Using Carbohydrates Enriched With Stable Isotopes
	Karel L. Schubert 1980-1983)
1980	Identification And Partial Characterization of Actin From Glycine Max And *Trifolium repens*
1982	Dark CO2 Fixation And Amino Acid Metabolism in Symbiotic N2-Fixing Systems: Labeling Studies With 14C And 13N-Labeled Tracers
1983	Studies On The Plasmid-Coding of Nodulation And Nitrogen Fixation Genes in Two Strains of *Rhizobium trifolii*
1983	Nitrogen Metabolism in Soybeans : The Biosynthesis of Ureides in Seedlings And The Partitioning of N into Vegetative And Reproductive Tissue
	Hsing-Jien Kung (1977-1984)
1981	Involvement of Cellular Oncongenes in Avian Leukosis Virus induced Neoplastic Diseases: Lymphoid Leukosis And Erythroleukemia
1985	Retroviral Induced Lymphoma : Promoter-Insertional Activation of The Cellular Myc Gene By Reticuloendotheliosis Virus

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1987	C-Erb B Activation And Avian Leukosis Virus Induced Erythroblastosis
1987	Search For A Chicken Major Histocompatibility Complex Class II Alpha Gene : Transformation-Related Viral Transcripts in Marek's Disease Virus-Transformed Cell Lines
	John L. Wang (1977-)
1981	Lectin Receptors And Cytoskeletal Structures in Soybean Cells
1981	Molecular Analysis of Density-Dependent Inhibition of Growth In 3T3 Fibroblasts
1983	Biochemical Analysis of Transformation-Sensitive Alterations in The Substratum Associated Material of Chicken Embryo Fibroblasts
1983	Isolation And Characterization of Lectins From Mammalian Fibroblasts
1984	Characterization of A Monoclonal Antibody Reactive With The Plasma Membrane of Soybean Protoplasts
1985	Isolation And Characterization of A Growth Regulatory Polypeptide From Cultured 3T3 Fibroblasts
1985	The Lateral Mobility of Protein And Lipid Components of The Plasma Membrane of Soybean Cells
1986	Turnover of Cell Surface Proteoglycands in Cultured Fibroblasts
1986	Proliferation Dependent Expression And Nuclear Localization of Carbohydrate-Binding Protein 35 In Cultured Fibroblasts
1988	Characterization And Functional Analysis of SB-1 Lectin From Cultured Soybean Root Cells
1988	Actin And Microfilaments in Cultured Soybean Cells
1990	Carbohydrate Binding Protein 35: Characterization, Expression And Localization of Isoelectric Variants in Cultured Cells
1990	Serum Responsiveness of Carbohydrate Binding Protein 35 Expression: Comparison Between Human Fibroblasts of Different Replicative Capacities
1990	Identification And Characterization of Carbohydrate Binding Protein 35 Gene Structure
1992	Carbohydrate Binding Protein 35: In Vivo And In Vitro Expression Properties of The Polypeptides
1992	Characterization of A Nuclear Carbohydrate-Binding Protein 35 Ribonucleoprotein Complex
1994	Carbohydrate Binding Activities of *Bradyrhizobium japonicum* : Localization And Expression of The Lectin BJ38
1995	Evidence For An Association Between Splicing Components: Galectin-3 And Polypeptide(S) of snRNP

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1999	Galectin-3: Gene Structure, Regulation of Expression And Subcellular Localization
2001	Studies On The Nuclear Repeat Signal of Galectin-3
2006	Galectin-1, Galectin-3, And TFII-I in Pre-mRNA Splicing
2007	Characterization of Galectin-3-snRNP Complexes And Mechanism of Galectin Entry into The Splicing Pathway
	David G. McConnell (1973-2002)
1983	Studies On The GTP-Binding Protein Activator of Cyclic GMP Phosphodiesterase in Bovine Retinal Outer Segments
1988	Studies On Phosphoinositide Metabolism In Retinal Rod Outer Segments
1993	Studies of cGMP Phosphodiesterase And Phosphoinositide-Specific Phospholipases C in Bovine Retinal Rod Outer Segment
1997	Cloning, Sequencing, And Expression of Two Bovine Retinal Isoforms of 14-3-3 Protein Which Copurify With A Phophoinositide-Specific Phospholipase C
	David N. Arnosti (1997-)
1983	Chloroplast Membrane Adaption And Repair In Response To Environmental Stress In Maize Seedlings (*Zea mays* L.)
1985	Instability of Photosystem II Complexes In A Chloroplast-Encoded Tobacco Mutant
1985	Structure And Function of The Light Harvesting Chlorophyll A/B Complex: Investigations Using Reconstitution And Monoclonal Antibodies
	Shelaugh Ferguson-Miller (1978-)
1984	Diffusion In The Mitochondrial Inner Membrane : Implications For The Mechanism of Electron Transfer And Hexaammineruthenium, An Effective Electron Donor To Cytochrome Oxidase
1984	Cytochrome C Oxidase Purified By Affinity Chromatography in Laurylmaltoside: The Effects of Detergent, Lipid Depletion, And Subunit III Removal On Function
1985	Determination of The Physical And Functional Size of Mammalian Cytochrome Oxidase

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1987	The Location And Mobility of Fluorescently Labeled Ubiquinone In Mitochondrial Membranes And Unilamellar Phospholipid Vesicles
1988	Clarification of The Roles of Subunit III And Phospholipid In Cytochrome C Oxidase Activity
1990	Conversion of The Mitochondrial Gene For Mammalian Cytochrome Oxidase Subunit II To A Universal Equivalent And Expression in *E. coli* , in Vitro, And in Xenopus Oocytes
1990	The Use of Monoclonal Antibodies And A Protein Modifying Reagent To Study The Interaction of Cytochrome C With Cytochrome C Oxidase
1992	Volume 1: Assessment of The Role of Plant Mitochondrial Respiratory Complexes in Cytoplasmic Male Sterility And Volume 2: Structural Analysis of Plant Cytochrome C Oxidase
1995	Search For Residues Critical To Proton Pumping In Cytochrome C Oxidase
1998	Study of The Electron Transfer And Proton Pump Ion Mechanisms in Cytochrome Oxidase
1998	The Role of Subunit II in Cytochrome C Oxidase On Cytochrome C Binding And Electron Transfer
2002	Electron Transfer in Cytochrome C Oxidase: Cytochrome C Docking & Electron/Proton Coupling
2003	Proton And Water Exit in Cytochrome C Oxidase
2005	X-Ray Crystallographic Studies of Cytochrome C Oxidase From *Rhodobacter sphaeroides*
2009	Proton Movement in Cytochrome C Oxidase of *Rhodobacter sphaeroides*
	Jerry Dodgson (1980-2004)
1985	Part I. Studies On The Hamster Ribonucleotide Reductase Genes. Part II. Construction of Mutations in The Chicken Adult Alpha Globin Genes
1985	Characterization of A Chicken H3.3 Replacement Variant Histone Gene
1987	The Isolation And Characterization of Erythroid-Expressed Clones From A Chicken Reticulocyte cDNA Library
1988	Analysis of The Chicken Erythroid-Specific H5 Histone Gene
1988	The Marek's Disease Herpesvirus B Antigen Glycoprotein Complex: Characterization And Processing of Its Precursor Polypeptide And Identification And Characterization of The Gene Encoding It
1990	Chicken Chromosomal Protein Genes

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	Veronica M. Maher (1980-2010)
1985	Correlation Between O_P6_S-Methylguanine-DNA Methyltransferase Activity And Resistance of Human Cells To The Cytotoxic And Mutagenic Effect of N-Methyl-N'-Nitro-N-Nitrosoguanidine
1988	Kinds And Spectra of Mutations Formed When A Shuttle Vector Containing Adducts of Benzo [A] Pyrene-7,8-Diol-9,10-Epoxide Or 1-Nitrosopyrene Replicates in Mammalian Cells
1991	Effect of Strand-Specific Excision Repair On The Spectra of Mutations induced By Benzo[A]Pyrene-Diol Epoxide And Ultraviolet Radiation in Diploid Human Cells
1994	Evidence From The Frequency And Spectrum of Mutations That Human Fibroblasts Can Remove Potentially Mutagenic Lesions Induced By N-Ethyl-N-Nitrosources Using Nucleotide Excision Repair O-6 Alkylguanine-DNA Alkyltransferase Or Both Kinds of Repair
1997	Plan B Masters Degree
1998	Mechanisms of Malignant Transformation of Human Fibroblasts By Methylnitrosourea
2006	Structure And Function Relationships of Dihyroneopterin Aldolases From *Eschericihia coli* And *Staphylococcus aureus*
2008	The Role of Human Rev7, The Accessory Subunit of Human DNA Polymerase Zeta, In Cell Survival And DNA Damage Induced Mutageneesis
	Lee McIntosh (1984-2005)
1986	A Molecular Analysis of Ribulose 1,5-Bisphosphate Carboxylase Small Subunit Transit Peptide Function
1991	Molecular And Developmental Aspects of Respiratory Complexes in Higher Plant Mitochondria
1992	A Biochemical Basis For Heritable Resistance of Maize To The Fungal Pathogen *Cochliobolus carbonum*
1992	Developmental And Salicylic Acid Regulated Expression of The Alternative Oxidase of Higher Plants
	Barry Chelm, Microbiology and Mol. Genetics
1986	Characterization of The Genes Encoding Glutamine Synthetase I And Glutamine Synthetase II From *Bradyrhizobium japonicum*
	Melvin Schlinder (1980-2006)

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1987	Studies On The Consequences of Cell Shape For Membrane Dynamics: Relationship To Cytoskeletal Organization
1988	Characterization And Functional Analysis of SB-1 Lectin From Cultured Soybean Root Cells
1991	Characterization of Gap Junction-Like Polypeptides In Plant Cells
1998	The Use of Optical Displacemnt Microviscometry (ODM) And Reconstituted Model Systems To Measure Aluminum Induced Changes In The Organization And Viscosity of Actin
	Ronald L. Davis (1982-1987)
1987	Molecular Analysis of The DUNCE Gene of *Drosophila melanogaster*, A Gene involved in cAMP Metabolism And Behavioral Plasticity
1988	Isolation And Characterization of Genes Regulated By Cyclic AMP In *Drosophila melanogaster* And Differentially Expressed In DUNCE Mutants
	Justin J. McCormick (1980-)
1988	Malignant Transformation Induced in Human Fibroblasts By Expression of A Transfected T24 H-RAS Oncogene: Requirement For An Infinite Lifespan
1988	Expression of Growth Factor Genes in Transformed Human Fibroblasts And Cells Derived From Human Fibrosarcomas: A Possible Mechanism For Replication in The Absence of Exogenous Growth Factors
1988	Biochemical And Biological Analysis of Human Fibroblasts Transformed With N-ras Oncogenes
2001	Role of Hepatocyte Growth Factor And Its Receptor met In The Malignant Transformtion of Human Fibroblasts
2002	The Role of The Two RHO GTPases, CDC42 And RAC1, in The Malignant Transformation of Human Fibroblasts
2002	Plan B Masters Degree
2004	Role of Overexpression of The Sp1 And Sp3 Transcription Factors in The Malignant Transformation of Human Fibroblasts
2006	The Role of Sprouty-2 in The Malignant Transformation of Human Fibroblasts By H-RAS Oncogene
2006	By Participating in The TGF-[Beta]/Smad Signaling Pathway, LRP12 Regulates The Tumorigenicity of Human Fibrosarcoma-Derived Cell Line SHAC

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	Donald Jump(1995-)
1988	Effects of Ah-Inducers On The Activity of Thyroid-Regulated Enzymes And Control of Thyroid Hormone Metabolism
1998	Involvement of Peroxisome Proliferator Activated Receptor (alpha) In Polyunsaturated Fatty Acid Regulation of Hepatic S14 Gene Transcription
2006	Glucose N-3 Polyunsaturated Fatty Acids And Peroxisome Proliferator Activated Recepter-[Alpha] Agonist Regulate Rat Liver Pyruvate Kinase Gene Transcription
	Laurie Kaguni (1984-)
1988	Mitochondrial DNA Polymerase From *Drosophila melanogaster* Embryos: Purification, Subunit Structure And Template-Primer Utilization Studies
1991	3'-5' Exonuclease In Drosophila Mitochondrial DNA Polymerase: Kinetic And Mechanistic Studies
1994	A + T Regulatory Region of The *Drosophila melanogaster* Mitochondrial Genome: Organization, Evolution And Protein:DNA Interactions
1994	Processivity of Mitochondrial DNA Polymerase From Drosophila Embryos: Effects of Reaction Conditions, DNA-Binding Proteins, And Enzyme Purity
1997	Drosophila Pol Y And Its Recombinant Catalytic And Accessory Subunits: Effects of Reaction Conditions And Drosophila Mitochondrial Single-Stranded-Binding Protein
2000	Homology Modeling of The Accessory Subunit of Drosophila Mitochondrial DNA Polymerase And Subunit Interaction Studies
2006	Modular Architecture And Dynamic Oligomeric Structure of The Human Mitochondrial Replicative DNA Helicase
	Jon Kaguni (1984-)
1988	dnaA46 Protein in Initiation of in Vitro oriC Plasmid Replication
1990	The Interaction of *Escherichia coli* Gene Products With Mutant Forms of dnaA Protein

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1994	Effects of Isolated Missense Mutations From The DNAa5 And DNAa46 Alleles In Initiation of *Escherichia coli* oriC Replication
1996	Mutants of The *E. coli* DNAa Gene: Genetic And Biochemical Analysis of Its Replication Activity
1996	Epitope Mapping And Functional Analysis of Monoclonal Antibodies To DNAa Protein
1997	The Influence of IHF And FIS On The Binding of DNAa Protein In oriC, The *E. coli* Chromosomal Origin
1997	Proteins That Interact With *E. coli* DNAa Protein And Modulation of Chromosomal DNA Replication
2003	Regulation of Chromosomal Replication in *E. coli*: I. Function of N-Terminal Domain in DNAa Oligomer Formation. II. Biochemical And Genetic Studies of Hyperactive Cells
2008	Novel DNAa Alleles of *Escherichia coli* That Are Hyperactive in Initiation of Chromosomal DNA Replication
	Estelle J. McGroarty (1982-)
1988	Characterization of The Physical And Chemical Structure of *Pseudomonas aeruginosa* Lipopolysaccharide
1990	Characterization of OmpC And OmpF Porins From *Escherichia coli* K-12
1991	Characterization of A Common Antigen Lipopolysaccharide From *Pseudomonas aeruginosa* AK1401
1993	The Effect of Environmental Factors On The Function And Structure of Porins From *Escherichia coli* K-12
1998	An investigation of The Structural Components involved in The Mechanism of The pH induced Switch in The Channel Size of OmpF Porin From *E. coli* K-12
	Gregory J. Zeikus (1984-2009)
1989	Biochemical And Molecular Characterization of Glucose Isomerase From Thermoanaerobes
1991	Biochemical Characterization of Amylopullulanase From *Clostridium thermohydrosulfuricum* 39E
1993	Biochemistry of Ethanol Fermentation By *Thermoanaerobacter ethanolicus*
1996	*Thermoanaerobacter ethanolicus* 30E Secondary Alcohol Dehydrogenase: Molecular Basis For Stability And Catalysis
1996	Molecular Biochemistry of *Thermoanaerobacter ethanolicus* 39E Amylopullulanase: Analysis of Substrate Cleavage Specificity And Thermophilicity By Site-Directed And Deletion Mutagenesis

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2007	Molecular Design And Characterization of *Thermoanaerobacter ethanolicus* 39E Secondary Alcohol Dehydrogenase For Chiral Aromatic Alcohol Sythesis And Cofactor Specificity Change
	Jack Preiss (1985-2009)
1989	Molecular Characterization of Bovine And Human Retinal Rod cGMP Phospodiesterase And Chromosamal Localization of The Human Gene
1994	Structure-Function Study On Allosteric Regulation of ADP-Glucose Pyrophosphorylase From *Cyangobacterium anabaena* PCC 7210
1997	Molecular Cloning of Maize Endosperm Soluble Starch Synthase 1
1997	The Allosteric Regulation Sites of ADP-Glucose Pyprophosphorylase From *Cyanobacterium anabaena* PCC 7120
1998	Glucose-1-Phosphate Site And Reductive Activation Mechanism of Potato Tuber ADP-Glucose Pyrophosphorylase
2000	Structural Analysis of Branching Enzymes And ADP-Glucose Pyrophosphorylase
2001	From Regulation To Catalysis: A Study of The ADP-Glucose Pyrophosphorylase Enzyme
2006	Structure Function Relationship Studies of *Escherichia coli* ADP-Glucose Pyrophosphorylase
	Susan Conrad, Microbiology and Molecular Genetics
1990	G1/S Phase Regulation of Thymidine Kinase Following Serum Induction of Quiescent Cells
2001	The Role of Retinoblastoma Protein And Insulin Like Growth Factor Signaling In Antiestrogen Resistance
	Robert Hausinger (1985-)
1990	Cloning, Sequence, And Characterization of The *Klebsiella aerogenes* Urease Operon
1990	Molecular Cloning, cDNA Sequencing, Expression In *E. coli* , Active Site Identification And Catalytic Mechanism of Pig Liver Thioltransferase
1991	Active Site Studies On *Klebsiella aerogenes* Urease, A Nickel- Containing Enzyme
1996	Urease Metallocenter Assembly in *Klebsiella aerogenes*

Year	Academic Advisor/Thesis Title
1998	Substrate Specificity And Spectroscopic Properties of 2,4-Dichlorophenoxyacetic Acid α-Ketoglutarate Dioxygenase
2008	New Insights In The Urease Activation Process Obtained By Characterization of Apourease Complexes And The Ureg Accessory Protein of *Klebsiella aerogenes*
2010	Characterization of Four Members of the Ferrous Ion and α-Ketoglutarate Dependent Hydroxylase Family From Trypanosoma brucei: Two Thymine Hydroxylase-like Proteins, J-Binding Protein 1, and an AlkB Homolog
	Steven Triezenberg (1988-)
1991	Critical Structural Elements of The VP16 Transcriptional Activation Domain
1993	Site-Specific And Random Mutagenesis Studies of The VP16 Transcriptional Activation Domain
1995	Mutational And Fluorescences Studies of The VP16 Transcriptional Activation Domain
1996	The Effect of Deletion Mutations of The Activation Domain of VP16 Upon Herpes Simplex Virus Type I Lytic Infection
1998	Mutational And Fluorescence Analysis of A Transcriptional Activation Domain of The VP16 Protein of Herpes Simplex Virus
1999	Structural And Functional Comparison of The Transcriptional Activating Domains of VP16 And RELA
2003	Phosphorylation of The Transcriptional Activator VP16 During Lytic Infection By Herpes Simplex Type 1
2004	VP16-Dependent Association of Chromatin-Modifying Coactivators And Under-Representation of Histones At Ie Gene Promoters During Hsv-1 Infection
2006	The Role of The VP16AD:TBP Interaction in Transcriptional Activation
	Lee Kroos (1988-)
1991	C-Signal Dependent Developmental Gene Expression in *Myxococcus xanthus*
1994	Characterization of The Role of The Spoiiid Switch Protein During *Bacillus subtilis* Sporulation
1994	Processing of A Mother-Cell-Specific Sigma Factor During Development of *Bacillus subtilis*
1997	Developmental Gene Expression Regulated By A Cascade of Sigma Factors in *Bacillus subtilis*

Year	Academic Advisor/Thesis Title
2000	Transcriptional Regularion of Genes Encoding Spore Coat Proteins By Mother-Cell Specific Sigma-K RNA Polymerase During Sporulation
2001	Characterization of Regulatory Mechanisms of Cell-Cell Interaction-Dependent Genes of *Myxococcus xanthus*
	Michael Denison (1988-1994)
1991	Characterization of The Interaction of TCDD: Ah Receptor Complexes With A Dioxin-Responsive Transcriptional Enhancer
	Rawle Hollingsworth (1988-)
1992	Role of Rhizobium Cell Surface Carbohydrates in Infection
1992	Dissection of Endotoxin Biological Activities Using Variant Lipid A And Synthetic Antagonists
1993	A Structural And Computational Analysis of Molecular Mechanisms For Membrane Adaptation To Extreme Stress
1993	Sialic Acid Analogues And Their Biological Application
1995	Studies On The Dynamics of Lipid Alkyl Chains In Biological Membranes Subjected To Environmental Stress
1996	Investigations of The Molecular Mechanisms For Host Specificity And Infection in The Rhizobium/Legume Symbiosis
1997	Lipopolysaccharides
1997	The Roles of Rhizobial Surface And Membrane Components In Symbiosis
1997	Characterization of Biochemical Elements Important For Host-Pathogen Interaction in The Rhizobium-Legume System: A Paradigm For Infection
1998	General Principles of Membrane Functions In Adaptation And Adptability of Bacteria To Extreme Environments
2005	Implementation And Evaluation of A Molecular Strategy For Delivery of Nucleic Acid Based Therapeutics
2009	A Real Time Bacterial Cell Detection System
	Nikos Panayotatos, Microbiology and Mol. Genetics
1993	Recombinant Nucleases As Probes For DNA Conformation In Vitro And In Vivo

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Year	Academic Advisor/Thesis Title
	Coleman P. Wold, Plant Biology
1993	Analysis of Pattern Formation In The Heterocyst-Forming Filamentous *Cyanobacterium anabaena* Sp. Pcc 7120
	Zachary Burton (1988-)
1993	Purification of The Human Basal Transcription Factor TFIIE Produced In Bacteria
1994	Production And Functional Study of Human RNA Ploymerase Ii General Transcription Factor Rap74
1995	Functions of Transcription Factor IIF In Initiation And Elongation By RNA Polymerase
1996	Mutagenic Analysis of Human RAP30, The Small Unit of General Transcription Factor Tfiie
1998	Functional Dissection of Human RAP74 In Transcriptional Initiation, Elongation, And Recycling
1999	Interactions of TFIIF in The Preinitiation Complex
2008	Pyrophosphate As A Dynamic Probe of The Human RNA Polymerase II Mechanism
2008	Downstream of NTP Effects On Human RNA Polymerase II Transcription Elongation
	David L. DeWitt (1993-)
1994	Examination of The N-Glycosylation And Membrane Association of The Prostaglandin Endoperoxide Synthase Isozymes
1996	The Transcriptional Regulation of Prostaglandin Endoperoxide Synthases-1 And -2 By 2,3,7,8-Tetrachlorodibenzo-P-Dioxin
1998	Plan B Masters Degree
2001	Plan B Masters Degree
2003	Examination of The Membrane Binding Domain of Human Cyclooxygenase-2 Enzyme Using Site Directed Spin Labeling And Electron Paramagnetic Resonance Spectroscopy
2007	Role of C-Terminal 18 Amino Acids For The Biological Activity of Prostaglandin Endoperoxide H Synthase-2
	Pamela Green (1998-2002)
1996	The RNS Family of S-Like Ribonucleases of *Arabidopsis thaliana* : Structures, Expression And Function

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Year	Academic Advisor/Thesis Title
1996	Structure, Function, And Regulation of Early Nodulin ENOD2 Genes From Legume Plants
1996	Identification and Characterization of Ribonucleases in *Arabidopsis thaliana*
1996	Genetic Analysis of Wax Ester And Triacyglycerol Biosynthesis in *Acinetobacter calcoaceticus* Strain BD413
1996	Cytokinin And Nitrate Regulation of Nitrate Reductase in *Agrostemma githago*
2000	The Role of The Cell Wall Degrading Enzymes *Cochliobolus carbonum* Pathogenicity
2001	The Xrn-Family of 5'-3' Exoribonucleases in *Arabidopsis thaliana*
2003	Inherent And Regulated mRNA Stability in *A. thaliana*
	Honggao Yan (1993-2009)
1998	Biochemical And NMR Studies of Human Cellular Retinoic Acid Binding Proteins
1999	NMR Studies of Human Annexin I And Yeast Guanylate Kinase
	Davis N. Arnsoti (1997-)
2000	Analysis of A Transcriptional Repressor in *Drosophila melanogaster*
2003	The Function And Design of CIS-Acting Enhancer Elements Regulated By Short-Range Transcriptional Repressors: Grammar Studies From *Drosophila melanogaster*
2004	Transcriptional Repression Mediated By The Drosophila Knirps Protein: Contributions of CtBP And RPD3
	Timothy Zachrewski (1998-)
2001	Molecular Basis of Estrogenic Endocrine Disruptor-Estrogen Receptor Interactions: A Comparison Among Species
2002	Reproductive And Genomic Effects of Gestational And Lactational Exposure To Estrogenic Endocrine Disruptors
2003	In Vitro And In Vivo Evaluation of The Potential Estrogenic Effects of Polycyclic Aromatic Hydrocarbons
2005	In Vivo Examination of The Inhibitory Effects of 2,3,7,8- Tetrachlorodibenzo-P-Dioxin On Estrogen-Mediated Gene Expression Responses

Year	Academic Advisor/Thesis Title
2007	Tissue-Specific in Vitro And in Vivo Evaluation of Tamoxifen-Meciated Gene Expression
2008	Cross-Species Comparison of Estrogenic Endocrine Disruptor-induced, Uterotrophic Gene Expression in The Rodent
2010	Integration of Genome-wide Computation DRE Search, AhR Chip-Chip and Gene Expression Analyses of TCDD-elicted Responses in the Mouse Liver
2010	Hepatic Toxicity and Polychlorinated Biphenyls:Toxicogenomic Examination of Single Congener and Mixture Effects in C57BL/6 Mice
	Leslie Kuhn (1994-)
2001	Computational Techniques For Modeling Protein-Ligand Interactions And Their Application To Serine Proteases And Asparaginyl-TRNA Synthetase
2002	An Analysis of Protein Folding By Decoding The Hierarchy of Native-State Structural Interactions
2002	Protein Rigidity And Flexibility: Applications To Folding And Thermostability
2003	Modeling Flexibility in Protein-Ligand Recognition
2007	Structure-Based Ligand Screening And Design For Aminoacyl-TRNA Synthetase Inhibitors
	R. Michael Garavito (1998-)
2001	Crystallographic Studies of Lipid Metabolism Proteins: The Enzymes SQD1 And PGHS-1
2005	A Crystallographic Investigation of Ligand Binding To Ovine Prostaglandin Endoperoxide H Synthase-1
2005	Structural And Functional Studies of The Enzymes Involved In A Bacterial GDP-D-Rhamnose Biosynthetic Pathway
	Kathleen A. Gallo (1998-)
2001	Molecular Mechanisms Regulating The Mixed Lineage Kinase MLK3
2003	The Rgulation of The Mixed Lineage Kinase 3 By Subcellular Localiztion
2006	Dynamic Regulation of Mixed-Lineage Kinase 3 By C-Jun N-Terminal Kinase-Mediated Phosphorylation

Year	Academic Advisor/Thesis Title
2007	Study of Tyrosine Kinase Like Protein Kinases: I. A Novel Role For Mixed-Lineage Kinase 3 In Mitochondria Through Its Interaction Protein, Adenine Nucleotide Translocase 2.; II. Characterization of Roc Domain of Parkinson's Disease-Associated Kinase, Leucine Rich Repeat Kinase 2.
	Natasha Raikel (1998-2000)
2001	Vacuolar Transport of ctVSS-bearing Proteins: A Genetic Approach
	Douglas Gage (1987-)
2001	Study of Methionine S-Methyl Transferase And S-Methyl Methionine Cycle
2002	The Biosynthesis of Dimethylsulfoniopropionate (MDSP) in Marine Dinoflagellates
	Christoph Benning (1998-)
2004	Lipid Metabolism Under Nutrient Stress in Rhodobacter And Chlamydomonas
2004	Chloroplast Anionic Lipid Biosynthesis And Function
2006	Construction And Characterization of A Cardiolipin-Deficient Mutant in *Rhodobacter sphaeroides*
2009	Functional Analysis of A Phosphatidic Acid Transporter in *Arabidopsis thaliana*
2010	Regulation of Lipid Metabolism in Response to Environmental Stress in Plants and Algae
	R. William Henry (2000-)
2005	Regulation of Human Small Nuclear RNA Gene Transcription By The Tumor Suppressor Protein P53
2005	Regulation of Human Small Nuclear RNA Gene Transcription By The Oncogenic Protein Kinase CK2
	Donna J. Koslowsky, Microbiology and Mol. Genetics
2005	Isolation And Characterization of *Tryypansoma brucei* PPR Proteins, Putative Mitochondrial RNA Metabolism Proteins
	Gregg Howe (1998-)
2005	Biochemical And Physiological Studies On Plant Oxylipins

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Year	Academic Advisor/Thesis Title
2007	Subcellular Localization And Function of The *Arabidopsis thaliana* Small GTPase RabE, A Host ineracting Protein of The *Pseudomans syringae* Virulence Effector Avrpto
2008	Biochemical Characterization of The COI1-JAZ Receptor For Jazmonate
2009	Role of JAZ Proteins in The Regulation of JA Signaling in Arabidopsis
	Min-Hao Kuo (2001-)
2006	Analysis of Gcn5 Function in His3 Expression in *Saccharomyces cerevisiae*
2010	investigating A Novel Function of Histone H3 in Mitotic Checkpoint Control in *Saccharomyces cerevisiae*
	Todd Alan Ciche, Microbiology and Mol. Genetics
2008	The Photorhabdus Temperata sspAB Locus Is Required For Symbiont Transmission in *Heterorhabditis bacteriophora*
	K. W. Osteryoung, Plant Biology
2008	Biochemical Analysis of The Chloroplast Division Proteins FtsZ1 And FtsZ2
	William D. Atchison, Pharmacology And Toxicology
2008	The Nematode *Caenorhabditis elegans* : A Model Organism For Study of Methyl Mercury Toxicity
	John L. McCracken, Chemistry
2003	Examination of The Membrane Binding Domain of Human Cyclooxygenase-2 Enzyme Using Site Directed Spin Labeling And Electron Paramagnetic Resonance Spectroscopy
2008	EPR Studies of Electron And Proton Transfer in Cytochrome C Oxidase
	Kenneth Keegstra (1997-)
2008	Transcriptional Networks involved in Response To Low Temperature Stress in *Arabidopsis thaliana*
2009	Conservation of The Low Temperature Transcriptomes And CBF Regulons in Solanum Species And Arabidopsis

Year	Academic Advisor/Thesis Title
	Charles Hoogstraten (2002-)
2008	Analysis of Ribose Dynamics In RNA Molecules Utilizing C13 NMR Spin Relaxation Techniques Determined With Novel Specific Isotope Labeling Scheme
	Dean DellaPenna (2000-)
2008	Functional And Evolutionary Characterization of Arabidopsis Carotenoid Hydroxylases
	James J. Galligan, Pharmacology And Toxicology
2009	Cross-Inhibition Between P2X And nAChR Ligand-Gated Ion Channels In The Enteric Nervous System
	L. Karl Olson, Physiology
2009	Pancreatic Beta-Cell Fatty Acid Metabolism And Modulation of Function in Response To Glucolipotoxicity
	John LaPres (2001-)
2008	Neutrophils And Idiosyncratic Adverse Drug Reactions Resulting From Inflamation-Drug Interaction: Rantidine And Diclofenac As Examples
2010	Identification and Functional Characterization of the Aryl Hydrocarbon Receptor Protein Interaction Network
	William Wedemeyer (2004-)
2009	Experimental And Computational Investigation of Early Events In Protein Folding
2010	Understanding the Structure of YscF, the Type III Secretion Protein from Yersinia and How it Forms Pili
	Jay Goodman, Pharmacology And Toxicology
2009	Identification of Genes Involved in Tumorigenesis That Are Deregulated, With An Emphasis On Altered DNA Methylation

Year	Academic Advisor/Thesis Title
	Robert Larkin (2003-)
2010	The Integration of Light and Plastid Signals
	Daniel A. Jones (2006-)
2008	Analysis of Alkali Metal-Cationized Pharmaceuticals Using Electrospray Ionization Tandem Mass Spectrometry
	Cindy Miranti, Physiology
2010	Molecular Mechanism for CD82 Suppression of HGF-Induced Met Activation and Invasion
	Nicholas S. Duesbery, Van Andel Research Institute
2010	Necessity and Sufficiency of Mitogen-activated Protein Kinase Kinase Signaling Pathways for Melanoma Cell Proliferation

Appendix 6.5

Awards

to

Faculty, Students, Office Staff, and Alumni

and

Endowments
Department of Biochemistry and Molecular Biology

1961-2010

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	National Academy of Science		
Year	**Awardee**	**Years on Faculty**	
1983	Charles Arntzen	(1980-1984)	
1984	N. Edward Tolbert	(1961-1990)	
1984	Joe Varner	(1965-1973)	
2007	Pamela Fraker	(1973-)	
Year	**Distinguished Faculty College Level**	**Distinguished Professor University Level**	**University Distinguished Professor**
1969		N. Edward Tolbert	N. Edward Tolbert
1970		Willis Wood	
1974		Olaf Mickelsen	
1980	Charles Sweeley		
1986	Al Tulinsky	Charles Sweeley N. Edward Tolbert	
1987		Al Tulinsky	
1988	Clarence Suelter	Veronica Maher	
1990	Loran Bieber Jerry Dodgson	J. Justin McCormick Clarence Suelter	Charles Sweeley

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Year	Distinguished Faculty College Level	Distinguished Professor University Level	University Distinguished Professor
1991		Loran Bieber John Wilson	
1992	Pamela Fraker	William L. Smith	J. Justin McCormick
1993	Shelagh Ferguson-Miller		
1994		Jack Preiss	
1995	Pamela Fraker William W. Wells		
1996	Jack Preiss Steven Triezenberg	Shelagh Ferguson-Miller John Wang	
1997			Shelagh Ferguson-Miller
1998	John Wilson	Pamela Fraker	Kenneth Keegstra
1999	Robert Hausinger		
2001	Jerry Dodgson Lee McIntosh		Jack Preiss William L. Smith
2002	Laurie Kaguni	Lee McIntosh	

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Year	Distinguished Faculty College Level	Distinguished Professor University Level	University Distinguished Professor
2003	Laurie Kaguni		
2007	R. Michael Garavito	R. Michael Garavito	Laurie Kaguni
2008		Dean DellaPenna	
2009	Christoph Benning Robert Hausinger	Christoph Benning Robert Hausinger	Pamela Fraker
2010		Gregg Howe	

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The John A. Boezi Memorial Alumnus Award

Professor John A. Boezi was born in Binghamton, NY. He graduated from St. Bonaventure University and received his doctorate from the University of Illinois. He did post-doctoral work at the Carnegie Institution of Washington in Baltimore, MD and at the National Center for Scientific Research in France. In 1963, he joined the faculty of the newly formed Department of Biochemistry at Michigan State and played a pivotal role in developing molecular biology as an important aspect of the Department.

One major research effort of the Boezi laboratory was the Marek's disease virus, a herpesvirus that causes malignant lymphoma in susceptible chickens. He and his colleagues identified and characterized Marek's disease virus-induced DNA polymerase in productively infected cells and elucidated the mechanism of phosphonoacetate inhibition of the viral DNA polymerase. Phosphonoacetate has proved to be a specific and effective inhibitor of the replication of Marek's disease virus, herpes simplex virus types 1 and 2, Epstein-Barr virus, and human cytomegalovirus.

In 1977, Professor Boezi was honored with a Josiah Macy Foundation fellowship for a sabbatical year in the laboratory of Dr. I. Robert Lehman at Stanford University.

At Michigan State, Professor Boezi was also recognized as an excellent teacher. His dedication to teaching and his uncompromising principles of integrity and performance were respected by students and faculty colleagues. His untimely death in 1980 has inspired the establishment of an award, given annually in his memory, to a B.S., M.S., or Ph.D. recipient from this Department who has gone on to a distinguished career that reflects the qualities personified by John Boezi.

	John A. Boezi Memorial Alumnus Awardees				
Year	**Awardee**	**Degree**	**Year**	**Awardee**	**Degree**
1983	Donald W. Carlson	PhD, 1961	1996	Philip L. Felgner	Ph.D., 1978
1984	Allen T. Phillips	Ph.D., 1964	1997	Arlyn Garcia-Perez	Ph.D., 1984
1985	John A. Gerlt	B.S. 1969	1998	Ann E. Aust	Ph.D., 1975
1986	George H. Lorimer	Ph.D., 1972	1999	Peter A. Steck	Ph.D., 1981
1987	Lawrence B. Dumas	B.S., 1963	2000	Sally Camper	Ph.D., 1983
1988	Douglas D. Randall	Ph.D., 1970	2001	Anthony Serianni	Ph.D., 1980
1989	Ronald C. Desrosiers	Ph.D., 1975	2002	John Blenis	Ph.D., 1983
1990	George M. Stancel	Ph.D., 1970	2003	Marcia Kieliszewski	Ph.D., 1989
1991	Raymond J. Dingledine	B.S., 1971	2004	Paul Rosevear	Ph.D., 1980
1992	Howard C. Towle	Ph.D., 1974	2005	David Hart	Ph.D., 1969
1993	A. Stephen Dahms	Ph.D., 1969	2006	Andrew Ellington	B.S., 1981
1994	Sherwood R. Casjens	M.S., 1967	2007	Ming Tien	Ph.D., 1981
1995	Friedhelm Schroeder	Ph.D., 1973	2009	John Pierce	Ph.D., 1980

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The R. Guarth Hansen Award

The R. Guarth Hansen Award has been established to recognize outstanding young scientists who received their undergraduate or graduate training in the Department of Biochemistry and Molecular Biology at Michigan State University and are now in the early stages of a promising scientific career. Beginning in 2008, this award will be granted in alternate years of the Boezi award.

2009 Awardee: Jason Mathews, PhD, 2001

Outstanding Graduate Teaching Award: Presented to a student for exceptional performance as a graduate teaching assistant during his or her graduate program.

1994: Elizabeta B. Meyer
1995: Carol A. Mindock Wilkins
1997: Tonya Laakko
2000: Kim Binderup
2002: Elena Bray?
2003: Meghana Kulkarni
2007: Sean Law
2008: Anna Kopec
2009: Jana Simmons
Emily Harper
2010: Yi Zheng

Outstanding Graduate Research Award: Presented to a student working with a BMB faculty member as their major professor (not limited to BMB program graduate students) who has excelled in scholarship, research and teaching activities during his or her career in this department. Candidates should be graduate students in their final year of study.

2007: Martin Buckley
2008: Leron Katsir
2009: Hoo Sun Chung
2010: Fei Zheng

Undergraduate Research Fellowship: BMB Undergraduate Research Awards are given to MSU BMB undergraduate majors to pursue research in the laboratory of a BMB faculty member.
1991: Kathryn J. Ryan
1992: Joseph L. Lipar
1993: Vanita D. Jaglan
1999: Ali Mahajerin
Trevor T. P. Barkham
Danielle C. Pellek
2000: Janel Funk

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Todd A. Lydic
Andrew J. Zimolzak
Curtis R. Pickering
2003: Jay Sage
Aaron Kosinki
Irene Flick
2004: Cassandra Campbell
Shanna Ashley
2005: Kartik Viswanathan
Keyunna Castleberry-Austin
Monica Markovski
Bryan Mets
Nathan Zokoe
2006: Seth Dickey
Bryan Mets
2007: Andrea Stavoe
Ardian Coku
Jun Seok Lee
Seth Dickey
2008: Umakanth Avula
Nicole Baker
Greg Fedewa
Paul Luethy
Marie Fedewa
Chong Kim
AndreaStavoe
2009: Ashley Bourke
Xuemei Ye
Dennis Miner
Lauren Grenzicki
Yiwei Ma

Professor Richard L. Anderson Endowed Undergraduate Research Prize ($2,000, 1 award per year):

2010: Tomomi Takeuchi

Dr. James K. Billman, Jr., Undergraduate Research Award(s) (~$1000) 1-3 awards per year):

2010: Robin Green
Samuel Saitie
Christian Merrill

Outstanding Graduate Student Awardees
1983: Calvin F. Roff
1984: Paul F. Bates
1985: Diane White Husic
1986: Ioannis Moutstatsos

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Craig E. Thomas
1987: Chun-Nan Chen
1988: Linda C. Gregory
1989: Marcia J. Kieliszewski,
Qingping Wang (Honorable Mention)
1990: Theodore Rupp
Matthew J. Todd
1991: Ruey-Hwa Chen
W. Douglas Cress
1992: Hector Beltrandelrio
1993: Richard B. Halberg
1994: Yee-Yung Charng
David L. Lewis
1995: Pauline A. Bariola
1996:Mary Beth C. Moncrief
Mark D. Sutton
1997: Wenjing Liu
1998: Ruth E. Saari
Andrew G. Spencer
Yuejun Zhen
1999: Mark M. Kadrofske
2000: Li Fan
James P. Kastenmayer
2001: Otis Vacratsis
2002: Mark R. Fielden
2003: Bryan J. Schmidt
2004: Francisco Herrera
Wayne Riekhof
2005: Ling Qin
2006: Darrell Boverhof
Clarisa Bejar
2007: Colleen Doherty
2008: James E. Johnson
Anna Kopec
Leron Katsir
2009: Michael E. Ruckle
2010: Eric Moellering

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Outstanding Undergraduate Student Awardees

1983: Peggy A. Scherle
Julie M. Vogel
1984: John M. Andersland
Roger A. Wagner
1985: Sandra M. Pinnavaia
1986: Rebecca L. Dutch
1987: Sally A. Meiners
1988: Stephen F. Anderson
April J. Ping (Honrable Mention)
1989: Lanie C. Stephens
1990: Robert W. Burgess
Midori A. Harris (Honorable Mention)
Charles G. Hoogstraten (Honorable Men tion)
1991: Amy M. Poynor
1992: Corwin F. Kostrub
James P. White
1993: Michael J. Potter
1994: Tanya M. Leinicke
Vanita D. Jaglan (Honorable Mention)
Joseph L. Lipar (Honorable Mention)
1995: Melissa S. Wessling
1996: Jennifer A. Loconto
Paul Sanschagrin (Honorable Mention)
1997: Angela L. Purcell
Anthony T. Lagina (Honorable Mention)
Augen A. Pioszak (Honorable Mention)
Debrah M. Thompson (Honorable Mention)
1998: Michael E. Young
1999: Matthew T. Merski
2000: Tyra L. Frazier
Renee L. Micielli
2001: Andrew Antczak
2002: Janel D. Funk
2003: Woo Jung Moon
2004: Greta Monterosso
David Taggart
2005: Catherine Beauduy
Katherine Ruby
2006: Monica Markovski
2007: Seth Dickey
2008: Andrea Stavoe
2009: Yiwei Ma
2010: Xiaozhou Liu
Tom Cooke

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BMB Undergraduate students at the 2009 Boezi Banquet. (l to r) Katie Kim, Dennis Miner, Ashley Burg, Ardien Coku, Lauren Grenzicki, John Krcatovich, Xuemei Ye, Paul Luethy, Marissa Cann, Sarah Haskins, Marcos Gutierrez, Matt Karczewski, Adrienne Williams, Nocole Baker, Saundra Hempel, Shaimah Al-Failakawi, Tom Cooke, Irem Peker. Courtesy of Melinda Kochenderfer and Neil Bowby.

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Biochemistry and Molecular Biology Endowments as of 2011

Biochemistry Enrichment Fund Endowment
Provides support to departmental projects, which may include, but are not limited to: student awards, equipment purchases, faculty travel, research awards or other unbudgeted expenses.

Department of Biochemistry Undergraduate Fellowship
Award is intended to allow the student recipient support for education while devoting time toward a research project. Students will need to carry at least a 3.0 GPA and be a junior or senior at the time the award is activated. Information about the process, applications, and required materials will be available from the Undergraduate Office, Department of Biochemistry.

Dr. Jack Preiss Endowment in Biochemistry
Will be funded by a future gift to support a faculty position or graduate fellowship in the Department of Biochemistry and Molecular Biology

Dr. Richard U. and Claire M. Byerrum Endowed Fellowship
To Graduate/All majoring in Biochemistry and Molecular Biology

Prof. Richard L. Anderson Endowed Undergraduate Research Prize
This Award is intended to allow a student recipient support for education while devoting time toward a research project.

Dr. James K. Billman, Jr., Undergraduate Research Award(s)
This Award is intended to allow a student recipient support for education while devoting time toward a research project.

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Pamela J. Fraker Undergraduate Scholarship Endowment in Biochemistry
Preference will be given to students who have achieved sophomore status, who demonstrate financial need and who have earned a 3.0 GPA. If there are no eligible Biochemistry majors, other College of Natural Science students, meeting these criteria, may be considered.

William W. Wells Lectureship in Biochemistry
The financial obligations of the William W. Wells Endowment Fund are to be limited to the following: 1). Travel including round-trip airfare, lodging and meal expenses incurred by the Lecturer during the visit. 2). Refreshments for the lecturer, receptions held in the Biochemistry Department and meal reimbursements for faculty who are involved in accompanying the Lecturer to meals. 3). An honorarium for the lecturer to be presented in check form. 4). The printing of brochures and posters to advertise the Lectureship.

N. Edward Tolbert Endowed Lectureship in Plant Biochemistry
The N. Edward Tolbert Endowment Fund is to be used for the following: 1). Travel including round-trip airfare, lodging and meal expenses incurred by the Lecturer during the visit. 2). Refreshments for the lecturer, receptions held in the Biochemistry Department and meal reimbursements for faculty who are involved in accompanying the Lecturer to meals. 3). An honorarium for the lecturer to be presented in check form. 4). The printing of brochures and posters to advertise the Lectureship.

Dr. Charles C. Sweeley Lectureship in Biochemistry
Lectureship Requirements: (a) The Charles C. Sweeley Lectureship is to be held each year and consist of a lecture from a prominent scientist in the field of biochemistry. (b) The Lecturer must agree to present a one-hour lecture in his or her field. (c) The financial obligations of the Sweeley Lectureship are to be limited to: 1). Travel including round-trip airfare, lodging and meal expenses incurred by the Lecturer during the visit 2). Refreshments for the lecturer, receptions held in the Department of Biochemistry and meal reimbursements for faculty who are involved in accompanying the Lecturer to meals. 3). An honorarium for the lecturer to be presented in check form. 4).

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The printing of brochures and posters to advertise the Lectureship.

Anne L. Wedemeyer Endowed Research Scholarship
Recipient will participate in qualified biochemistry research opportunities related to the study of structures of biologically and medically important proteins. Awarded primarily to undergraduate individuals who will be sophomore, junior or senior level when receiving the scholarship and majoring in biochemistry and molecular biology. Scholarship awarded without regard to financial need. Scholarship awarded on basis of creativity, passion, and dedication, not necessarily measured by grades. Female students will primarily benefit.

The R. Gaurth Hansen Lecture
Expenditures from the Endowment will be used to support a Lectureship for Department of Biochemistry and Molecular Biology at the discretion of its Chairperson, or for any future successor MSU unit. Lectureship candidates will have received undergraduate research training in the laboratory of a faculty member of the Department of Biochemistry and Molecular Biology, graduate research training leading to the Ph.D. in Biochemistry and Molecular Biology, or graduate training leading to the Ph.D. in a program with which the Department of Biochemistry and Molecular Biology faculty mentor is affiliated. Recipients will currently be within their first six years of a tenure track appointment (Assistant Professor or equivalent) at an established academic institution, or in the equivalent early stages of a career in a non-academic setting. In either case, the selected candidates will have a record of excellence in accomplishments thus far, and demonstrated qualities that provide a basis for expecting future outstanding performance in their chosen career.

The Department of Biochemistry and Molecular Biology Legacy Endowment
Expenditures from the Endowment will be used for Department of Biochemistry and Molecular Biology purposes at the discretion of its Chairperson.

John A. Boezi Memorial Alumnus Award in Biochemistry
Candidates for the award shall be chosen from among the Department's Bachelors, Master, and Doctoral de-

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gree alumni. The Department of Biochemistry Award Selection Committee will select final candidates for the award based on the criteria of distinguished achievements in the field of Biochemistry.

Awards to Office Staff

Jack Breslin Distinguished Staff Award
1983: Betty Brazier

Clerical Technical Recognition Award
2003: Helen Farr

Faculty Professional Women's Association Outstanding Professional Award
2009: Teresa Vollmer

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Appendix 6.6

Memories of Research Laboratory Equipment

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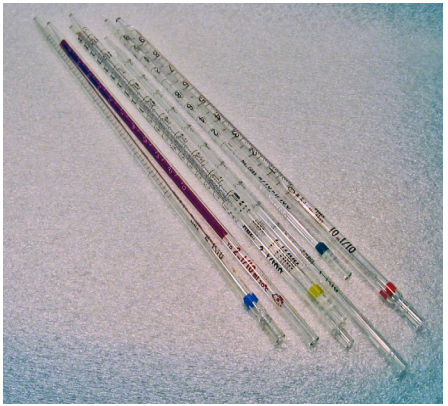
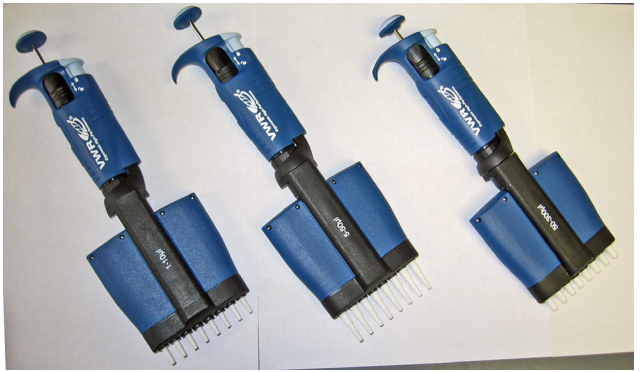


Glass pipets. Courtesy of the Michigan State UIniversity Musuem Historical Collections.

Courtesy of the Michigan State UIniversity Musuem Historical Collections.

Three pipetman. Courtesy of Neil Bowlby.

Courtesy of the Michigan State UIniversity Musuem Historical Collections.



Tri Pipetman. Courtesy of Neil Bowlby.

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Laboratory glassware. Courtesy of the MSU Museum.

Plastic laboratory containers. Photograph courtesy of Claire Veille.

Assortment of glass test tubes. Photograph courtesy of Neil Bowlby.

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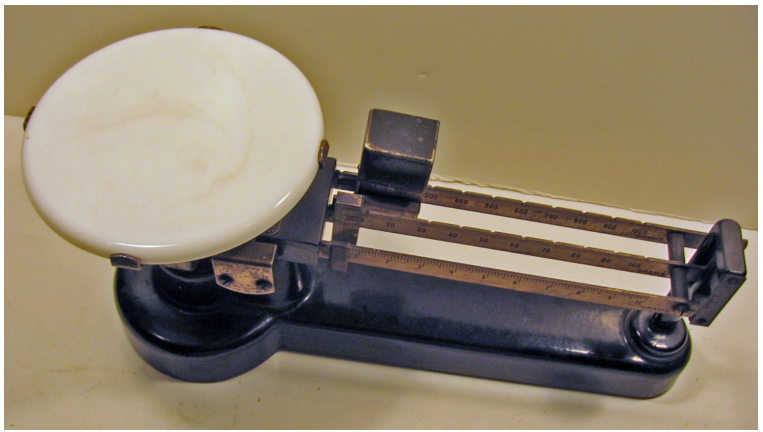
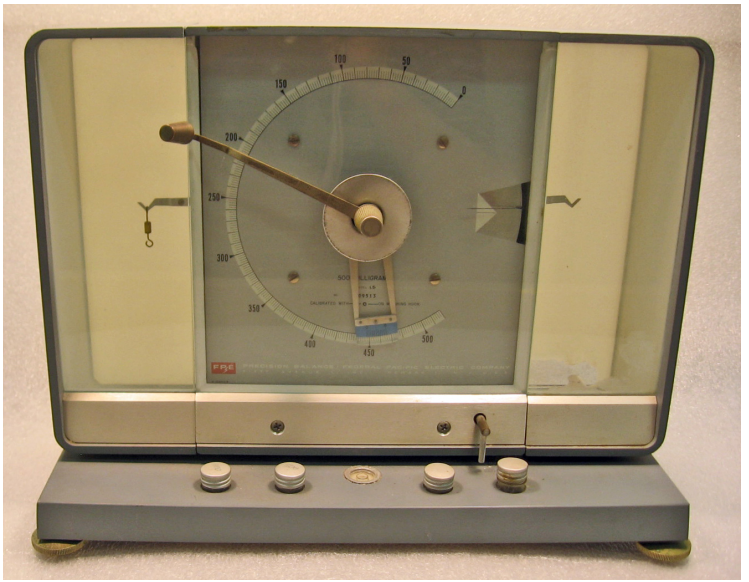
Torsion Balance, KL 7532, made by the Torsion Balance Co. Clifton, NJ. Courtesy of the Michigan State UIniversity Musuem Historical Collections. This instrument was originally purchased by the Chemistry Department in August 1963 for $180. Courtesy of Robert Keck, MSU Services.



Balance made by the Central Scientific Co., Chicago, Il. Courtesy of the Michigan State University Historical Collections.



Federal Pacific Scale, BS 3766. Courtesy of the Michigan State UIniversity Musuem Historical Collections. The Center for Integrative Studies-General Science originally purchased this instrument in July 1967 for $259. Courtesy of Robert Keck, MSU Services.

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Standard weights purchased by the Chemistry Department in June 1946 for $20. Courtesy of the Michigan State UIniversity Museum Historical Collections.

Analytical balance purchased by the Department of Soil Science in February 1937 for $60.00. Courtesy of the Michigan State UIniversity Museum Historical Collections.

Mettler Balance purchased by the Department of Medicine in February 1972 for $770. Courtesy of the Michigan State UIniversity Museum Historical Collections.

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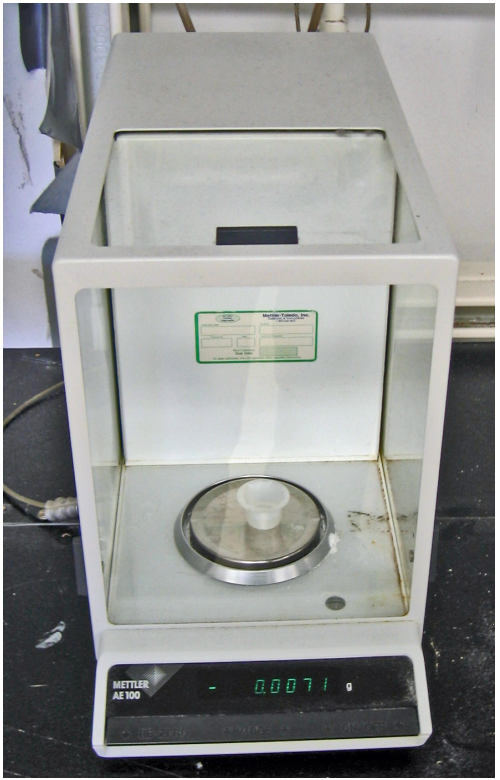
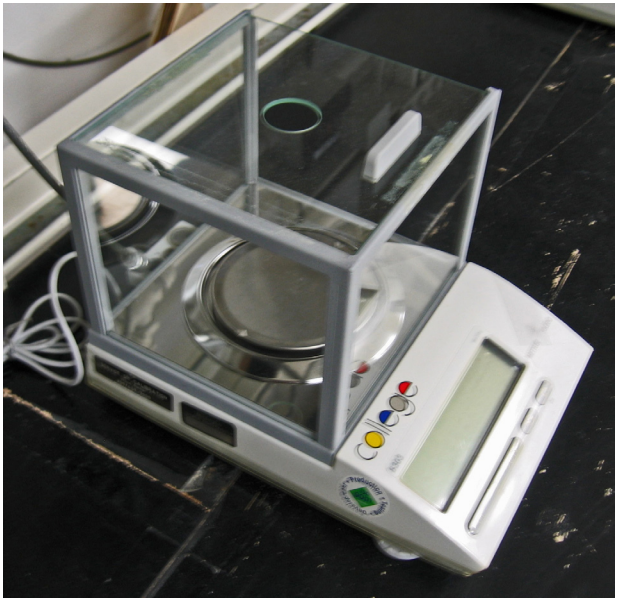


Mettler balance, AC 7987, purchased by the Biochemistry Department in February 1993 for $1817. Courtesy of Robert Keck, MSU Services. Courtesy of Neil Bowlby.



Mettler balance, AC 8158, purchased by the Biochemistry Department in November 1994 for $799. Courtesy of Robert Keck, MSU Services. Courtesy of Neil Bowlby.

Mettler PC 400 balance. No inventory number. Courtesy of Neil Bowlby.

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Bunsen Burner, Tirrel Type, H-Base, and its container. It was made by the Central Scientific Co. Courtesy of the Michigan State UIniversity Museum Historical Collections.

Folded filter paper. Courtesy of the Michigan State UIniversity Museum Historical Collections.

Hot plate. Courtesy of the Michigan State UIniversity Museum Historical Collections.

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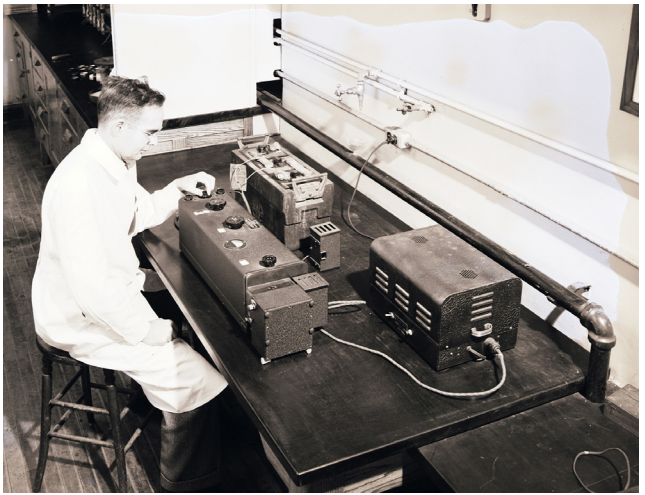
Klett Summerson Colorimeter, AC 3097, purchased by the Agricultural Chemistry Department in October 1956, for $227. Courtesy of Robert Keck, MSU Services.

Spectronic 20 Colorimeter, AP 1738, was purchased by the Department of Animal Pathology in November 1966 for $292. Courtesy of the Michigan State UInversity Museum Historical Collections.

Beckman Du Spectrophotometer being used by Professor Bob Evans. in October 1947. Courtesy of the Michigan State University Archives and Historical Collections (Media Collection, Negative 4656B.)



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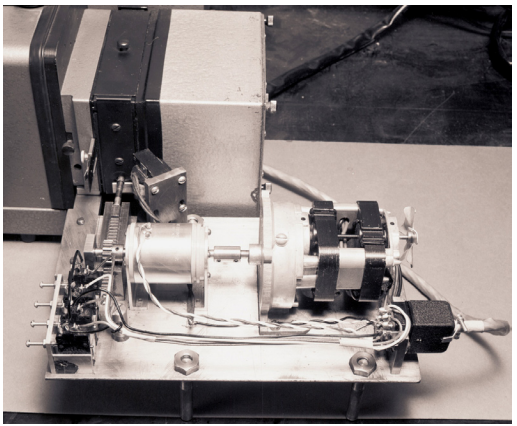
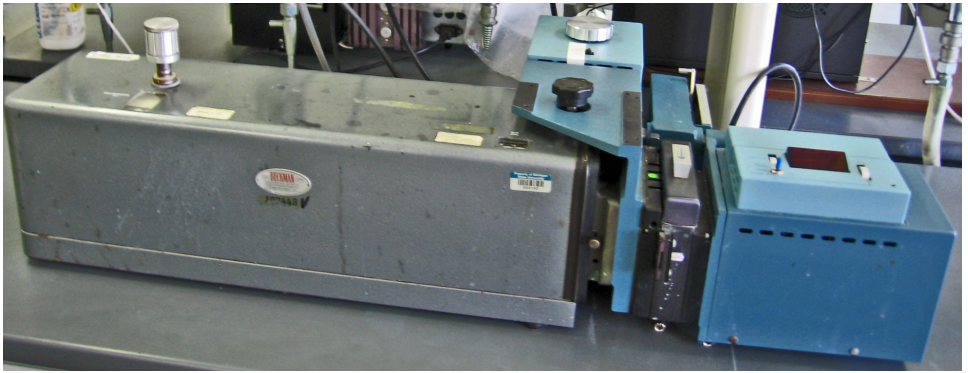
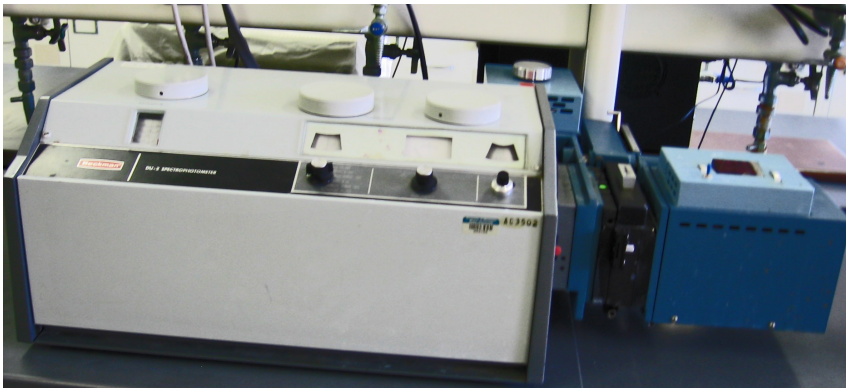


Electronic box (upper view) (Courtesy of Don Beitz) used in conjunction with the Automatic cuvet changer that formed the basis of a patent for a cam operated commercial cuvet changer issued to Saul Gilford and Willis Wood (Wood and Gilford, 1961). Courtesy of the Michigan State University Archives and Historical Collections, (Media Collection, Negative 22931).



Beckman DU Spectrophotometer, 003162, originally purchased by the Department of Biochemistry in December 1962 for $7215. It was updated with a Gilford Attachment on December 20, 1996. Courtesy of Robert Keck, MSU Services. Courtesy of Neil Bowlby.



Beckman DU 2 Spectrophotometer, AC3499, was purchased by the Department of Biochemistry in May 1965 for $2760. Courtesy of Robert Keck, MSU Services. Courtesy of Neil Bowlby.

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Gilford Standard cuvettes. Photograph courtesy of Neil Bowlby.

Nanodrop ND-2000C Spectrophotometer with cuvette, 100133, purchased by the Department of Biochemistiry and Molecular Biology in September 2009 for $10,500. Courtesy of Dean DellaPenna.

Spectrophotometer by Ocean Optics. Courtesy of Neil Bowlby.

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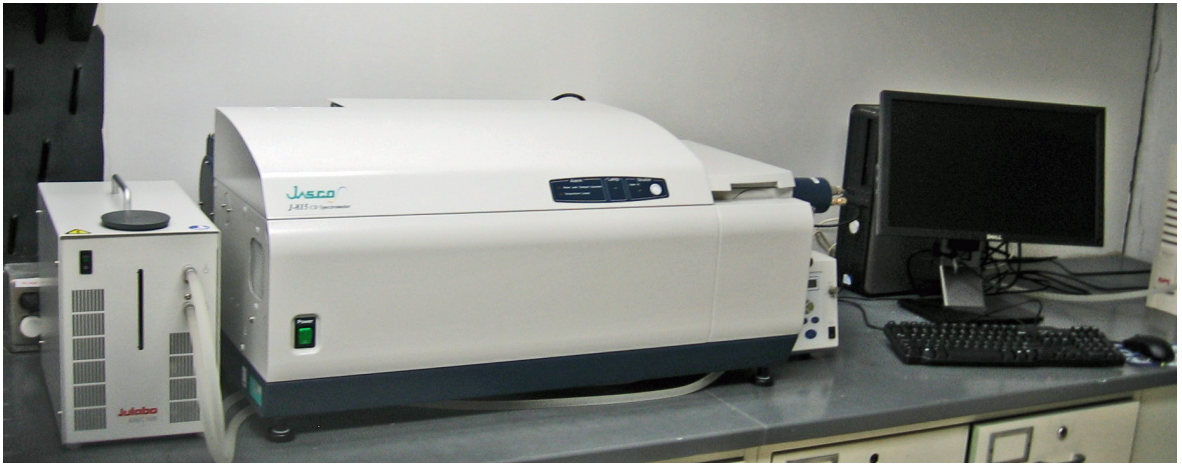
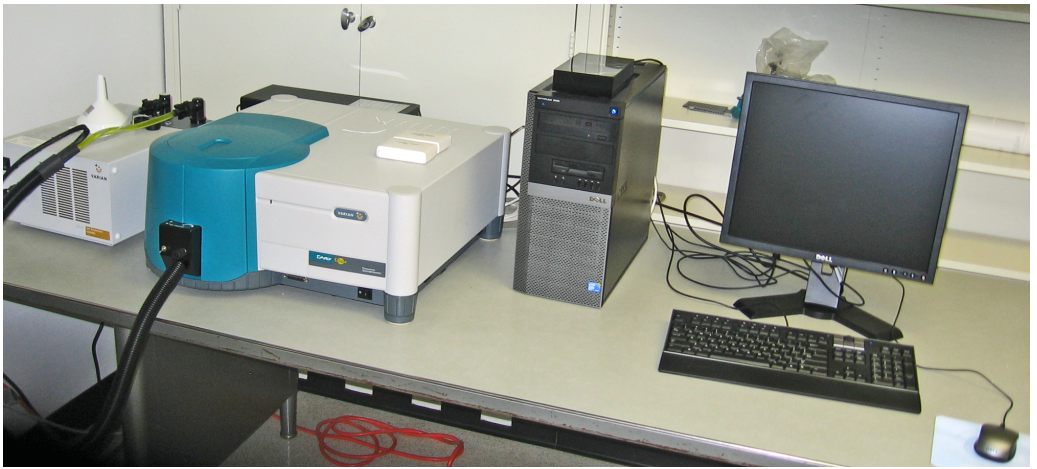


Jasco 815 CD Spectrometer.
Courtesy of Barbara Atshaves.

Varian Eclipse Fluorescence Biomelt Spectrophotometer, 100256, was purchased by the Department of Biochemistry and Molecular Biology in October 2009 for $30,602. Courtesy of Robert Keck, MSU Services. Courtesy of Barbara Atshaves



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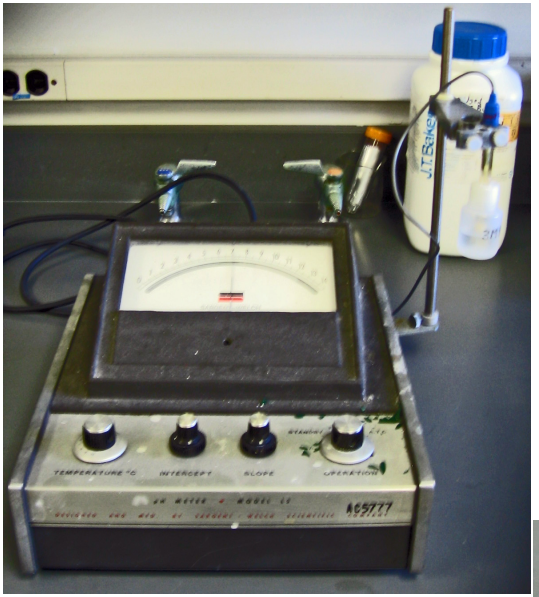
Beckman pH Meter, BP 3356, was purchased by the Department of Microbiology and Public Health in November 1953 for $345. Courtesy of the Michigan State UIniversity Museum Historical Collections.



Sargent Welch pH Meter, AC 5777, was purchased by the Department of Biochemistry in December 1977, for $369. Courtesy of Robert Keck, MSU Services. Courtesy of Neil Bowlby.

pH Meter. Courtesy of Neil Bowlby.

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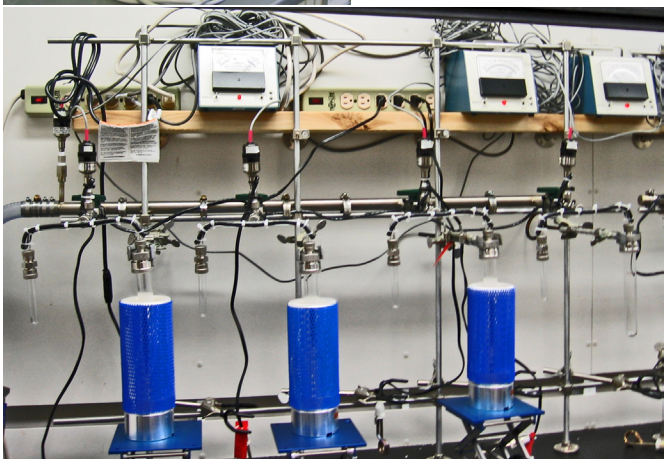
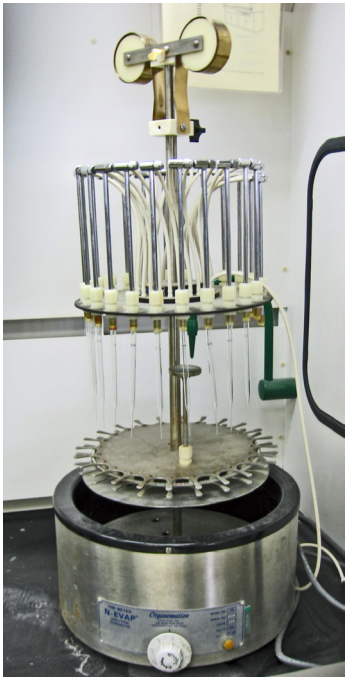
Buchi Rotary Evaporator, YC 1158, was purchased by the Plant Research Laboratory in June 1969 for $594. Courtesy of Robert Keck, MSU Service. Courtesy of Suzanne Hoffman-Benning.



Cryogenic Water Extraction System used for stable isotope analysis. Adam G. West*, Shela J. Patrickson and James R. Ehleringer. Rapid Commun. Mass Spectrom. (2006) 20: 1317–1321. Courtesy of Hui Yang and Eric Hegg. .

Protein concentrator. Courtesy of Jon Kaguni.



Evaporator, organomation, AC 6184, was purchased by the Department of Biochemistry in June 1979 for $521. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Neil Bowlby.

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Professor Richard U. Byerrum detecting radioactivity in a tobacco plant in 1955. Courtesy of the Michigan State University Archives and Historical Collections, UA3401, (Broadcast/Marketing/Photos, Box 5, Folder 16)

Beckman LS Scintillation counter, 011728, was purchased by the Department of Biochemistry and Molecular Biology in January 2000, for $16,655. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Jon Kaguni.

Liquid water isotope ratio analyzer, 023324, was purchased by the Department of Biochemistry and Molecular Biology in June 2009, for $36,950. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Eric Hegg.

Agilent Technologies 1200 Series HPLC, 100067, was brought from Texas A & M University to the Department of Biochemistry and Molecular Biology in September 2009: value $11,538. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Barbara Atshaves

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Laboratory centrifuge, International, AC 2196, was purchased by the Department of Biochemistry in July 1961 for $156. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Neil Bowlby.

Sorvall Centrifuge, SS3, AC 3549, was purchased by the Department of Biochemistry in November 1965 for $885. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Neil Bowlby.

Beckman Microcentrifuge, Model E, AC 8109, was purchased by the Department of Biochemistry in July 1994 for $1,145. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Neil Bowlby.

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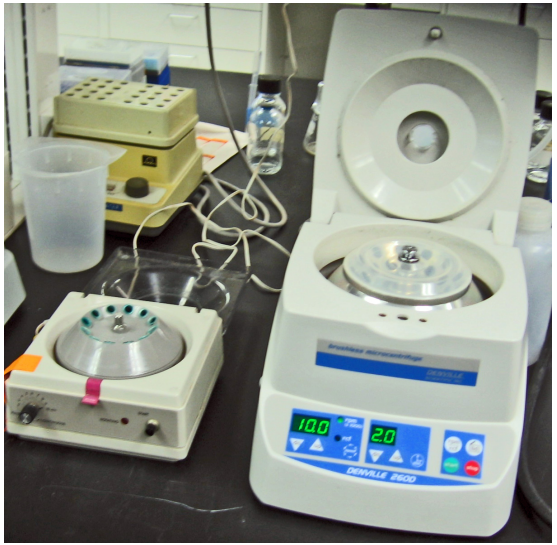

A sampling of small centrifuges that cost under $5,000.
Photographs courtesy of Claire Veille

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Centrifuge, no inventory number. Photograph courtesy of Claire Veille

Sorvall RC-6 Centrifuge, 100742, was purchased by the Department of Microbiology and Molecular Genetics in May 2010, for $24,419. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Claire Veille

Sorvall Discovery M120 SE Micro Ultracentrifuge, 018308, purchased by the Department of Biochemistry and Molecular Biology on August 24, 2005 for $36,697. Courtesy of Robert Keck, MSU Services. Photogpraph courtesy of Christoph Benning.

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Sorvall Centrifuge, RC 2B, was purchased by the Department of Biochemistry in July 1970 for $2,905. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Neil Bowlby.

Beckman Coulter Optima L-90K Ultracentrifuge, 013268, was purchased by the Department of Biochemistry and Molecular Biology in June 2006 for $26,080. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Michael Garavito.

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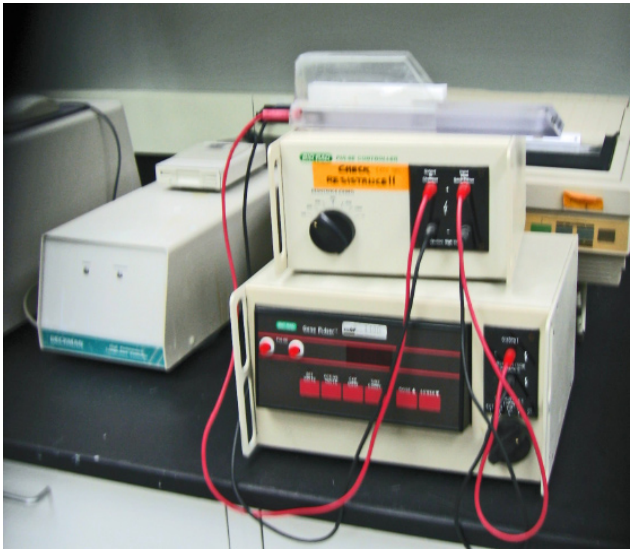
LabNet International Multigene Thermal Cycler. No Inventory Number. Photograph Courtesy of Claire Veille.



Gene Pulser Electroporation. No inventory number. Photograph courtesy of Claire Vielle.

Corbett Research Rotor-Gene 6000, 022715, was purchased by the Department of Biochemistry and Molecular Biology in December 2008 for $26,550. Photograph courtesy. of Dean DellaPenna.

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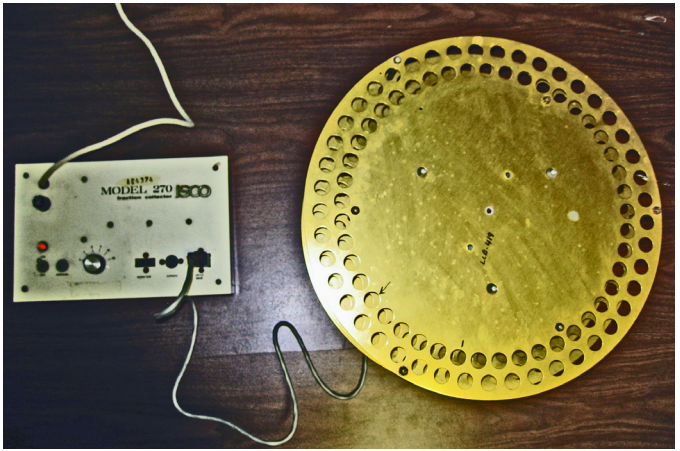
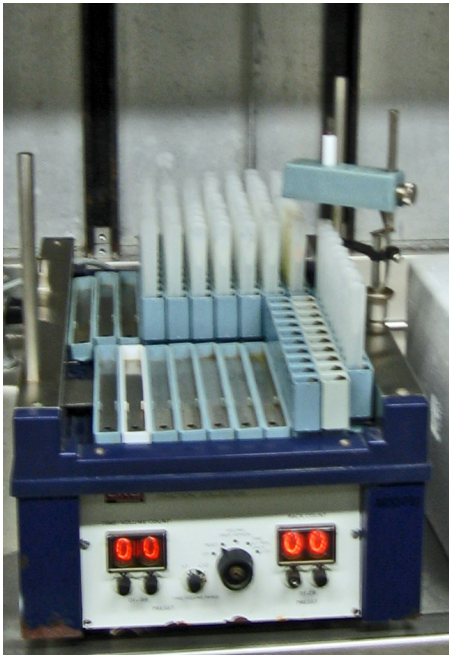
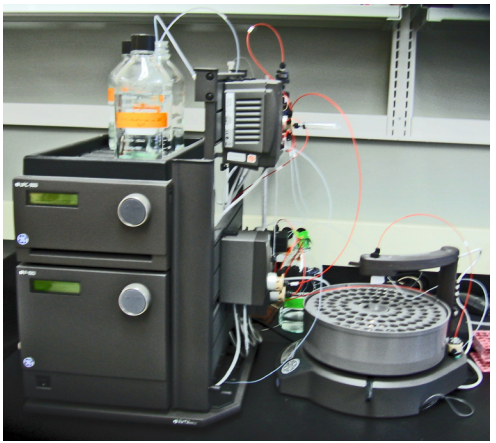
ISCO Fraction Collection, AC 4374, was purchased by the Department of Biochemistry in September 1968 for $326. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Christoph Benning.





LKB Fraction collector, AC 5571, was purchased by the Department of Biochemistry in July 1976 for $2163. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Jon Kaguni.



Fast protein liquid chromatograph with fraction collector. Photograph courtesy of Claire Veille.

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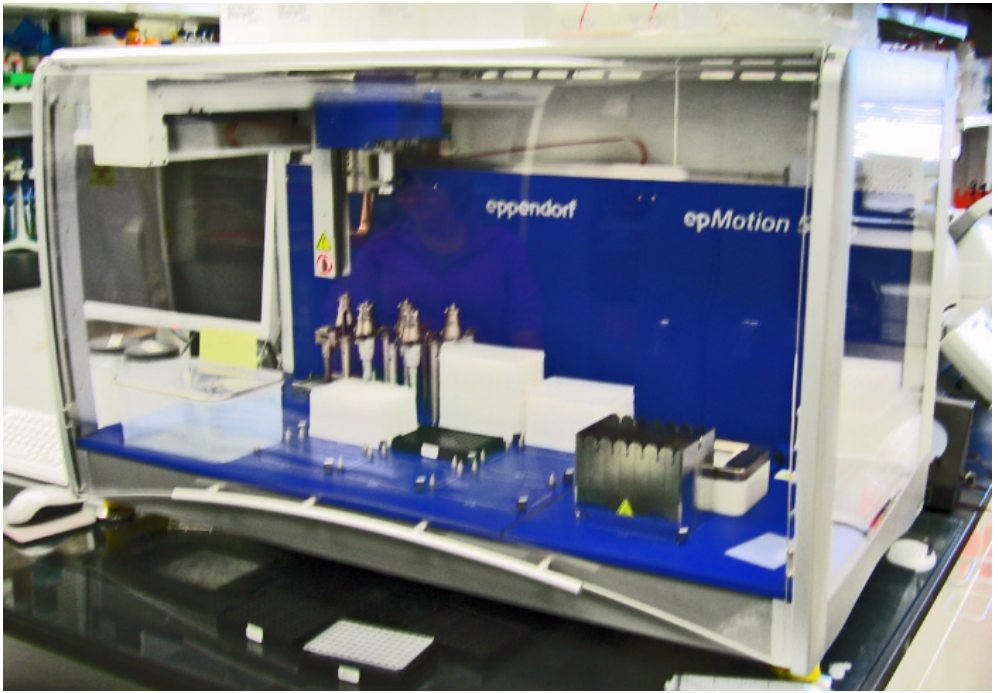
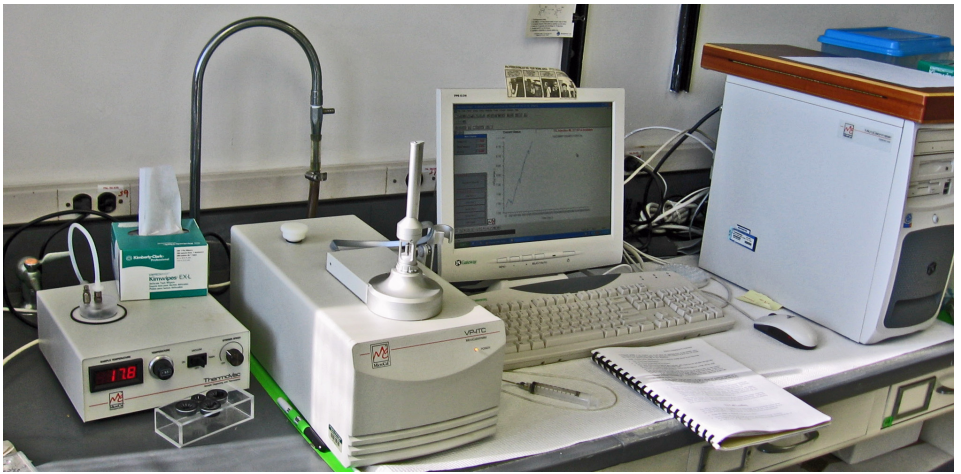


Eppendorf Epmotion 5075 Auto-Pipitting System, 100109. was purchased by the Department of Microbiology and Molecular Genetics in October 2009 for $66,808. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Claire Veille.

Crystal Gryphon System, 100198, was purchased in November 2009 for $56,920. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Carrie Hiser and Shelagh Ferguson-Miller. Gryphon from Art Robbins Instruments.

The Gryphon is a multiposition, high-throughput liquid-handling platform that incorporates a space-saving design with flexible dispensing options.

Reichert Surface Plasmon Resonance Spectrometer System, 100334, was purchased by the Department of Biochemistry and Molecular Biology in January 2010 for $70,000. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Charles Hoogstraten.



Microcalorimeter, 015217, was purchased by the Department of Biochemistry and Molecular Biology in August 2002 for $76,500. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Charles Hoogstraten.

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American Laboratory Steriliser. Photograph courtesy of Neil Bowlby..

Modern sterilizer. Photograph courtesy of Claire Veille.

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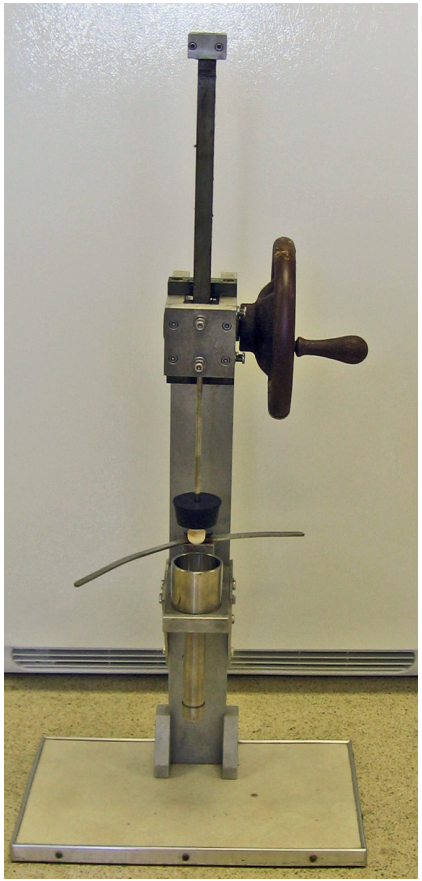

Embryo squasher. Photograph courtesy of Laurie Kaguni.

VirTis Homogeniser, AC 2548, was purchased by the Department of Biochemisry in August 1962 for $383. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Neil Bowlby.

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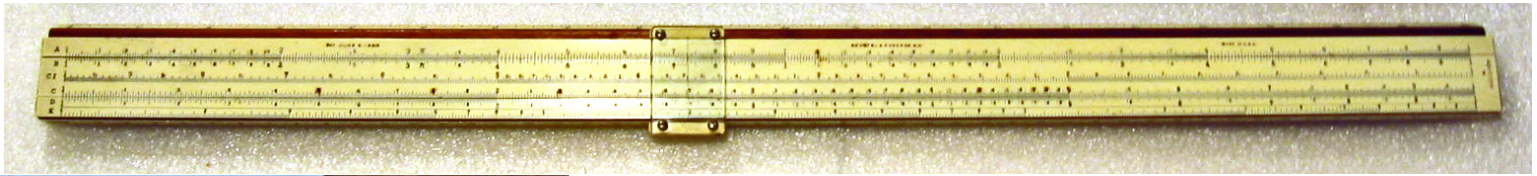
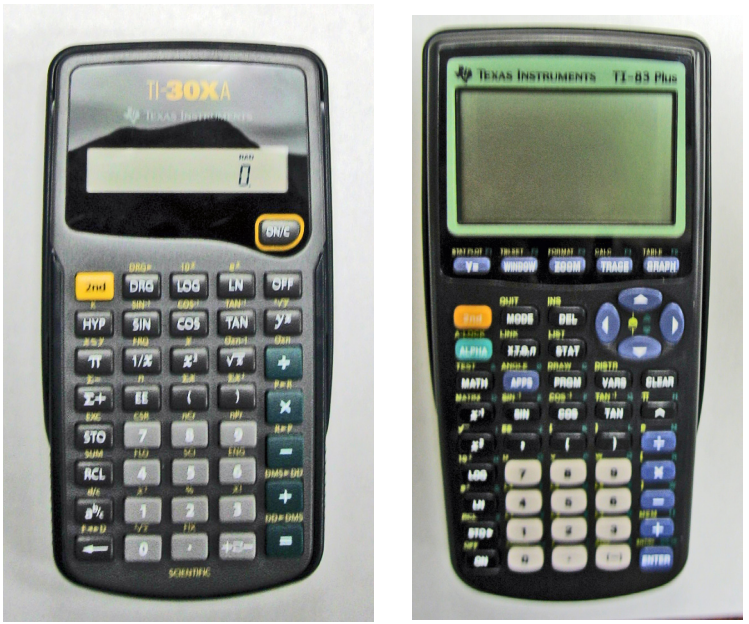


Slide rule and Monroe Calculator. Courtesy of the Michigan State UIniversity Museum Historical Collections. The slide rule was patented by Keuffel and Esser Co., New York on June 5, 1900, It is 20 1/2 inches long. The Monroe Calculator was purchased in 1938 for $85.



Hand held calculator (left) and graphing calculator (right). Photograph courtesy of Jon Stoltzfus.

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Heathkit Personal Computer. Courtesy of the Michigan State University Museum Historical Collections.

Zenith 286 Supersport Laptop computer used by John Wilson when he was Chairperson of the Department (1989-1994). This computer (AC 7630) was purchased by the Department of Biochemistry in April 1989 for $2799. Courtesy of Robert Keck, MSU Services. Photograph courtesy of Melinda Kochenderfer and K. “Pappan” Padmanabhan.

Commodore PET (**P**ersonal **E**lectronic **T**ransactor) personal computer, CL 2602. The Computer Laboratory acquired this PET Computer in August 1978 for $795. Courtesy of the Michigan State University Museum Historical Collections.

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From top to bottom is the AX08 laboratory peripheral, DF32 disk drive, PC01 high speed paper tape, and the PDP-8/I computer.. http://www.pdp8.net/pdp8i/pics/8irack.shtml?med

A view of the Macromolecular Computer Facility showing the many computers and monitors in 2011.

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Appendix 7.1

Brief Curriculum Vitae of Tenure Stream Faculty

Appointed to the Department of Biochemistry/ Biochemistry and Molecular Biology

1961-2010

in Alphabetical Order

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Richard L. Anderson

Education–Graduate and Postgraduate
B. S., Microbiology, University of Washington, 1954
Ph. D., Microbiology, University of Washington, 1959
NIH Postdoctoral Fellowship, MSU, 1959

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1961
Associate Professor, Biochemistry, MSU, 1966
Professor, Biochemistry, MSU, 1970
Professor Emeritus, MSU, 1995

Areas of Research Interest
Microbial physiology: Enzymology and metabolism of microorganisms: Pathways, mechanisms, and control of carbohydrate metabolism: Glycosaminoglycan metabolism in cultured human cells: Carbohydrate binding protein in cultured human cells

Honors
Editorial Board, Journal of Bacteriology, 1966-1970
Editor, Journal of Bacteriology, 1970-1975
Honoree of an endowed departmental scholarship by donor Dr. James Billman entitled the "Dr. Richard L. Anderson Biochemistry and Molecular Biology Research Prize 2009"

Publications and/or Patents (Five considered the most significant)
Anderson, R.L. and Ordal, E. J. (1961) CO2-Dependent Fermentation of Glucose by Cytophagasuccinicans, Journal of Bacteriology, 81, 139-146.

Kamel, M.Y., Hart, R. R., and Anderson, R. L. (1967) An Ultraspecific Micromethod for the Determination of D-Glucose, Analytical Biochemistry, 18, 270-273.

Kelker, N. E., Hanson, T. E., and Anderson, R. L. (1970) Alternate Pathways of D-Fructose Metabolism in *Aerobacter aerogenes*: A Specific D-Fructokinase and its Preferential Role in the Metabolism of Sucrose, J. of Biological Chemistry 245, 2060-2065.

Palmer, R.E., and Anderson, R. L. (1972) Cellobiose Metabolism in Aerobacter aerogenes, Journal of Biological Chemistry, 247, 3415-3433.

Sabularse, D. C., and Anderson, R. L., (1981) D-Fructose 2.6-Bisphosphate: A Naturally Occuring Activator for Inorganic Pyrophosphate: D-Fructose-6-Phosphate 1-Phosphotransferase in plants, Biochemical and Biophysical Research Communications, 103, 848-855.

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David Arnosti

Education-Graduate and Postgraduate
B.A., Lawrence University, Appleton, WI , 1982
Ph.D., University of California, Berkeley, 1989
Postdoctoral Researcher, University of Zurich, Switzerland, 1990
University of California, San Diego., 1993

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1996
Associate Professor, Biochemistry, 2002
Professor, Biochemistry and Molecular Biology, MSU, 2007-present
Associate Director, MSU Genetics Program, 2004-2009
Director, Gene Expression in Disease and Development Initiative, 2007 – present
Mercator Visiting Professorship, University of Cologne, Deutscheforschungsgemeinschaft, 2004

Honors
Sigma Xi North Central Regional Young Investigator Award, 1999, 2000

Areas of Research Interest
Eukaryotic gene regulation, transcriptional activation, and repression in Drosophila; Function of retinoblastoma tumor suppressor genes in development.

Publications five considered the most significant (undergraduate co-authors are underlined)

Walid Fakhouri, Ahmet Ay, Rupinder Sayal, Evan Dayringer, Jacqueline Dresch, Chichia Chiu, and David N. Arnosti. (2010) Deciphering a transcriptional grammar: modeling short-range repression in the Drosophila embryo, *Molecular Systems Biology*, 6:341.

Sandhya Payankaulam and David N. Arnosti, (2009) The Groucho corepressor is required for Knirps-mediated short-range repression, *Proc. Natl. Acad. Sci*., 106(41):17314-9.

M. M. Kulkarni and D. N. Arnosti. (2005) Cis-regulatory logic of short-range transcriptional repression in Drosophila. *Mol. Cell. Biol*.: 25: 3411-3420.

P. Struffi, M. Corado, M.M. Kulkarni, and D. N. Arnosti. (2004) Quantitative contributions of CtBP-dependent and -independent repression activities of Knirps. *Development*, 131: 2419-2429.

Hewitt, G.F., Strunk, B.S., Margulies, C., Priputin, T., Wang, X.-D., Amey, R., Pabst, B.A., Kosman, D., Reinitz, J., and Arnosti, D.N. (1999) "Transcriptional repression by the *Drosophila* Giant protein: cis element positioning provides an alternative means of interpreting an effector gradient", *Development* 126 (6) 1201-1210.

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Charles J. Arntzen

Education-Graduate and Postgraduate

B. S., Plant Physiology, University of Minnesota, St. Paul, 1965
M.S., Plant Physiology, University of Minnesota, St. Paul, 1967
Ph.D., Cell Physiology, Purdue University, Indiana, 1969
Postdoctoral, Charles F. Kettering Laboratory, 1970

Academic Appointments

Assistant Professor, Plant Physiology, University of Illinois, 1970
Associate Professor, Plant Physiology, University of Illinois,1974
Professor, Plant Physiology and Botany and Agronomy, University of Illinois, 1978
Director, DOE-Plant Research Laboratory, MSU, 1980-1984
Professor, Biochemistry, MSU, 1980-1984
Director, DuPont Company, Plant Science and Microbiology, Central, 1984
Director, DuPont Company, Biotechnology Research, Agricultural Products, 1987
Deputy Chancellor, Texas A&M University-College Station, Agriculture. 1988
Professor of Biochemistry and Biophysics, Texas A&M University-College Station, and Program Director, Institute of Biosciences and Technology, Plant Biotechnology, 1992
Adjunct Professor, University of Texas Health Science Center at Houston, Physiology, 1994
President and CEI, Boyce Thompson Institute for Plant Research; Adjunct Professor of Biology in Cornell University, 1995
Professor of Biology and Florence Ely Nelson Professor, School of Life Sciences, Arizona State University., 2001-
Founding Director, Arizona State University, Biodesign Institute (formerly Arizona Biomedical Institute), 2001-
Director, Arizona State University, Biodesign Institute, Center for Infectious Diseases and Vaccinology, 2003-2007

Honors

President, Midwest Plant Physiology Society, 1978-1979
Charles Albert Shull Award, American Society of Plant Physiologists, 1979
Award of Excellence (Outstanding manuscript in Weed Science) Weed Science Society of America,1980
Superior Service Award, U. S. Department of Agriculture, 1980
Chairman, Physiology Section, Weed Science Society of America, 1982-1983
National Academy of Sciences, elected 1983
Elected to the National Academy of Sciences of India, 1984
The Dennis Robert Hoagland Award, The American Society of Plant Physiologists, 1994
AAAS Fellow, American Association for the Advancement of Science. 1994
Doctor of Science, honoris causa, School of Science, Purdue University, 1997
President's Council of Advisors in Science and Technology (for George W. Bush), Executive Office of the President, United States Government, 2001-2008
Selby Fellowship, Australian Academy of Sciences, 2003
Doctor of Science, honoris causa, University of Minnesota, 2003

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National Nanotechnology Advisory Panel (appointed by George W. Bush), Office of Science and Technology, Office of the President, U.S.A., 2004-2009
Leadership in Science Public Service Award, American Society of Plant Biologists, 2004
Centennial Award, Botanical Society of America, 2006
Elected Fellow, American Society of Plant Biologists, 2007
Doctor of Science, honoris causa, The Hebrew University, Jerusalem, 2008

Areas of Research Interest
Basic research in plant molecular biology and protein engineering, as well as the utilization of plant biotechnology for biomanufacture of plant-made pharmaceuticals. Current interests include the production of a vaccine to prevent norovirus (stomach flu) infections, based upon the production of Virus-Like Particles in tobacco, and purification and formulation of these VLPs as antigens for mucosal immunization.

Publications (Five considered the most significant)
Pfister, K., K.E. Steinback, G. Gardner and C.J. Arntzen. (1981). Photoaffinity labeling of an herbicide receptor protein in chloroplast membranes. Proc. Natl. Acad. Sci. USA 78:981-985.

Staehelin, L.A. and C.J. Arntzen. (1983). Regulation of chloroplast membrane function: Protein phosphorylation changes the spatial organization of membrane components. J Cell Biology. 97:1327-1337.

Haq, T.A., H.S. Mason, J.D. Clements, C.J. Arntzen. (1995). Oral immunization with a recombinant antigen produced in transgenic plants. Science. 268:714-716.

Tacket, C.O., H.S. Mason, G. Losonsky, M.K. Estes, M.M. Levine, C.J. Arntzen (2000) Human immune responses to a Novel Norwalk virus vaccine delivered in transgenic potatoes, Journal of Infectious Diseases, 182: 302-305

Arntzen CJ (2008) Plant science. Using tobacco to treat cancer, Science. 321 (5892), 1052-1053.

Table of Contents

Barbara Atshaves

Education-Graduate and Postgraduate
- B.A., Chemistry, University of California, San Diego, 1985
- M.S., Chemistry, San Diego State University, San Diego, 1988
- Ph.D., Chemistry, Texas A&M University, College Station, 1993
- Postdoctoral Fellow, Biochemistry Department, Texas A&M University, College Station, 1993-94
- Postdoctoral Fellow, Vet. Physiol. and Pharm., Texas A&M University 1994-96

Academic Appointments
- Assistant Res. Scientist, Vet. Physiol. and Pharm., Texas A&M University, College Station, 1996
- Assistant Res. Professor, Vet. Physiol. and Pharm., Texas A&M University, College Station, 1999
- Assistant Professor, Biochemistry and Molecular Biology, MSU, 2009

Areas of Research Interest
Study of proteins involved in regulation of levels in animals, plants, and yeast; Mechanisms of intracellular regulation of free cellular fatty acids and cholesterol; Cellular storage of neutral lipids in lipid droplets and removal of lipids by oxidation.

Publications and/or Patents (Five considered most significant)
Atshaves BP, McIntosh AL, Martin GG, Landrock D, Payne HR, Bhuvanendran S, Landrock KK, Lyuksyutova OI, Johnson JD, Macfarlane RD, Kier AB and Schroeder F. Overexpression of sterol carrier protein-2 differentially alters hepatic cholesterol accumulation in cholesterol-fed mice. J Lipid Res 50:1429-1447, (2009).

Atshaves BP, McIntosh AL, Payne HR, Gallegos AM, Landrock KK, Maeda N, Kier AB and Schroeder F. SCP-2/SCP-x gene ablation alters lipid raft domains in primary cultured mouse hepatocytes. J Lipid Res 48:2193-2211, (2007).

Atshaves BP, McIntosh AL, Landrock D, Payne HR, Mackie J, Maeda N, Ball J, Schroeder F, and Kier AB. Effect of SCP-x gene ablation on branched-chain fatty acid metabolism. Am J Physiol Gastrointest Liver Physiol 292:G939-951, (2007).

Atshaves BP, Payne HR, McIntosh AL, Tichy SE, Russell D, Kier AB, and Schroeder F: Sexually dimorphic metabolism of branched-chain lipids in C57BL6/6J mice. J Lipid Res 45:812-30, (2004).

Atshaves BP, Storey SM, McIntosh AL, Petrescu AD, Lyuksyutova OI, Greenberg AI, Schroeder F: Sterol carrier protein-2 expression modulates protein & lipid composition of lipid droplets. J Biol Chem 276:25324-25335, (2001).

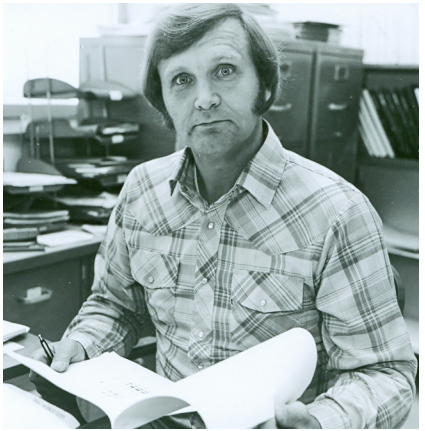
Table of Contents

Steven D. Aust

Education – Graduate and Postgraduate
- B. S., Washington State University, 1960
- M. S., Washington State University, 1962
- Ph. D., University of Illinois, 1965
- Postdoctoral, Karolinska Institute, Sweden, 1965
- Sabbatical, Ruakura Agricultural Research Center, Hamilton, New Zealand, 1975-1976

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1967
- Associate Professor, Biochemistry, MSU, 1973
- Professor, Biochemistry, MSU, 1977
- Associate Director, Environmental Toxicology Center, MSU, 1980-1984
- Director, Center for the Study of Active Oxygen in Biology and Medicine, MSU, 1985-1987
- Director, Center for Excellence in Biotechnology, Utah State University, 1987-1995
- Professor, Chemistry and Biochemistry, Utah State University, 1987-2008
- Professor, Interdepartmental Graduate Program in Toxicology, Utah State University 1987-2008
- Emeritus professor, Chemistry and Biochemistry, Utah State University 2008-present

Areas of Research Interest
Enzymology of mixed-function oxidase of liver endoplasmic reticulum: Toxicology of polyhalogenated aromatic hydrocarbons: Role of iron and active oxygen in lipid peroxidation, ischemia, and toxicity; Biodegradation of environmental pollutants; Free radical generation by ultrasound instruments used for removal of cataracts



Honors
- NRC Facial Eczema Fellowship, Ruakura Agricultural Research Center, Hamilton, NewZealand, 1975
- DuPont Science and Engineering Award, 1988
- Fellow, The Academy of Toxicological Sciences, 1992
- Fellow, The Oxygen Society, 1994
- Alumni Achievement Award, Washington State University,1997
- Utah State University College of Science Faculty Researcher of the Year, 2002
- Governors Award for Science and Technology, 2002
- D. Wynne Thorne Research Award, 2003
- Utah State University Outstanding Graduate Mentor Award, 2003
- American Chemical Society Kenneth A. Spencer Award, 2004

Publications and/or Patents (Five considered the most significant)
Oxidation of Persistent Environmental-Pollutants by a White Rot Fungus. Bumpus, J. A, Tien, M., Wright, D.S., Aust, S. D., Science 228, 1434-1436 (1985)

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Transition Metals as Catalysts of “Autoxidation “ Reactions. Miller, D.M., Buettner, G.R., Aust, S.D. Free Rad. Biol. Med. 8, 95-108 (1990).

Engineering a Disulfide Bond in Recombinant Manganese Peroxidase Results in Increased Thermostability. Reading, N.S., Aust, S.D. Biotech. Prog. 16, 326-333 (2000).

Production of Recombinant Human Apoferritin Heteromers. Grace, Jr. J.E., Van Eden, M.E., Aust. S.D. Arch. Biochem. Biophys. 384,116-122 (2000).

Quantification of Hydroxyl Radical Produced During Phacoemulsification. Gardner, J.M., Aust, S.D. J. Cataract. Refract. Surg. 35, 2149-2153 (2009).

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Selma L. Bandemer

Education-Graduate and Postgraduate
B. S., Chemistry, University of Michigan, 1920
M. S., Chemistry, University of Michigan, 1923
Ph. D., Analytical Biochemistry, MSU, 1949

Academic Appointments
Assistant Chemist, Agricultural Experiment Station., MSU, 1920
Research Assistant, Agricultural Experiment Station, MSU, 1924-1926
Assistant Professor, Agricultural Chemistry, MSU, 1946
Associate Professor, Agricultural Chemistry, MSU, 1949
Associate Professor, Biochemistry, MSU, 1961- 1966

Areas of Research Interest
Amino acids in proteins: Lipid distribution in egg yolk; Quantitative estimation of proteins

Publications and/or Patents (Five considered most significant)
Bandemer, S. L. and Evans, R. J. Amino acid composition of some seeds, Journal of Agricultural and Food Chemistry, 11, 134 (1963),

Evans R. J., Bandemer S. L., Davidson, J. A., Fatty Acid Distribution in Tissues from Hens Fed Cottonseed Oil or Sterculia foetida Seeds, Journal of Nutrition, 76, 314-&, (1962)

Evans, R. J., Bandemer, S. L., Davidson J.A., et al., Binding of Lipid to Protein in Low-density Lipoprotein from Hens Egg, Biochimica et Biophysica Acta, 164, 566-& (1968)

Evans, R. J., Bandemer, S. L, Davidson J. A., Fatty Acid And Lipide Distribution In Egg Yolks From Hens Fed Cottonseed Oil Or Sterculia Foetida Seeds Journal of Nutrition, 73, 282-& (1961)

Evans R. J., Bandemer, S. L., Nutritive Value of Legume Seed Proteins, Journal of Agricultural and Food Chemistry, 15, 439-& (1967)

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Robert Barker

Education – Graduate and Postgraduate
- B.A., Zoology, University of British Columbia, 1952
- M.A., Physiology, University of British Columbia, 1953
- Ph.D., Biochemistry, University of California, Berkeley, 1958
- Postdoctoral Fellow, Chemistry, Washington University, St. Louis, MO 1958
- Visiting Scientist, Chemistry, National Institute of Metabolic Diseases, Bethesda, MD, 1959

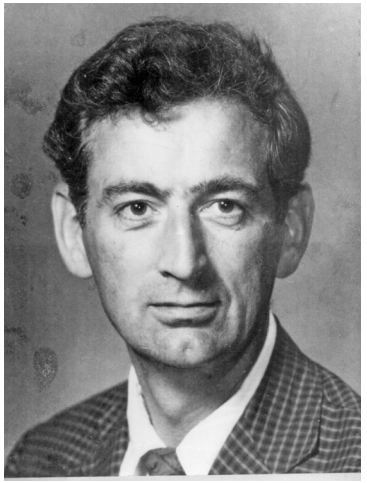
Academic Appointments
- Assistant Professor, Biochemistry, University of Tennessee, Memphis, 1960
- Associate Professor, Biochemistry, University of Tennessee, 1963
- Associate Professor, Biochemistry, University of Iowa, 1963
- Professor, Biochemistry, University of Iowa, Iowa City, 1967
- Associate Dean, College of Medicine, University of Iowa, 1971
- Professor and Chairperson, Biochemistry, MSU, 1974
- Director, Division of Biological Sciences, Cornell University, 1979

Honors
- Honorary Doctor of Science, MSU 1978

Areas of Research Interest (at MSU)
Use of heavy isotopes to analyze enzymatic reactions; Carbohydrate chemistry and biochemistry

Publications and/or Patents (Five considered the most significant)

Serianni, A. S., Nunez, H. A., Barker, R. (1979) Carbon-13-Enriched Carbohydrates - Preparation of Aldononitriles and Their Reduction With a Palladium Catalyst, Carbohydrate Research, 72, 71-78.



O'Connor, J. V., Nunez, H. A., Barker, R. (1979) Alpha-Glycopyranosyl and Beta-Glycopyranosyl Phosphates and 1,2-Phosphates - Assignments of Conformations in Solution by C-13 and H-1 NMR Biochemistry, 18, 500-507.

Nunez, H. A., Barker, R. (1980) Enzymatic-Synthesis and C-13 Nuclear Magnetic-Resonance Conformational Studies of Disaccharides Containing Beta-D-Galactopyranosyl and Beta-D-[1-C-13]Galactopyranosyl Residues, Biochemistry, 19, 489-495.

Pierce, J., Tolbert, N. E., Barker, R. (1980) A mass spectrometric analysis of the reactions of ribulose-bisphosphate carboxylase/oxygenase . J. Biol. Chem. 255, 509.

Hayes, M. L., Serianni, A. S., Barker, R. (1982) Methyl Beta-Lactoside - 600-Mhz H-1-Mhz And 75-Mhz C-13-NMR Studies of H-2-Enriched And C-13-Enriched Compounds, Carbohydrate Research, 100, 87-101.

Table of Contents

Erwin J. Benne

Education

B. S., Chemistry and Education, Kansas State University, 1928
M. S.. Physical Chemistry, Kansas State University, 1931
Ph. D., Chemistry, Soil Science and Plant Physiology, Kansas State University, 1937

Academic Appointments

Instructor, Chemistry, Kansas State University, 1930-1938
Research Assistant, Agricultural Experiment Station, Research Associate, Professor, Agricultural Chemistry, MSU, 1938-1961
Professor, Biochemistry, MSU, 1961- 1970

Areas of Research Interest

The role of vitamins and minerals in the nutritive value of foods; Structural analysis of biological systems by electron microscopy; Development of special analytical methods

Publications and/or Patents (Five considered most significant)

Thomas, J. W., Brown, L. D., Emery, R. S., et al., Comparisons Between Alfalfa Silage and Hay, Journal of Dairy Science 52, 195-& (1969)

Austin, R. S., Hillman, D., Thomas, J. W., et al., Nitrogen and Acid Components of Ureatreated and Control Silages, Journal of Dairy Science, 51, 974-& (1968)

Ingalls, J. R., Thomas, J. W., Benne E. J., et al., Comparative Response of Wether Lambs to Several Cuttings of Alfalfa Birdsfoot Trefoil Bromegrass and Reed Canarygrass, Journal of Animal Science, 24, 1159-& (1965)

Brown, L. D., Emery, R. S., Benne, E. J., et al., Effect of Level and Source of Sulfur on the Utilization of Urea by Dairy Heifers, Journal of Dairy Science, 43, 890-890 (1960)

Price, J. F., Pearson, A. M., Benne, E. J., Specific Gravity and Chemical Composition of the Untrimmed Ham as Related to Leanness of Pork Carcasses, Journal of Animal Science, 16, 85-92 (1957)

Table of Contents

Christoph Benning

Education-Graduate and Postgraduate

Vordiploma - Biology, Westfälische Wilhelms-Universität, Münster, Germany, 1982

Diploma - Biology, Albert-Ludwigs-Universität, Freiburg, Germany, 1986

Ph.D. - Genetics, MSU, 1991

Research Associate, DOE Plant Research Laboratory, MSU, 1991

Academic Appointments

Assistant Professor, Institut für Genbiologische Forschung Berlin GmbH and Chemistry and Biochemistry, Freie Universität Berlin, Germany 1993

Assistant Professor, Biochemistry and Molecular Biology, MSU, 1998

Associate Professor, Biochemistry and Molecular Biology, MSU, 2001

Professor**,** Biochemistry and Molecular Biology, MSU, 2005

Areas of Research Interest

Biosynthesis of lipids in photosynthetic membranes; Lipid trafficking phenomena involving chloroplasts; Engineering of crops and algae for biodiesel production.

Honors

Distinguished Faculty Award, MSU College of Natural Science, 2009

Distinguished Faculty Award, Michigan State University, 2009

Publications and/or Patents (Five considered the most significant.)

Härtel, H., Dörmann, P., and C. Benning. (2000). DGD1-independent biosynthesis of extraplastidic galactolipids after phosphate deprivation in Arabidopsis. Proc. Natl. Acad. Sci. USA 97: 10649-10654.

Yu, B., Xu, C., and C. Benning. (2002). Arabidopsis disrupted in SQD2 encoding sulfolipid synthase is impaired in phosphate limited growth. Proc. Natl. Acad. Sci. USA 99:5732 5737.

Xu, C., Fan, J., Riekhof, W., Froehlich, J.E. and C. Benning. (2003). A permease like protein involved in ER to thylakoid lipid transfer in Arabidopsis. EMBO J., 22:2370-2379.

Moellering, E.R., Muthan, B., and C. Benning. (2010). Freezing tolerance in plants requires lipid remodeling at the outer chloroplast membrane. Science, Epub ahead of print August 26.

Patent:

Lipid metabolism regulators in plants. Christoph Benning and Alex Cernac. (PCT/US2002/007441, Patent filed on March 8, 2002).

Table of Contents

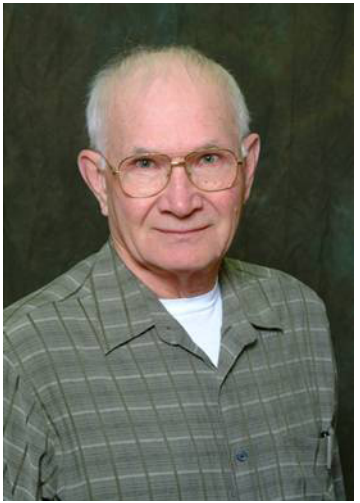
Loran E. Bieber

Education-Graduate and Postgraduate
- B.S., Chemistry, North Dakota State Univ., 1955
- M.S., Chemistry, North Dakota State Univ., 1956
- Ph.D., Biochemistry, Oregon State University, 1963
- Postdoctoral Fellow, Biochemistry, Univ. California, Los Angelos, 1963

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1965
- Associate Professor, Biochemistry, MSU, 1969
- Professor, Biochemistry, MSU, 1974- 2007
- Associate Chairman, Biochemistry, MSU, 1977-1984
- Associate Dean, Research, Human Medicine, 1984-2002
- Assistant Vice President, Research Services (interim), 1990-1991
- Associate Dean, Research, Human Medicine, 1991-2005
- Assistant Vice President, Research Graduate Studies, 2002-2005
- University Intellectual Official (Interim) 2005-2007
- Professor Emeritus, MSU, 2007

Areas of Research Interest
Insect metabolism: Mechanism of oxidative phosphorylation Properties and functions of polyene antibiotics: Control of PEP formation in neonatal piglet liver mitochondria: Branched-chain amino acid metabolism: Lymphocyte and macrophage metabolism, effect of aging and stimulation: Function of carnitine and carnitine acyltransferase in intermediary metabolism: Regulation of fatty acid oxidation

Honors
- Distinguished Scholar Award, University of Adelaide, 1983
- Distinguished Faculty Award, College of Human Medicine, MSU, 1990
- Distinguished Faculty Award, MSU, 1991
- Lester J. Evans Distinguished Service Award, College of Human Medicine, MSU, 2004



Publications and/or Patents (Five considered most significant)

Schroeder, F., Bieber, L. L., Holland, J. F.,Fluorometric Investigations of Interaction of Polyene Antibiotics With Sterols, Biochemistry, 11, 3105-& (1972)

Bieber, L. L., Abraham, T., Helmrath, T., Rapid Spectrophotometric Assay For Carnitine Palmitoyltransferase, Analytical Biochemistry 50, 509-& (1972)

Markwell, M. A. K., Bieber, L. L., Tolbert, N. E., Differential Increase of Hepatic Peroxisomal Mitochondrial and Microsomal Carnitine Acyltransferases in Clofibrate-Fed Rats, Biochemical Pharmacology 26, 1697-1702 (1977)

Markwell, M. A. K., Haas, S. M., Bieber, L. L., et al.,Modification of Lowry Procedure To Simplify Protein Determination In Membrane

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and Lipoprotein Samples, Analytical Biochemistry, 87, 206-210 (1978)

Clarke, P. R. H., Bieber, L. L.,Isolation and Purification of Mitochondrial Carnitine Octanoyltransferase Activities From Beef-Heart, Journal Of Biological Chemistry, 256, 9861-9868 (1981)

John Boezi

Education – Graduate and Postgraduate
- B. S. St. Bonaventure University, 1955
- Ph.D. – Biochemistry, University of Illinois, 1960
- Postdoctoral, Carnegie Institution of Washington, DC, 1960
- Postdoctoral, National Center for Scientific Research, France, 1961

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1963
- Associate Professor, Biochemistry, MSU, 1967
- Professor, Biochemistry, MSU, 1971-1980

Areas of Research Interest
Enzymology of DNA Polymerase; Herpesvirus replication and DNA Polymerase; Genetics of a Chinese-Hamster Cell Line

Publications and/or Patents (Five considered the most significant.)

Boezi J. A., Demoss, R. D., Properties of A Tryptophan Transport System in Escherichia Coli, Biochimica et Biophysica Acta, 49, 471-& (1961)

Blakesley, R. W., Boezi, J. A., New Staining Technique For Proteins In Polyacrylamide Gels Using Coomassie Brilliant Blue G250, Analytical Biochemistry, 82, 580-582 (1977)

Reno, J. M, Lee, L. F., Boezi, J. A., Inhibition of Herpesvirus Replication and Herpesvirus-Induced Deoxyribonucleic-Acid Polymerase By Phosphonoformate, Antimicrobial Agents and Chemotherapy, 13, 188-192 (1978)

Banks, G. R., Boezi, J. A, Lehman, I, R., High Molecular-Weight DNA-Polymerase from Drosophila-Melanogaster Embryos - Purification, Structure, and Partial Characterization, Journal of Biological Chemistry Volume: 254, 9886-9892 (1979)

Chang, C. C., Boezi, J. A., Warren, S. T., et al., Isolation and Characterization of a UV-Sensitive Hypermutable Aphidicolin-Resistant Chinese-Hamster Cell-Line, Somatic Cell Genetics, 7, 235-253 (1981)

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Zachary F. Burton

Education – Graduate and Postgraduate

B.Sc. - University of California, Los Angeles, 1975
Ph.D. - University of California, Los Angeles, 1980
Postdoctoral, McArdle Laboratory for Cancer Research, University of Wisconsin. 1980
Postdoctoral, Charles H. Best Laboratory, University of Toronto. 1983

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1987
Associate Professor, Biochemistry, MSU, 1993
Professor, Biochemistry and Molecular Biology, MSU, 2002

Areas of Research Interest
Transient state kinetics of RNA polymerase II elongation; Functional dynamics of RNA polymerase II: Transcription Factor IIF; Transcription Factor IIS; Hepatitis delta antigen alpha-amanitin; Transcriptional initiation, elongation, and recycling

Honors
Outstanding Undergraduate Advisor Award, MSU, 2001, 2004

Representative publications (Five considered the most ignificant.)
Xiong, Y., and Burton, Z.F. (2007) A tunable ratchet driving human RNA polymerase II translocation adjusted by accurately templated nucleoside triphosphates loaded at downstream sites and by elongation factors. J. Biol. Chem. 282, 36582-36592.

Kireeva, M.L., Nedialkov, Y.A., Malagon, F., Purtov, Y.A., Cremona, G.H., Lubkowska, L., Burton, Z.F., Strathern, J.N., Kashlev, M. (2008) Transient Reversal of RNA Polymerase II Active Site Closing Controls Fidelity of Transcription Elongation. Molecular Cell 30, 557-566
.
Kireeva, M.L., Nedialkov, Y.A., Gong, X.Q., Zhang, C., Xiong, Y., Moon, W.J., Burton, Z.F., and Kashlev, M. (2009). Millisecond phase kinetic analysis of elongation catalyzed by human, yeast and *Escherichia coli* RNA polymerase. Methods 48, 333-345.

Domecq, C., Kireeva, M., Archambault, J., Kashlev, M., Coulombe, B., Burton, Z.F. Site-directed mutagenesis, purification and assay of *Saccharomyces cerevisiae* RNA polymerase II (2010) Protein Expression and Purification 69, 83-90.

Kireeva, M. Kashlev, M. and Burton, Z.F. (2010) Translocation by multi-subunit RNA polymerases. Biochem et Biophys Acta-Gene Regulatory Mechanisms. 1799, 389-401.

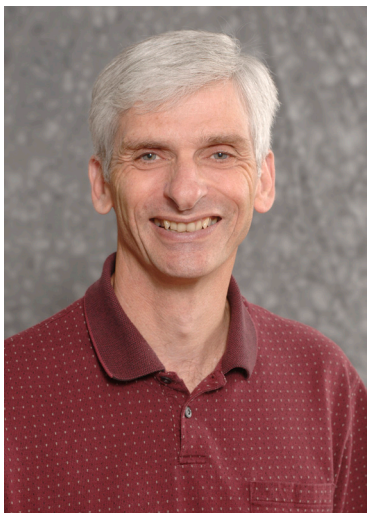


Table of Contents

Richard U. Byerrum

Education-Graduate and Postgraduate
A. B., Wabash College, 1942
Research Associate, Department of Pharmacology, University of Chicago, 1945-1946
Ph. D., University of Illinois, 1947

Academic Appointments
Instructor, Chemistry, MSU, 1947
Assistant Professor, Chemistry, MSU, 1948
Associate Professor, Chemistry, MSU, 1953
Professor, Chemistry, MSU, 1957
Assistant Provost, MSU, 1959
Professor, Biochemistry, MSU, 1961
Dean, College of Natural Science, MSU, 1962-1986
Professor Emeritus, MSU, 1991

Areas of Research Interest
Biosynthesis of Nicotine: Biosynthesis of alkaloids: Isolation and characterization of tumor inhibiting materials from mushrooms: Biosynthesis of glycerol

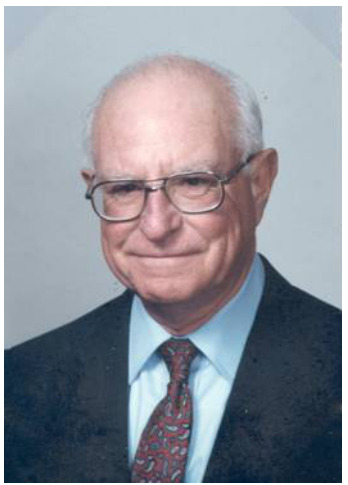
Publications and/or Patents (Five considered most significant)
Gee R., Goyal, A., Gerber, D., et al., Isolation of Dihydroxyacetone Phosphate Reductase From Dunaliella Chloroplasts And Comparison With Isozymes From Spinach Leaves, Plant Physiology, 88, 896-903 (1988)

Gee, R. W., Byerrum, R.U., Gerber, D. W, et al. Differential Inhibition And Activation of 2 Leaf Dihydroxyacetone Phosphate Reductases - Role of Fructose 2,6-Bisphosphate, Plant Physiology, 87, 379-383 (1988)

Gee, R.W., Byerrum, R.U., Gerber, D. W., Dihydroxyacetone Phosphate Reductase in Plants, Plant Physiology, 86, 98-103 (1988)

Mann, D. F., Byerrum, R. U., Quinolinic Acid Phosphoribosyltransferase From Castor Bean Endosperm .1. Purification and Characterization, Journal of Biological Chemistry, 249, 6817-6823 (1974)

Jackanic, T. M., Byerrum, R. U., Incorporation of Aspartate and Malate into Pyridine Ring of Nicotine, Journal of Biological Chemistry, 241, 1296-& (1966)



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Christina Chan

Education – Graduate and Postgraduate

B. S. Chemical Engineering, Columbia University, NYC, 1984
M. S. Chemical and Biochemical Egr, University of Pennsylvania, Philadelphia, 1986
Ph. D. Chemical and Biochemical Egr University of Pennsylvania, Philadelphia, 1990
Postdoctoral, Biomedical Engineering, Center for Engineering Medicine, Massachusetts General Hospital/Harvard Medical School, Boston, 1999-2001

Academic Appointments

Adjunct Assistant Professor, Chemical Engineering, UMBC, Catonsville, MD., 1997
Adjunct Assistant Professor, Mechanical Engineering, UMBC, Catonsville, MD., 1998
Associate Professor, Chemical Engineering and Materials Science, MSU, 2002
George W. Bissell Associate Professor of Chemical Engineering and Materials Science, MSU, 2005
Associate Professor, Biochemistry and Molecular Biology, MSU, 2006
Associate Professor, Computer Science and Engineering, MSU, 2007
George W. Bissell Professor of Chemical Engineering and Materials Science, MSU, 2008
Professor, Computer Science and Engineering Department, MSU, 2008
Professor, Biochemistry and Molecular Biology, MSU, 2009

Areas of Research Interest

Free fatty acids, namely palmitate, involvement in the development of diseases, such as diabetes, cancer and Alzheimer's disease; The biophysical interactions with membranes and proteins? Mathematical modeling and its integration with experimental studies to associate molecular level interactions.

Honors

Withrow Excellence in Teaching Award, 2010
Sigma Xi, member since 2006.
National Academy of Engineering invitation to "Frontiers in Engineering", 2004
Whitaker Young Investigator Award, 2003-2006.
E. I. DuPont & Nemours Fellowship, 1984-1988.
Member of Phi Lambda Upsilon.
Member of Tau Beta Pi.
Graduated with Highest Honors, Columbia University, 1984.

Publication and/or Patents (Five considered the most significant)

Li, Z., and Chan, C., "Inferring pathways and networks with a Bayesian framework", (2004) *FASEB J* ournal 18(6): 746-8 (2005).

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Li, Z., and Chan, C., “Integrating gene expression and metabolic profiles”, (2004) Journal Biological Chemistry 279: 27124-27137.

Kidambi, S., Lee, I., and Chan, C., “Controlling Primary Hepatocyte Adhesion and Spreading on Protein Free Polyelectrolyte Multilayer Films”, (2004) Journal of the American Chemical Society Communications 126(50):16286-7.

Patil, S., Melrose, J., and Chan, C., “Involvement of astroglial ceramide in palmitic acid-induced Alzheimer-like changes in primary neurons”, (2007) European Journal of Neuroscience, 26(8):2131-2141.

Yang, X. and Chan, C., “Repression of PKR Mediates Palmitate-Induced Apoptosis in HepG2 Cells through Bcl-2”, (2009) Cell Research, 19(4): 469-486.

Table of Contents

Ronald L. Davis

Education-Graduate and PostGraduate
- B.S., Zoology, Brigham Young University, Provo, UT, 1974
- M.S., Genetics, University of California, Davis, 1975
- Ph.D., Genetics, University of California,Davis, 1979
- Postdoctoral, Molecular Biology, California Institute of Technology, Pasadena, 1979-82

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1983
- Associate Professor, Biochemistry, MSU, 1987
- Associate Professor, Neuroscience and Cell Biology, Baylor College of Medicine, Houston, TX, 1987-91
- Adjunct Associate Professor, Cell Biology, Baylor College of Medicine, 1991-93
- Senior Staff Scientist, Cold Spring Harbor Laboratory, 1991-93
- Professor, Departments of Molecular and Cellular Biology, Genetics, and Neuroscience, Baylor College of Medicine, 1993-2009
- Professor, Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, 1998-2009
- Vice Chair for Research, Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, 1999-2007
- Director, Center for Memory and Learning, Baylor College of Medicine, 2007-2009
- Founding Chair, Department of Neuroscience, Scripps Research Institute Florida, Jupitor 2009-

Areas of Research Interest
Molecular and cellular biology of learning; Memory decline with aging: Neurogenetics of brain dysfunction including learning disabilities and bipolar disorder. Multiphoton microscopy/ Neuroimaging

Honors
- Development Award in Neuroscience from the McKnight Foundation, 1988-1991.
- R. P. Doherty-Welch Chair in Science, 1993-present.
- Student Choice Award in Teaching (8-Stranded Beta-Barrel Jelly Roll Teaching Award), Baylor College of Medicine, 1998.
- Michael E. DeBakey Excellence in Research Award, 1998.
- Academic Career Leadership Award 1998-2004.
- McKnight Neuroscience of Brain Disorders Award, 2003-2006.
- NARSAD Distinguished Investigator Award, 2005.
- Ellison Medical Foundation Senior Scholar in Aging, 2007-2012.
- Elected Fellow of the American Association for the Advancement of Science, 2009

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Publications and/or Patents (Five considered the most significant)

Byers, D., Davis, R.L. and Kiger, J.A., Jr. (1981). Defect in cyclic AMP phosphodiesterase due to the *dunce* mutation of learning in *Drosophila melanogaster*. Nature 289:79-81.

Chen, C.-N., Denome, S. and Davis, R.L. (1986). Molecular analysis of cDNA clones and the corresponding genomic coding sequences of the *Drosophila dunce*$^{+}$ gene, the structural gene for cAMP phosphodiesterase. Proc. Natl. Acad. Sci. USA 83, 9313-9317.

Nighorn, A., Healy, M. and Davis, R.L. (1991). The cAMP phosphodiesterase encoded by the *Drosophila dunce* gene is concentrated in mushroom body neuropil. Neuron 6, 455-467..

McGuire, S.E., Le, P.T., Osborn, A.J., Matsumoto, K., and Davis, R.L. (2003). Spatio-temporal rescue of memory dysfunction in *Drosophila*. Science 302, 1765-1768.

Yu, D., Ponomarev, A. and Davis, R.L. (2004). Altered representation of the spatial code for odors after olfactory classical conditioning: memory trace formation by synaptic recruitment. Neuron 42, 437-449.

Table of Contents

William C. Deal, Jr.

Education – Graduate and Postgraduate
B.S., Chemistry, Louisiana College, 1958
Ph.D., Physical Chemistry, University of Illinois, 1962
Postdoctoral Research Associate, Marine Biological Laboratory, Woods Hole, MA, Summers of 1962 and 1963

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1962
Associate Professor, Biochemistry, MSU, 1966
Professor, Biochemistry, MSU, 1971
Professor Emeritus, MSU, 1998

Areas of Research Interest
Immune defense and regulation of cell proliferation by interleukin and interleukin 2: Roles of protein kinase C and protein tyrosine kinases in cell proliferation: Proteins phosphorylated in regulation of immune cell proliferation: Mechanism of stimulation of lymphocyte proliferation by lymphokines

Honors
Golden Key Outstanding Teaching Award (Michigan Chapter of the Golden Key National Honor Society) 1992

Publications and/or Patents
Deal W. C., Vanholde, K. E., Rutter, W. J., Reversible Dissociation Of Aldolase Into Unfolded Subunits, Biochemistry, 2, 246-& (1963)

Steinmetz, M. A., Deal, W. C., Metabolic Control And Structure Of Glycolytic Enzymes .3. Dissociation And Subunit Structure Of Rabbit Muscle Pyruvate Kinase, Biochemistry, 5, 1399-& (1966)

Deal, W.C., Metabolic Control And Structure Of Glycolytic Enzymes .4. Nicotinamide-Adenine Dinucleotide Dependent In Vitro Reversal Of Dissociation And Possible In Vivo Control Of Yeast Glyceraldehyde 3-Phosphate Dehydrogenase Synthesis, Biochemistry, 8, 2795-& (1969)

Constant, S. M., Deal, W. C., Reversible Dissociation Of Tetrameric Rabbit Muscle Glyceraldehyde 3-Phosphate Dehydrogenase Into Dimers Or Monomers By Adenosine Triphosphate, Journal Of Biological Chemistry, 244, 5695-& (1969)

Stancel, G. M., Deal, W. C., Reversible Dissociation Of Yeast Glyceraldehyde 3-Phosphate Dehydrogenase By Adenosine Triphosphate, Biochemistry, 8, 4005-& (1969)

Table of Contents

Thomas Lloyd Deits

Education – Graduate and Postgraduate
B.A., Chemistry and History, Revelle College, University of California, San Diego, 1972
Ph.D., Organic Chemistry, University of Washington, 1980
Postdoctoral Research, University of Washington, 1980-1982
Postdoctoral Research, University of Minnesota, 1982-1987

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1987 – 1994
Chair, Science Department, Lansing Community College, 1995-

Areas of Research Interest
Structure and function of enzymes containing non-heme iron: Enzymology of macromolecular assembly in prokaryotes and eukaryotes.

Honors
Regents Scholar, University of California, 1968-72

Publications and/or Patents (Five considered the most significant)
The Bicarbonate Proton In Carbonic-Anhydrase Catalysis, Pocker, Y., Deits, T. L., Journal oft the American Chemical Society 105, 980-986 (1983)

Conformational Control of Ovoperoxidase Catalysis in the Sea-Urchin Fertilization Membrane, Deits, T. L.,, Shapiro, B. M., Journal of Biological Chemistry 261, 2159-2165 (1986)

Kinetics of Mg ATP-Dependent Iron Chelation From the Fe-Protein of The Azotobacter-Vinelandii Nitrogenase Complex - Evidence For 2 States, Deits, T. L., Howard, J. B., Journal of Biological Chemistry 264, 6619-6628 (1989)

Effect of Salts On Azotobacter-Vinelandii Nitrogenase Activities - Inhibition of Iron Chelation and Substrate Reduction, Deits, T. L., Howard, J. B., Journal of Biological Chemistry 265, 3859-3867 (1990)

Detection of Metabolites of The Entner-Doudoroff Pathway By HPLC With Pulsed Amperometry - Application to Assays for Pathway Enzymes, Taha Taha, S. M., Deits, T. L., Analytical Biochemistry 219, 115-120 (1994)

Table of Contents

Dean DellaPenna

Education-Graduate and Postgraduate

B.S., Cellular Biology (Botanical), Ohio University, 1984
Ph.D., Plant Physiology, University of California, Davis, 1987.
Postdoctoral Research Associate, Vegetable Crops, University of California, Davis 1988
Visiting Scientist/Lecturer, Scientific and Industrial Research, Auckland, New Zealand. Jan –April, 1989
McKnight Postdoctoral Fellow, Washington State University, Pullman, WA Washington. Apr 1989-May,1990

Academic Appointments

Assistant Professor, Plant Sciences and Biochemistry, University of Arizona, Tucson, AZ. May 1990
Associate Professor, Biochemistry, University of Nevada, Reno, 1996.
Associate Professor, Biochemistry and Molecular Biology, MSU, 2000.
Professor, Biochemistry and Molecular Biology, MSU, 2002.

Areas of Research Interest

Molecular, genetic, genomic and biochemical approaches to fundamental processes in plant metabolism and physiology: Synthesis and function of carotenoids and tocopherols, Genetics and biochemistry of mineral bioavailability: Genetic and biochemical control of the production of primary storage compounds in plants.

HONORS

Young Botanist Award (Botanical Society of America), 1984
Outstanding Graduate Student Award (Dept. of Vegetable Crops), 1987
Researcher of the Year Award, University of Nevada, Reno, 1999
President's Lecture, Experimental Biology Meeting, Society for Nutritional Sciences, 2000
Distinguished Faculty Award, MSU, 2008
AAAS Fellow, elected 2009
Gordon Conference on Plant Metabolic Engineering, Elected Vice Chair 2011, Chair for 2013 meeting

Publications and/or Patents (Five considered the most significant)

Yan J, Bermudez Kandianis C, Harjes CE, Bai L, Kim EH, Yang X, Skinner DJ, Fu Z, Mitchell S, Li Q, Salas Fernandez MG, Zaharieva M, Babu R, Fu Y, Palacios N, Li J, DellaPenna D, Brutnell T, Buckler ES, Warburton EL, Rocheford T. (2010) Rare Genetic Variation at Zea mays crtRB1 Increases b-carotene in Maize Grain. Nature Genetics 42:322-327.

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Gilliland LU, Magallanes-Lundback M, Hemming C, Supplee A, Koornneef M, Bentsink L, DellaPenna D. (2006) Genetic basis for natural variation in seed vitamin E levels in Arabidopsis thaliana. Proc Natl Acad Sci U S A. 103(49):18834-41.

Tian L, Musetti V, Kim J, Magallanes-Lundback M, DellaPenna D. (2004) The Arabidopsis LUT1 locus encodes a member of the cytochrome P450 family that is required for carotenoid epsilon-ring hydroxylation activity. Proceedings of the National Academy of Sciences. USA 101:402-7.

Shintani, D. and D. DellaPenna (1998) Elevating the Vitamin E content of plants through metabolic engineering. Science 282:2098-2100.

Pogson, B., K. McDonald, M. Truong, G. Britton and D. DellaPenna. (1996) Lutein deficient mutants in Arabidopsis thaliana: Genetic and biochemical characterization of the epsilon-cyclase and epsilon-hydroxylase. The Plant Cell 8:1627-1639=

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Deborah P. Delmer

Education-Graduate and Postgraduate

A.B., Bacteriology, Indiana University, 1964
Ph.D., Cellular Biology, University of California, San Diego, 1968
Postdoctoral Fellow, Chemistry, University of Colorado, 1968
Postdoctoral Fellow, Biology, University of California, San Diego, 1969

Academic Appointments

Research Biologist and Lecturer, University of California, San Diego, 1970
Acting Assistant Professor, University of California, San Diego, 1973
Assistant Professor, ERDA Plant Research Laboratory and Biochemistry, MSU, 1974
Associate Professor, DOE Plant Research Laboratory and Biochemistry, 1978
Visiting Scientist, ARCO Plant Cell Research Institute, Dublin, CA 1982

Areas of Research Interest

Biosynthesis of tryptophan in higher plants; Sucrose biosynthesis and metabolism: Circadian rhythms in fungi; Mechanism and regulation of cellulose and callose biosynthesis in plants; Gene expression in the developing cotton fiver; Cell wall structure in higher plants; Role of G-proteins in regulation of cytoskeletal organization in higher plants.

Publication and/or Patents (Five considered the most important)

Meinert, M. C., Delmer, D. P., (1977) Changes in Biochemical Composition of Cell-Wall of Cotton Fiber during Development, Plant Physiology, 59, 1088-1097.

Maltby, D., Carpita, N. C., Montezinos, D., Kulow, C., Delmer, D. P. (1979) Beta-1,3-Glucan in Developing Cotton Fibers - Structure, Localization, and Relationship of Synthesis to That of Secondary Wall Cellulose, Plant Physiology, 63, 1158-1164.

Hayashi, T., Marsden, M. P. F., Delmer, D. P., (1987) Pea Xyloglucan and Cellulose .5. Xyloglucan-Cellulose Interactions in vitro and in vivo, Plant Physiology, 83, 384-389.

Hayashi T, Read Sm, Bussell J, Thelen M, Lin Fc, Brown Rm, Delmer, D. F. (1987) UDP-Glucose - (1-3)-Beta-Glucan Synthases From Mung Bean And Cotton - Differential-Effects of Ca-2+ And Mg-2+ on Enzyme Properties and on Macromolecular Structure Of The Glucan Product, Plant Physiology, 83, 1054-1062.

Shedletzky, E., Shmuel, M., Delmer, D. P., Lamport, D. T. A. (1990) Adaptation And Growth Of Tomato Cells On The Herbicide 2,6-Dichlorobenzonitrile Leads To Production of Unique Cell-Walls Virtually Lacking a Cellulose-Xyloglucan Network Plant Physiology, 94, 980-987.

Table of Contents

Michael S. Denison

Education-Graduate and Postgraduate
- A.A., Biology, with honors, County College of Morris, 1975.
- B.S., Marine Biology, Magna Cum Laude, St. Francis College, 1977.
- M.S., Animal Physiology, Mississippi State University, 1980.
- Ph.D., Environmental Toxicology, Cornell University, 1983.
- Postdoctoral Research, Division of Clinical Pharmacology, Hospital for Sick Children, Toronto. 1983-1985
- Postdoctoral Research, Pharmacology, Stanford University. 1986

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1988
- Adjunct Assistant Professor, Pesticide Research Center, MSU, 1991-1994
- Assistant Professor, Environmental Toxicology, University of California, Davis, 1992
- Associate Professor, Environmental Toxicology, University of California, Davis, 1994
- Professor, Environmental Toxicology, University of California, Davis, 1997-

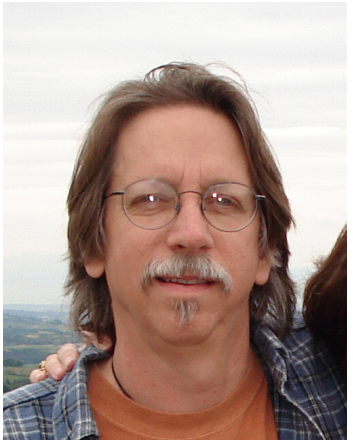
Areas of Research Interest at MSU

Molecular mechanisms of action of halogenated aromatic hydrocarbons; Structure and function of receptors for xenobiotics and hormones; Molecular mechanisms of constitutive and inducible gene expression; Development and application of recombinant bioassay systems for detection of toxic chemicals.

Honors at MSU

Senior Scientist Merit award from the Michigan Regional Chapter of the Society of Toxicology for Research Presentation, 1989, 1990

Young Investigator Award International Life Sciences Institute 1990



Publications and/or Patents (Five considered the most significant.)

Denison, M.S., Young, C.M., Hamilton, J.W. and Wilkinson, C.F. (1989) Nickel and nickel-conjugate metabolism and toxicity, J. Irreprod. Results 34, 27-28.

Denison, M.S., Fisher, J.M. and Whitlock, J.P., Jr. (1988) The DNA recognition site for the dioxin-Ah receptor complex: nucleotide sequence and functional analysis, J. Biol. Chem. 263, 17721-17724.

Knockaert, M., Blondel, M., Bach, S., Leost, M., Elbi, C., Hager, G.L., Nagy, S.R., Han, D., Denison, M., French, M., Ryan, X.P., Magiatis, P., Polychronopoulos, P., Greengard, P., Skaltsounis, L. and

Meijer, L. (2004) Independent actions on cyclin-dependent kinases and aryl hydrocarbon receptor mediate the antiproliferative effects of indirubins, Oncogene 23, 4400-4412.

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Soshilov, A.A. and Denison, M.S. (2008) Role of the Per/Arnt/Sim domains in ligand-dependent transformation of the aryl hydrocarbon receptor, J. Biol. Chem. 283, 32995-32305.

David Dewitt

Education-Graduate and Postgraduate
- B.S., University of California, Davis, 1976
- Ph.D., Biochemistry, MSU, 1982
- Postdoctoral Fellow, La Jolla Cancer Research Foundation, 1982

Academic Appointments
- Instructor, Biochemistry, MSU, 1986
- Assistant Professor, Biochemistry, MSU, 1995
- Associate Professor, Biochemistry, 1999
- Director, Research Technology Support Facility, MSU, 2001-
- Professor, Department of Biochemistry, MSU, 2007
- Interim Associate Dean for Research and Budgets, College of Natural Science, MSU, 2007
- Associate Dean for Research and Budgets, College of Natural Science, MSU, 2008

Areas of Research Interest
Biochemistry and cellular biology of prostaglandin biosynthesis; Structure, substrate and drug specificity, membrane association, and cellular biology of cyclooxygenases; Developing and adapting heterologous protein expression systems for the efficient and high throughput expression of membrane proteins; Proteomics analysis of metal reducing bacteria.

Publications and/or Patents (Five considered most important)

MirAfzali, Z., Leipprandt, JR, McCracken JL, and DeWitt DL. Topography of the Prostaglandin Endperoxide H2 Synthase-2 in Membranes, J. Biol. Chem. 281(38):28354-28364, 2006.

Meade, E.A., W.L. Smith, and D.L. DeWitt. Differential inhibition of PGH synthase (cyclooxygenase) isozymes by aspirin and other non-steroidal anti-inflammatory drugs. J. Biol. Chem., 268, 6610-6614 (1993).

Meade, E.A., and D.L. DeWitt. Serum and Glucocorticoid regulation of gene transcription and expression of prostaglandin H synthase-1 and prostaglandin H synthase-2 isozymes. Arch. of Bioch., 306, 94-102 (1993).

DeWitt, D.L., E.A. El-Harith, S.A. Kraemer, E.F. Yao, R.L. Armstrong, and W.L. Smith. The aspirin site and the heme binding site of prostaglandin endoperoxide synthase. J. Biol. Chem. 265, 5192-5198 (1990).

DeWitt, D.L., and W.L. Smith. The primary structure of prostaglandin G/H synthase from sheep vesicular gland determined from the complementary DNA sequence. Proc. Natl. Acad. Sci. USA 85, 1412-1416 (1988).

Table of Contents

Jerry B. Dodgson

Education
- B. S. – Chemistry, MSU, 1969
- Ph. D. – Biochemistry, University of Wisconsin 1976
- Postdoctoral, Chemistry, California Institute of Technology, 1976

Academic Appointments
- Assistant Professor, Microbiology and Biochemistry, MSU, 1979
- Associate Professor, Microbiology and Biochemistry, MSU, 1983
- Director, Biotechnology Research Center, MSU, 1987-1998
- Professor, Microbiology and Biochemistry, MSU, 1988
- Chairperson, Microbiology & Molecular Genetics, MSU, 1989-2003

Areas of Research Interest

Molecular genetics, primarily of chicken genes expressed in red blood cells and chromatin protein genes; avian genomics; transgenic approaches in birds

Honors
- National Merit Scholar (1965-1969)
- Research Career Development Awardee, N.I.H. (1984-1989)
- Distinguished Faculty Award, College of Natural Science Alumni Assoc., MSU, 1990
- Group Honor Award, USDA, 1997
- Distinguished Faculty Award, College of Natural Science, MSU, 2001
- Merck Award for Achievement in Poultry Science 2003, presented by the Poultry Science Association
- Pfizer Award for Research Excellence 2005, presented by the MSU College of Veterinary Medicine
- NRSP-8 Distinguished Lecturer 2009, NRSP-8/PAG XVII meeting, San Diego, CA

Publications and/or Patents (Five considered the most significant)

Dodgson, J. B., J. Strommer, and J. D. Engel. 1979. The isolation of the chicken ß-globin gene and a linked embryonic ß-like globin gene from a chicken DNA recombinant library. Cell 17:879-887.

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Li, Y. and J.B. Dodgson. 1995. The chicken HMG17 gene is dispensable for cell growth in vitro. Mol. Cell Biol. 15:5516-5523.

Ren C., M.K. Lee, B. Yan, K. Ding, B. Cox, M.N. Romanov, J.A. Price, J.B. Dodgson and H.B. Zhang. 2003. A BAC-based physical map of the chicken genome. Genome Research 13:2754-2758.

Hillier LW, Miller W, Birney E, Warren W, Hardison RC, Ponting CP, Bork P, Burt DW, Groenen MA, Delany ME, Dodgson JB, Chinwalla AT, Cliften PF, Clifton SW, Delehaunty KD, Fronick C, Fulton RS, Graves TA, Kremitzki C, Layman D, Magrini V, McPherson JD, Miner TL, Minx P, Nash WE, Nhan MN, Nelson JO, Oddy LG, Pohl CS, Randall-Maher J, Smith SM, Wallis JW, Yang SP, Romanov MN, Rondelli CM, Paton B, Smith J, Morrice D, Daniels L, Tempest HG, Robertson L, Masabanda JS, Griffin DK, Vignal A, Fillon V, Jacobbson L, Kerje S, Andersson L, Crooijmans RP, Aerts J, van der Poel JJ, Ellegren H, Sequencing C, Caldwell RB, Hubbard SJ, Grafham DV, Kierzek AM, McLaren SR, Overton IM, Arakawa H, Beattie KJ, Bezzubov Y, Boardman PE, Bonfield JK, Croning MD, Davies RM, Francis MD, Humphray SJ, Scott CE, Taylor RG, Tickle C, Brown WR, Rogers J, Buerstedde JM, Wilson SA, Stubbs L, Ovcharenko I, Gordon L, Lucas S, Miller MM, Inoko H, Shiina T, Kaufman J, Salomonsen J, Skjoedt K, Wong GK, Wang J, Liu B, Wang J, Yu J, Yang H, Nefedov M, Koriabine M, Dejong PJ, Goodstadt L, Webber C, Dickens NJ, Letunic I, Suyama M, Torrents D, von Mering C, Zdobnov EM, Makova K, Nekrutenko A, Elnitski L, Eswara P, King DC, Yang S, Tyekucheva S, Radakrishnan A, Harris RS, Chiaromonte F, Taylor J, He J, Rijnkels M, Griffiths-Jones S, Ureta-Vidal A, Hoffman MM, Severin J, Searle SM, Law AS, Speed D, Waddington D, Cheng Z, Tuzun E, Eichler E, Bao Z,

Flicek P, Shteynberg DD, Brent MR, Bye JM, Huckle EJ, Chatterji S, Dewey C, Pachter L, Kouranov A, Mourelatos Z, Hatzigeorgiou AG, Paterson AH, Ivarie R, Brandstrom M, Axelsson E, Backstrom N, Berlin S, Webster MT, Pourquie O, Reymond A, Ucla C, Antonarakis SE, Long M, Emerson JJ, Betran E, Dupanloup I, Kaessmann H, Hinrichs AS, Bejerano G, Furey TS, Harte RA, Raney B, Siepel A, Kent WJ, Haussler D, Eyras E, Castelo R, Abril JF, Castellano S, Camara F, Parra G, Guigo R, Bourque G, Tesler G, Pevzner PA, Smit A, Fulton LA, Mardis ER, Wilson RK; International Chicken Genome Sequencing Consortium. 2004. Sequence and comparative analysis of the chicken genome provide unique perspectives on vertebrate evolution. Nature 432:695-716.

Wallis, J.W., J. Aerts, M. Groenen, R. Crooijmans, D. Layman, T. Graves, D. Scheer, C. Kremitzki, J. Higgenbotham, T. Gaige, K. Mead, J. Walker, D. Albracht, J. Divito, S.-P. Yang, S. Leong, A. Chinwalla, L. Hillier, M. Sekhon, J. Dodgson, M.N. Romanov, H. Cheng, P.J. de Jong, H. Zhang, J.D. McPherson, M. Krzywinski, J. Schein, E. Mardis, R. Wilson and W.C. Warren. 2004. A physical map of the chicken genome. Nature 432:761-764.

Table of Contents

Clifford W. Duncan

Education-Graduate and Postgraduate
B. S., Chemistry, Oregon State University, 1923
M. S., University of Washington, 1927

Academic Appointments
Instructor, Oregon State University, 1923-1929
Assistant, Agricultural Experiment Station, MSU, 1929-1931
Research Assistant, Agricultural Experiment Station, MSU, 1931-1943
Research Associate, Agricultural Experiment Station, MSU, 1943-1946
Associate Professor, Agricultural Chemistry, MSU, 1946-1952
Research Professor, Agricultural Chemistry, MSU, 1952-1961
Professor, Biochemistry, MSU, 1961- 1962

Areas of Research Interest
Isolation and determination of bovine hemoglobins: Response of plants and animals to soil fertility: Isolation of plant carbohydrates

Publications and/or Patents
Lassiter, C. A., Brown, L.D., Duncan, C. W., Effect Of Protein Level In Milk Replacers on Growth And Protein Metabolism of Dairy Calves, Journal of Dairy Science, 46, 538-& (1963)

Emery, R. S., Smith, C. K., Duncan, C. W., Bloat Versus No Bloat In Identical-Twin Cows Fed Identical Rations, Journal of Dairy Science, 43, 568-569 (1960).

Grimes, R. M., Duncan, C. W., Electrophoretic Properties of The Globins of Bovine Hemoglobin-A and Hemoglobin-B, Archives of Biochemistry And Biophysics, 84, 393-404 (1959)

Lassiter, C. A., Brown, L. D., Duncan, C. W., Effect of Aureomycin, Erythromycin, And Hygromycin on The Growth Rate and Well-Being of Young Dairy Calves, Journal of Dairy Science, 42, 1712-1717 (1959)

Lassiter, C. A., Grimes, R. M., Duncan, C. W., Preliminary Studies Regarding The Optimum Protein Level of Milk Replacers, Journal of Dairy Science, 42, 919-919 (1959)

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Jennifer L. Ekstrom

Education-Graduate and Postgraduate
B. S. – Chemistry, University of Illinois, Urbana-Champaign, 1990
Ph.D. – Biochemistry, Cornell University, Ithaca, NY, 1999
Postdoctoral Fellow, Pfizer Global Research and Development, Groton, CT, & University of California, San Francisco, 1999

Academic Appointments
Scientist, Structural Biochemistry, Phylos, Inc, Lexington, MA, 2002
Assistant Professor, Biochemistry, MSU, 2003-2010

Areas of Research Interest
Protein structure and function; enzymology

Publications and/or Patents (Five considered most significant)
The crystal structure of human S-adenosylmethionine decarboxylase at 2.25 angstrom resolution reveals a novel fold. J. L. Ekstrom, I. I. Mathews, B. A. Stanley, A. E. Pegg., S. E. Ealick. (1999) Structure 7, 583-595.

"Structure-Activity Analysis of the Purine-Binding Site of Human Liver Glycogen Phosphorylase" J. L. Ekstrom, T. A. Pauly, M.D. Carty, W.C. Soeller, J. Culp, D. E. Danley, D. J. Hoover, J. L. Treadway, E. M. Gibbs, Y. S. N. Day, D.G. Myszka and V. L. Rath (2002) Chemistry and Biology, 9, 915-924.

"Mechanism of Human *S*-adenosylmethionine Decarboxylase Proenzyme Processing as Revealed by the Structure of the S68A Mutant" W.D. Tolbert, Y. Zhang, S.E. Cottet, E.M. Bennett, J. L. Ekstrom, A. E. Pegg and S. E. Ealick, (2003) Biochemistry, 42, 2386-2395.

"X-ray crystallographic and Kinetic Studies of Human Sorbitol Dehydrogenase" T. A. Pauly, J. L. Ekstrom, D. A. Beebe, B. Chrunyk, D. Cunningham, M. Griffor, A. Kamath, S. E. Lee, R. Madura, D. Mcguire, T. Subashi, D. Wasilko, P. Watts, B. L. Mylari, P. J. Oates, P. D. Adams and V. L. Rath, (2003) Structure, 11, 1071-1085.

"Contributions of Amino-Acid Side Chains to the Kinetics and Thermodynamics of the Bivalent Binding of Protein L to the Ig κ Light Chain". H. G. Svensson, W.J. Wedemeyer, J. L. Ekstrom, D. R. Callender T. Kortemme, D. E. Kim, U. Sjöbring and D. Baker (2004), Biochemistry. 43, 2445-2457.

Table of Contents

Robert J. Evans

Education-Graduate and Postgraduate
B. S., Utah State University, 1934
M. S., Utah State University, 1936
Ph. D., University of Wisconsin, 1939

Academic Appointments
Instructor, Carbon College, Utah, 1939
Assistant and Associate Chemist, Washington State College, 1940
Professor, Agricultural Chemistry, MSU, 1947
Professor, Biochemistry, MSU, 1961
Professor Emeritus, MSU, 1977

Areas of Research Interest
Heat inactivation of proteins: Proteins of navy beans (Praseolus vulgaris) and their nutritive value: Identification of lipoproteins in eggs: Amino acid content of poultry feeds and their biological availability: Cause of pink white discoloration of stored eggs from hens fed cottonseed oil

Publications and/or Patents
Evans, R. J., Flegal, C. J., Foerder, C. A., Bauer, D. H., Lavigne, M., Influence Of Crude Cottonseed Oil In Feed On Blood and Egg-Yolk Lipoproteins of Laying Hens, Poultry Science, 56, 468-479 (1977)

Evans, R. J., Flegal, C. J., Bauer, D. H., Molecular Sizes of Egg-Yolk Very Low-Density Lipoproteins Fractionated By Ultracentrifugation, Poultry Science, 54, 3, 889-895 (1975)

Evans, R. J., Bandemer, S. L., Davidson, J. A., Lipids and Fatty Acids In Fresh and Stored Shell Eggs, Poultry Science, 46, 151-& (1967)

Kakade, M. K., Evans, R. J., Nutritive Value of Navy Beans (Phaseolus Vulgaris) British Journal of Nutrition 19, 269-& (1965)

Evans, R. J., Bandemer, S. L., Lipide Distribution in Egg Yolk Lipoprotein Complexes, Poultry Science, 40, 597-603 (1961)

Table of Contents

James L. Fairley

Education-Graduate and Postgraduate
B. S., Chemistry, San Jose State College, 1942
Ph. D., Biochemistry, Stanford University, 1949
Research Associate, Stanford University, 1950
Research Associate, Radiation Laboratory, University of California, 1951

Academic Appointments
Associate Professor, Chemistry, MSU, 1952
Associate Professor, Biochemistry, MSU, 1961
Professor, Biochemistry, MSU, 1962
Professor Emeritus, MSU, 1986

Areas of Research Interest
Metabolic reactions involved in the biogenesis of the nucleic acid pyrimidines; Amino acid interrelationships in Neurospora; Ribonucleic acid metabolism related to protein biosynthesis

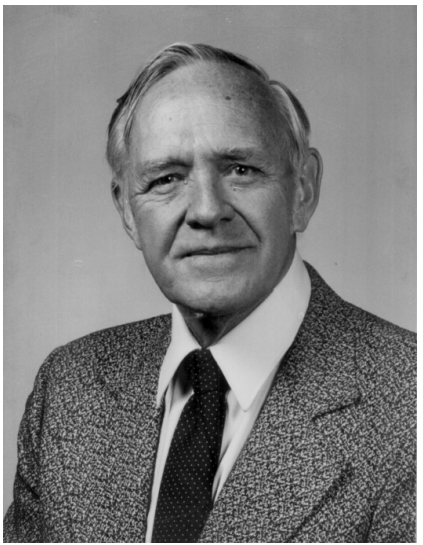
Publications and/or Patents (Five considered most significant.)
Kroeker, W. D., Hanson, D. M., Fairley, J. L., Activity of Wheat Seedling Nuclease Toward Single-Stranded Nucleic-Acids, Journal of Biological Chemistry, 250, 3767-3772 (1975)

Kroeker, W. D., Fairley, J. L., Specific Limited Cleavage Of Bihelical Deoxyribonucleic-Acid By Wheat Seedling Nuclease, Journal of Biological Chemistry, 250, 3773-3778 (1975)

Hanson, D. M. And Fairley, J. L., Enzymes of Nucleic Acid Metabolism From Wheat Seedlings .I. Purification and General Properties of Associated Deoxyribonuclease Ribonuclease And 3'-Nucleotidase Activities, Journal of Biological Chemistry, 244, 2440-& (1969)

Wampler, D. E., Fairley, J. L., Argininosuccinate Synthetase of Neurospora Crassa, Archives of Biochemistry And Biophysics, 121, 580-& (1967)

Fairley, J. L., Chemical Foundations of Molecular Biology Journal of Chemical Education, 42, A922-& (1965)



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Michael Feig

Education-Graduate and Postgraduate
- Vordiplom - Computer Science, Technical University of Berlin, Berlin, Germany 1990
- Vordiplom - Physics, Technical University of Berlin, Berlin, Germany 1990
- Diplom - Physics, Technical University of Berlin, Berlin, Germany 1994
- Ph.D. - Chemistry, University of Houston, Houston, TX, 1999
- Research Associate, The Scripps Research Institute, La Jolla, CA, Molecular Biology, 1999

Academic Appointments
- Assistant Professor, Biochemistry and Molecular Biology (75%), Chemistry (25%), Computer Science and Engineering (Adjunct 0%), MSU, 2003
- Associate Professor, Departments of Biochemistry and Molecular Biology (75%), Chemistry (25%), Computer Science and Engineering (0%, adjunct) 2009

Honors
- American Chemical Society Hewlett-Packard Outstanding Junior Faculty Award in Computational Chemistry, 2007
- MSU College of Natural Science Teacher-Scholar Award, 2007
- Sigma Xi, MSU Chapter Junior Faculty Award, 2005
- Shell Graduate Research Excellence Award, 1998

Areas of Research Interests
Computational methods based on physical principles to study the structure and dynamics of biomolecules; computer simulations to study dynamic aspects of the interactions of proteins and DNA; computer simulation techniques to study the interactions of proteins and peptides with membranes; multiscale computational methods to study the dynamics of biomolecules in cellular environments from the molecular to the cellular scales; using computational methods to provide a more accurate prediction of protein structures from its amino acid sequence; new computational methodology to better study the structure and dynamics of biological macromolecules

Publications and/or Patents
Afra Panahi, Michael Feig: Conformational Sampling of Influenza Fusion Peptide in Membrane Bilayers as a Function of Termini and Protonation States, Journal of Physical Chemistry B (2010) 114, 1407-1416

Michael Feig, Zachary F. Burton: RNA Polymerase II Flexibility During Translocation From Normal Mode Analysis Proteins (2010) 78, 434-446

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Shayantani Mukherjee, Michael Feig: Conformational change in MSH2-MSH6 upon binding DNA coupled to ATPase activity Biophysical Journal (2009) 96, L63-L65

Seiichiro Tanizaki, Jacob W. Clifford, Brian D. Connelly, Michael Feig: Conformational Sampling of Peptides in Cellular Environments Biophysical Journal (2008) 94, 747-759

Seiichiro Tanizaki, Michael Feig: A new generalized Born formalism for heterogeneous dielectric environments: Application to the implicit modeling of biological membranes Journal of Chemical Physics (2005) 122, 124706

Shelagh M. Ferguson-Miller

Education-Graduate and Postgraduate
- B.S. - Physiology and Biochemistry, Univ. of Toronto, Ontario, Canada, 1964
- M.A. - Biochemistry, Univ. of Toronto, Ontario, Canada, 1966
- Ph.D. - Biochemistry, Univ. of Wisconsin, Madison, 1971
- Postdoctoral Research, Oxford University 1971-72
- Postdoctoral Research, Northwestern University 1972-77

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1978
- Associate Professor, Biochemistry, MSU, 1982
- Professor, Biochemistry, MSU, 1987
- Associate Chairperson, Biochemistry, 1989-2002
- Chair, Biochemistry and Molecular Biology. 2003 – 2008

Areas of Research Interest
Mitochondrial ion transport: anion transport systems and the effects of antibiotics on cation movement and energy coupling: Electron transport: structure, function and evolution of cytochrome *c:* Organization of electron transport proteins in intact membranes. Plant cytochrome *c* oxidase: Structure, function and developmental changes: Mechanism and regulation of electron transfer and energy transduction in cytochrome *c* oxidase: Design of detergents for membrane protein analysis and crystallization: *Rhodobacter sphaeroides* cytochrome *c* oxidase: structure/function analysis by site-directed mutagenesis, spectroscopy, and stopped-flow proton pumping: Crystallographic analysis of cytochrome oxidase and mutant forms: Expression, Purification, Analysis and Crystallization of the Peripheral Benzodiazepine Receptor/ TspO from Rs and human mitochondria (Center for Mitochondrial Science & Medicine)

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Honors

Teaching Award, College of Human Medicine, Class of 1985
Distinguished Faculty Award, College of Human Medicine. 1993
"Hot Paper" citation -*The Scientist*, February, 1995
Distinguished Faculty Award, Michigan State University, 1996
University Distinguished Professor,MSU, 1997
Michigan Association of Governing Boards Outstanding Faculty Award, 1998
Director of Michigan Center for Structural Biology, 2001-present
Fellow of American Association for the Advancement of Science, 2007
Fellow of the Biophysical Society, 2010

Publications and or Patents (Five considered the most significant)

Ling Qin, Denise A. Mills, Jian Liu, Denis A. Proshlyakov, Carrie Hiser, and Shelagh Ferguson-Miller. (2009) Redox dependent conformational changes in cytochrome *c* oxidase suggest a gating mechanism for proton uptake. Biochemistry, 48, 5121-5130

Ling Qin, Denise A. Mills, Leann Buhrow, Carrie Hiser, Shelagh Ferguson-Miller (2008) A Conserved Steroid Binding Site in Cytochrome c Oxidase Biochemistry, Rapid Report 47:9931-3

Ling Qin, Carrie Hiser, Anne Mulichak, R. Michael Garavito, and Shelagh Ferguson-Miller (2006) "Identification of Conserved Lipid/ Detergent Binding Sites in a High Resolution Structure of the Membrane Protein Cytochrome c Oxidase" Proc Natl Acad Sci USA 103 16117-16122.

Denise A. Mills, Bryan Schmidt, Carrie Hiser, Erica Westley, and Shelagh Ferguson-Miller "Membrane potential-controlled inhibition of cytochrome c oxidase by zinc". J. Biol. Chem. 277, 14894-14901 (2002)

P. Rosevear, T. VanAken, J. Baxter and S. Ferguson_Miller. Alkyl glycoside detergents. A simpler synthesis and their effects on the kinetic and physical properties of cytochrome oxidase. Biochemistry 19, 4108 (1980).

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Philip Filner

Education-Graduate and Postgraduate
B.A. – Biophysics, Johns Hopkins University, 1960
Ph.D. – Biochemistry, California Institute of Technology, 1965

Academic Appointments
Assistant Professor, Biochemistry and DOE-Plant Research Laboratory, MSU, 1965
Associate Professor, Biochemistry and DOE-Plant Research Laboratory, MSU, 1969
Professor, Biochemistry and DOE-Plant Research Laboratory, MSU, 1973-1979
Acting Director, DOE-Plant Research Laboratory, MSU, 1979-1980

Areas of Research Interest (at MSU)
Plant sciences: Enzyme induction

Publications and/or Patents (Five considered the most significant)
A Test For De Novo Synthesis of Enzymes - Density Labeling With H2O18 Of Barley Alpha-Amylase Induced By Gibberellic Acid, Filner, P., Varner, J. E. Proceedings of The National Academy of Sciences of The United States of America 58, 1520 (1967)

Enzyme Induction in Higher Plants, Filner, P., Wray, J. L., Varner, J. E. Science 165, 358-& (1969)

Structural and Functional Relationships of Enzyme Activities Induced By Nitrate In Barley, Wray, J. L., Filner, P., Biochemical Journal 119, 715-& (1970)

Synthesis and Turnover of Nitrate Reductase Induced By Nitrate in Cultured Tobacco Cells, Zielke, H. R., Filner, P., Journal of Biological Chemistry 246, 1772-& (1971)

Anaerobic Nitrite Production By Plant-Cells And Tissues - Evidence For 2 Nitrate Pools Ferrari, T. E.,, Yoder, O. C., Filner, P., Plant Physiology 51, 423-431 (1973)

Table of Contents

Allen S. Fox

Education-Graduate and Postgraduate
B.S., University of Chicago, 1941
Ph.D., University of Chicago, 1948

Academic Appointments
Assistant Professor, Zoology, Ohio State University, 1948
Associate Professor, Zoology, MSU, 1954
Associate Professor, Agricultural Chemistry, MSU, 1959
Associate Professor, Biochemistry, MSU, 1961-1963

Areas of Research Interests
Transformation by DNA in Drosophila: Genetic control of the tertiary structure of tyrosinase in Neurospora: Structural studies of the protein in Y-1 in Drosophila: Biosynthesis of xanthine dehydrogenase in Drosophila: Development of Drosophila tissue culture techniques

Publications and/or Patents
Fox, A. S., Burnett, J. B., Tyrosinases of Diverse Thermostabilities and Their Interconversion in Neurospora-Crassa Biochimica et Biophysica Acta, 61, 108-& (1962)

Parzen, S. D., Fox, A. S., Purification of Xanthine Dehydrogenase From Drosophila Melanogaster, Biochimica et Biophysica Acta 92, 465-& (1964)

Fox, A. S., Singh, I. P., Munyon, I. L., et al., Genetic Determination, Amino Acid Composition, and Synthesis of Sex Peptide of Males In Drosophila Melanogaster, Genetics, 47, 953-& (1962)

Fox, A. S., Kan, J., Kang, S. H., et al., Protein Synthesis in Cell-Free Preparations From Drosophila Melanogaster, Journal of Biological Chemistry, 240, 2059-& (1965)

Fox, A. S., Yoon, S. B., Specific Genetic Effects of DNA in Drosophila Melanogaster, Genetics, 53, 897-& (1966)

Photograph courtesy of University of Wisconsin-Madison Archives.

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Pamela J. Fraker

Education-Graduate and Postgraduate
B.S., Purdue University, 1966
Ph.D., University of Illinois, 1971
Postdoctoral Studies, University of Illinois Medical College, Biological Chemistry, 1971

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1973
Associate Professor, Biochemistry, MSU, 1979
Professor, Biochemistry & Molecular Biology, MSU, 1983
Professor, Microbiology, 1984-1997
Professor, Food Science and Human Nutrition, 1998
Graduate Program Director, Biochemistry, 1995-2000
Director of Flow Cytometry Facility, MSU, 1988-2006.

Areas of Research Interest
Obesity and altered immune status—obese, overfed mouse: Immune defense in morbidly obese, gastric bypass patients: Impact of zinc deficiency and protein calorie deficiencies on immune defense: Cellular immunology: Role of programmed cell death in immune regulation and malnutrition: Role of glucocorticoid-induced apoptosis in regulation of lymphopoiesis: Utilization of flow cytometer for analysis of programmed cell death, development of flow cytometry methods: Trace element biochemistry and nutrition: Induction of apoptosis by free zinc

Honors
Bio-Serv Research Award for Junior investigators, American Institute of Nutrition, 1981
College of Natural Science Alumni Distinguished Faculty Award for 1992
Goldsmith Research Award, American College of Nutrition, 1993,
Distinguished Faculty Award, College of Natural Science, 1995,
MSU Distinguished Faculty Award, 1998
University of Texas , Jean Andrews Lectureship, Oct 2007
National Academy of Sciences, elected 2007
Purdue University Science Hall of Fame, May 2008
MSU-University Distinguished Professor, 2009

Publications and/or Patents (Five considered the most significant)
A role for leptin in sustaining lymphopoiesis and myelopoiesis, Claycombe, K., King, L. E., Fraker, P. J., Proceedings of The National Academy of Sciences of The United States of America, 105, 2017-2021 (2008)

Apoptosis plays a distinct role in the loss of precursor lymphocytes during zinc deficiency in mice, King, L. E., Osati-Ashtiani, F., Fraker, P. J., Journal of Nutrition 132, 974-979 (2002)

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Comparative-Evaluation of Several DNA-Binding Dyes in The Detection of Apoptosis-Associated Chromatin Degradation By Flow-Cytometry, Telford, W. G., King, L. E., Fraker, P. J., Cytometry 13, 137-143 (1992)

Protein and Cell-Membrane Iodinations With a Sparingly Soluble Chloramide, 1,3,4,6-Tetrachloro-3a,6a-Diphenylglycoluril, Fraker, P. J., Speck, J. C., Biochemical and Biophysical Research Communications 80, 849-857 (1978)

Effect of Zinc-Deficiency on Immune-Response of Young-Adult A-J Mouse, Fraker, P. J., Haas, S. M., Luecke, R. W., Journal of Nutrition 107, 1889-1895 (1977)

Edward F. Fritsch

Education:-Graduate and Postgraduate
- B.S., Massachusetts Institute of Technology, 1972
- Ph.D., Molecular Biology, University of Wisconsin, 1977
- Postdoctoral Fellow, University of Southern California, 1977-1978
- Postdoctoral Fellow, California Institute of Technology, 1978

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1980
- Senior Scientist, Genetics Institute, Boston, MA, 1982

Areas of Research Interest
Molecular biology of gene expression: Isolation and characterization of eukaryotic genes

Publications and/or Patents (Five considered the most significant.)
Characterization of Deletions Which Affect The Expression of Fetal Globin Genes in Man, Fritsch, E. F., Lawn, R. M., Maniatis, T., Nature 279, 598-603 (1979)

Molecular-Cloning and Characterization of the Human Beta-Like Globin Gene-Cluster, Fritsch, E.F. , Lawn, R. M., Maniatis, T., Cell 19, 959-972 (1980)

The Molecular Genetics of Human Hemoglobins, Maniatis, T., Fritsch, E. F., Lauer, J., Lawn, R. M., Annual Review of Genetics 14, 145-178 (1980)

Isolation And Characterization of Genomic and CDNA Clones of Human Erythropoietin, Jacobs, K., Shoemaker, C., Rudersdorf, R., Neill, S. D., Kaufman, R. J., Mufson, A., Seehra, J., Jones, S. S., Hewick, R., Fritsch, E. F., Kawakita, M., Nature 313, 806-810 (1985)

Stimulation of Fetal Hemoglobin-Synthesis by Erythropoietin in Baboons, Alkhatti, A., Veith, R. W., Papayannopoulou, T., Fritsch, E. F., Goldwasser, E., Stamatoyannopoulos, G., New England Journal of Medicine 317, 415-420 (1987)

A photograph of Professor Fritsch was not available.

Table of Contents

Douglas A. Gage

Education – Graduate and Postgraduate
- B. S., Florida State University, Tallahassee, Florida, 1977
- M. S, Florida State University, Tallahassee, Florida, 1981
- Ph.D., University of Texas, Austin, Texas, 1986
- Postdoctoral Research Associate, DOE Plant Research Laboratory, MSU, 1986-1987

Academic Appointments
- Applications Manager, NIH Mass Spectrometry Facility, MSU, 1987
- Research Assistant Professor of Biochemistry, 1989
- Facility Manager, NIH Mass Spectrometry Facility, MSU, 1989
- Co-director and Manager, NIH Mass Spectrometry Facility, MSU, 1991
- Research Associate Professor, Biochemistry, MSU, 1993
- Assistant Professor, Biochemistry, MSU, 1994
- Director, Mass Spectrometry Facility, MSU, 2000-2002
- Associate Professor of Biochemistry, MSU, 2000-2002
- Senior Director and Head, Discovery Biomarkers, Pfizer Global R&D, Ann Arbor 2002-2007
- Adjunct Associate Professor of Biochemistry and Molecular Biology, 2002-
- Assistant to the Vice President for Research, MSU, 2007-2010
- Director, MSU BioEconomy Network, Office of the Vice President for Research, 2010-

Areas of Research Interest
Natural Products Chemistry and Biosynthesis: Mass Spectrometry of Lipids, Peptides and Carbohydrates: Plant Evolution and Biochemical Systematics

Honors:
Editorial Board, Analytical Biochemistry (1994-1997); Metabolomics (2005-2008)

Publications (Five considered the most significant)

Froehlich, J.E., Wilkerson, C., Ray, K., McAndrew, R.S., Osteryoung, K.W., Gage, D.A., and Phinney, B.S.: Proteomic Study of the *Arabidopsis thaliana* chloroplastic envelope membrane utilizing alternatives to traditional two-dimensional electrophoresis. J. Proteome Research 4: 413-425 (2003)

Li W., Scott A.P., Siefkes M.J., Yan H., Liu Q., Yun S.S. and Gage D. A.: Bile Acid secreted by male sea lamprey that acts as a sex pheromone. Science 296:138-141 (2002)

Gage, D.A., Rhodes, D., Nolte, K.D., Hicks, W.A., Leustek, T., Cooper, A.J.L., and Hanson, A.D.: A new route for synthesis of dimethylsulphoniopropionate in marine algae. Nature, 387: 891-894 (1997)

Hanson, A.D., Rathinasabapathi, B., Rivoal, J., Burnet, M., Dillon, M.O., and Gage, D.A.: Osmoprotective compounds in the

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Plumbaginaceae: a natural experiment in metabolic engineering of stress tolerance. Proc. Nat. Acad. Sci., 91: 306-310 (1994)

Zeevaart, J.A.D., Heath, T., and Gage, D.A.: Evidence for a universal pathway of abscisic acid biosynthesis in higher plants from 18O incorporation patterns. Plant Physiol., 91: 1594-1601 (1989)

Kathleen Anne Gallo

Education-Graduate and Postgraduate

B.S. Biochemistry, Catholic University of America, Washington, DC, 1984
Ph.D. Chemistry, Harvard University, Cambridge, MA, 1992
Postdoctoral Researcher, Genentech, Inc., Departments of Cell Genetics and Molecular Biology, So. San Francisco, CA, 1992

Academic Appointments

Assistant Professor, Physiology, Biochemistry & Molecular Biology, MSU, 1996
Associate Professor, Physiology, Biochemistry & Molecular Biology, MSU, 2002
Quantitative Biology and Modeling Initiative, MSU, 2005
Neuroscience Program, 2006
Professor, Physiology, Biochemistry and Molecular Biology, 2007
Professor, Physiology, MSU 2009

Areas of Research Interest

Deciphering the molecular mechanisms regulating the activity of mammalian protein kinases and their signaling pathways; how dysregulation of protein kinases impacts human disease including cancer; mixed-lineage family of protein kinases.

Publications and/or Patents (Five considered the most significant)

Cdc42-Induced Activation of the Mixed-Lineage Kinase Sprk in Vivo - Requirement of the Cdc42/Rac Interactive Binding Motif and Changes In Phosphorylation. Bock, B. C., Vacratsis, P. O., Qamirani, E., Gallo, K. A. Journal of Biological Chemistry 275, 14231-14241 (2000)

Autoinhibition of mixed lineage kinase 3 through its Src homology 3 domain Zhang, H., Gallo, K. A. Journal of Biological Chemistry 276 45598-45603 (2001)

Mixed-Lineage Kinase Control of JNK and P38 MAPK Pathways. Gallo, K. A., Johnson, G. L. Nature Reviews Molecular Cell Biology 3, 663-672 (2002)

Lrrk2 in Parkinson's Disease: Protein Domains and Functional Insights. Mata, I. F., Wedemeyer, W. J., Farrer, M. J., Taylor, J. P., Gallo, K. A. Trends In Neurosciences. 29, 286-293 (2006)

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MLK3 is critical for breast cancer cell migration and promotes a malignant phenotype in mammary epithelial cells Chen, J., Miller, E. M. and Gallo, K. A. Oncogene 29, 4399-4411 (2010)

R. Michael Garavito

Education-Graduate and Postgraduate
- B. A., Biology/Anthropology, University of California, San Diego 1974
- Ph.D., Biophysics/Biochemistry, Purdue University, 1978
- Postdoctoral Research Associate, Microbiology, Biocenter, Basel, Switzerland, 1979

Academic Appointments
- Independent Research Scientist, Biocenter, Basel, Switzerland, 1981
- Privat Dozent (lecturer), University of Basel, Switzerland, 1984
- Assistant Professor, Biochemistry and Molecular Biology, The University of Chicago, 1987
- Associate Professor, Biochemistry and Molecular Biology, The University of Chicago, 1994
- Associate Professor, Biochemistry, MSU, 1995
- Professor, Biochemistry and Molecular Biology, MSU, 2000
- Director, Macromolecular Crystallography Facility, Michigan Center for Structural Biology, MSU, 2000-2007
- Director, REF Center of Excellence in the Structural Biology of Membrane Proteins, MSU, 2004-2009
- Chair, Management Board of the Life Sciences Collaborative Access Team, Argonne National Laboratory, 2007-present

Areas of Research Interest
Structure and function of membrane proteins; Biosynthesis of glycolipids and function of glycosyltransferase; Protein crystallography.

Honors
Sigma Xi, 1989.
Martin D. and Virginia S. Kamen Sustaining Fund for Junior Faculty, 1991
MSU College of Natural Science Distinguished Faculty Award, 2007
MSU Distinguished Faculty Award, 2007.

Publications and/or Patents (Five considered the most significant)
Resin Development for Electron-Microscopy and an Analysis of Embedding At Low-Temperature. Carlemalm, E., Garavito, R. M., Villiger, W. Journal of Microscopy-Oxford 126, 123-143 (1982)

X-Ray-Diffraction Analysis of Matrix Porin, an Integral Membrane-Protein from Escherichia-Coli Outer Membranes. Garavito, R. M., Jenkins, J., Jansonius, J. N., Karlsson, R., Rosenbusch, J. P. Journal of Molecular Biology 164, 313-327 (1983)

Table of Contents

The X-Ray Crystal-Structure of The Membrane-Protein Prostaglandin-H(2) Synthase-1. Picot, D., Loll, P. J., Garavito, R. M. Nature 367, 243-249 (1994)

The Structural Basis of Aspirin Activity Inferred From the Crystal-Structure of Inactivated Prostaglandin H-2 Synthase. Loll, P. J., Picot, D., Garavito, R. M. Nature Structural Biology 2, 637-643 (1995)
The Productive Conformation Of Arachidonic Acid Bound To Prostaglandin Synthase. Malkowski, M. G., Ginell, S. L., Smith, W. L., Garavito, R. M. Science 289, 1933-1937 (2000)

Pamela Jill Green

Education – Graduate and Postgraduate
- B.S., Purdue University with Honors 1979
- Ph.D., Biochemistry and Molecular Biology, State University of New York, Stony Brook, NY, 1985
- Postdoctoral Fellow, Laboratory of Plant Molecular Biology, Rockefeller University, New York, 1985

Academic Appointments
- Assistant Professor, MSU-DOE Plant Research Laboratory and Biochemistry, MSU, 1988
- Associate Professor, MSU-DOE Plant Research Laboratory and Biochemistry, MSU, 1994
- Professor, MSU-DOE Plant Research Laboratory and Biochemistry, MSU, 1999
- Crawford H. Greenewalt Chair, Professor of Plant and Soil Science and Marine Science, Delaware Biotechnology Institute, University of Delaware, 2002

Areas of Research Interest
Genomic analysis of miRNAs, siRNAs and their targets: RNA degradation: Ribonucleases: Regulation of gene expression during environmental stress.

Honors
Fellow of American Society of Plant Biology, 2009
AAAS Fellow, 2006
Board of Trustees, Gordon Research Conferences 2002 – 2008, Chair 2006-7,
Committee on Science and the Arts, The Franklin Institute, Philadelphia, 2004, Planning Chair, 2009-2011
Board of Directors, International Society for Plant Molecular Biology, 1997-2001
North American Arabidopsis Steering Committee, 1995-1997, Co-Chair 1997
Individual Award in Plant Biology from the McKnight Foundation, 1989-1992

Publications (Five considered most significant)
Newman, T.C., Ohme-Takagi, M., Taylor, C.T. and Green, P.J. DST sequences, highly conserved

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among plant SAUR genes, target reporter transcripts for rapid degradation in tobacco. Plant Cell 5: 701-714 (1993).

Gutiérrez, R.A., Ewing R.M., Cherry, J.M., and Green, P.J. Identification of unstable transcripts in Arabidopsis by cDNA microarray analysis: Rapid decay is associated with a group of touch- and specific clock-controlled genes. Proc. Nat'l Acad. Sci. USA, 99:11513-11518 (2002)

Souret, F.S., Kastenmayer, J.P., and Green, P.J. AtXRN4 degrades mRNA in Arabidopsis and its substrates include selected miRNA targets. Molecular Cell, 15:173-183, (2004)

Lu, C., Tej, S.S., Luo, S., Haudenschild, C.D., Meyers, B.C., and Green, P.J. Elucidation of the small RNA component of the transcriptome. Science, 309:1567-1569 (2005)

German, M.A., Pillay, M., Jeong, D-H., Hetawal, A., Luo, S., Janardhanan, P., Kannan, V., Rymarquis, L., Nobuta, K., German, R., De Paoli, E., Lu, C., Schroth, G., Meyers, B.C. and Green, P.J. Global identification of microRNA-target RNA pairs by parallel analysis of RNA ends. Nature Biotechnology 26: 941 - 946 (2008)

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R. Guarth Hansen

Education-Graduate and Postgraduate
Chemistry, Utah State University, 1938-1941
B. S, Chemistry, University of Wisconsin, 1944
M.S., Biochemistry, University of Wisconsin, 1946
Ph. D., Biochemistry, University of Wisconsin, 1948

Academic Appointments
Assistant Professor, College of Medicine, University of Utah, 1948
Associate Professor, Biochemistry, University of Illinois, 1950
Professor, Biochemistry, University of Illinois, 1955
Professor and Department Head, Agricultural Chemistry, MSU 1957
Professor and Department Chairman, Biochemistry, MSU 1961-1968

Areas of Research Interest
Mechanisms of galactose formation and utilization in animals and humans: Isolation of nucleotides: Metabolic disorders

Honors
Borden Award, American Institute of Nutrition, 1960

Publications (Five considered the most significant.)
Hansen, R. G., Henning, U., Regulation of Pyruvate Dehydrogenase Activity In Escherichia Coli K12, Biochimica et Biophysica Acta, 122, 355-& (1966)

Nordin, J. H., Hansen, R. G., Isolation and Characterization of Galactose From Hydrolysates Of Glycogen, Journal of Biological Chemistry, 238, 489-& (1963)

Bretthauer, R. K., Hansen, R. G., Wilken, D. R., Biosynthesis of Guanosine Diphosphate Mannose and Phosphomannan by Hansanula Holstii, Biochimica Et Biophysica Acta, 78, 420-& (1963)

Johnson, J. C., Shanoff, M., Bass, S. T., Boezi, J. B., and Hansen. R. G. An Enzymic Method For Determination of Inorganic Pyrophosphate and its Use as an Assay for RNA Polymerase, Analytical Biochemistry, 26, 137-& (1968)

Hansen, R. G., Henning, U., Regulation of Pyruvate Dehydrogenase Activity in Escherichia Coli K12, Biochimica et Biophysica Acta, 122, 355-& (1966)

Table of Contents

Robert P. Hausinger

Education-Graduate and Postgraduate
- B.S. - University of Wisconsin, 1977
- Ph.D. - University of Minnesota, 1982
- Postdoctoral - Massachusetts Institute of Technology, 1982-1984

Academic Appointments
- Assistant Professor, Microbiology and Biochemistry, MSU, 1984
- Associate Professor, Microbiology and Biochemistry, MSU, 1989
- Professor, Microbiology and Molecular Genetics and Biochemistry and Molecular Biology, MSU, 1994-present.
- Associate Chair and Director of Graduate Studies, Microbiology and Molecular Genetics, MSU, 2003-present
- Co-Director, Quantitative Biology Initiative, and Director, Quantitative Biology Program MSU, 2007-2010

Areas of Research Interest;
Urease metallocenter assembly; Mechanism of Fe(II)/alpha-ketoglutarate hydroxylases; Mechanism and function of human ABH1 DNA-abasic site lyase; Engineering cyanobacterial nitrogenase for hydrogen production

Honors
- Cyrus P. Barnum Teaching Award, 1979, 1980
- Sigma Xi Junior Faculty Award, MSU, 1995
- Distinguished Faculty Award, College of Natural Science 1999, 2009
- College of Natural Science Alumni Association Meritorious Faculty Award, 2000
- Sigma Xi Senior Meritorious Faculty Award, 2006
- MSU Distinguished Faculty Award, 2009

Publications and/or Patents (Five considered most significant)

Mulrooney, S.B., and R.P. Hausinger. (1990). Sequence of the Klebsiella aerogenes urease genes and evidence for accessory proteins facilitating nickel incorporation. J. Bacteriol. 172, 5837-5843.

Fukumori, F., and R.P. Hausinger. (1993). Purification and characterization of 2,4-dichloro¬phenoxy¬acetate/α-ketoglutarate dioxygenase. J. Biol. Chem. 263:24311-24317.

Jabri, E., M.B. Carr, R.P. Hausinger, and P.A. Karplus. (1995). The crystal structure of urease from Klebsiella aerogenes. Science 268:998-1004.

Trewick, S. C., T. F. Henshaw, R. P. Hausinger, T. Lindahl, and B. Sedgwick. (2002). Oxidative demethylation by Escherichia coli AlkB directly reverts DNA base damage. Nature 419:174-178.

Proshlyakov, D. A., T. F. Henshaw, G. R. Monterosso, M. J. Ryle, and R. P. Hausinger. (2004). Direct detection of oxygen intermediates in the non-heme Fe enzyme taurine/□-ketoglutarate dioxygenase. J. Am. Chem. Soc. 126:1022-1023.

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Eric Linke Hegg

Education-Graduate and Postgraduate
- B.A., Chemistry and History, Kalamazoo College, Michigan, 1991, highest GPA
- Ph.D., Bioinorganic Chemistry, University of Wisconsin-Madison, 1996
- Postdoctoral Research Fellow, University of Minnesota, 1996

Academic Appointments
- Assistant Professor, Chemistry, University of Utah, 1999
- Associate Professor, Chemistry, University of Utah, 2006
- Associate Professor, Biochemistry & Molecular Biology, MSU, 2006

Areas of Research Interests
Biosynthesis, transport, and regulation of heme and other metal cofactors; Biodiversity and assembly of novel H_2-generating enzymes; Metabolism and water transport.

Honors
- Cooper Prize in Physics, Kalamazoo College, 1989
- Phi Beta Kappa, Kalamazoo College, 1990
- National Alpha Lambda Delta Award, highest class GPA, Kalamazoo College, 1991
- Lemeul Smith Prize in Chemistry, Kalamazoo College, 1991
- McElvain Scholarship, Chemistry, University of Wisconsin. 1991
- Sam Charles Slifkin Award, Chemistry, University of Wisconsin, 1996
- Best Poster Award at ICBIC10, Society of Biological Inorganic Chemistry, 2001
- Cottrell Scholars Award, Research Corporation, 2002
- NSF Career Award, National Science Foundation, 2004

Publications and/or Patents (Five considered most significant)

Brown, K.R.; Allan, B.M.; Do, P.; Hegg, E.L. "Identification of Novel Hemes Generated by Heme A Synthase: Evidence for Two Successive Monooxygenase Reactions." Biochemistry (2002) 41, 10906-10913.

Brown, K.R.; Brown, B.M.; Hoagland, E.; Mayne, C.L.; Hegg, E.L. "Heme A Synthase Does Not Incorporate Molecular Oxygen into the Formyl Group of Heme A." Biochemistry (2004) 43, 8616-8624.

Kreuzer-Martin, H.W.; Ehleringer, J.R.; Hegg, E.L. "Oxygen Isotopes Indicate Most Intracellular Water in Log-Phase Escherichia coli Is Derived from Metabolism." Proc. Natl. Acad. Sci. U.S.A. (2005),102, 17337-17341.

Kreuzer-Martin, H.W.; Lott, M.J.; Ehleringer, J.R.; Hegg, E.L. "Metabolic Processes Account for the Majority of the Intracellular Water in Log-Phase Escherichia coli Cells As Revealed by Hydrogen Isotopes." Biochemistry (2006) 45, 13622-13630.

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Wang, Z; Hegg, E.L. "Elucidating the Differential Regulatory Mechanisms of Heme A Synthase and Heme O Synthase." J. Biol. Chem., (2009) 284, 839-847.

Ronald William Henry

Education - Graduate and Postgraduate

B.Sc., Microbiology, University of Alberta, Edmonton, Alberta, Canada 1985

Ph.D., Microbiology, University of Alberta, Edmonton, Alberta, Canada 1992

Post-doctoral Fellow, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY 1992

Academic Appointments

Assistant Professor, Biochemistry & Molecular Biology, MSU, 1998

Associate Professor, Biochemistry & Molecular Biology, MSU, 2005

Associate Chair, Biochemistry & Molecular Biology, MSU, 2008-

Research Interests

Mechanisms of human small nuclear RNA gene regulation; Gene regulation by the p53 and RB tumor suppressor proteins; Protein stability pathways in gene regulation

Honors

Elected to University of Alberta Graduate Faculties Council, 1989-1990

University of Alberta Outstanding Student Teaching Award, 1991
Province of Alberta Graduate Fellowship, 1990-1991
Joseph Goldring Foundation Fellowship, 1997-1998
Senior Award, Multiple Myeloma Research Foundation, 2008

Publications and/or Patents (Five considered the most significant,)

H. A. Hirsch, L. Gu, and R. W. Henry, The Retinoblastoma tumor suppressor protein targets distinct general transcription factors to regulate RNA polymerase III gene expression, Mol Cell Biol 20 (2000) 9182-9191.

H. A. Hirsch, G. W. Jawdekar, K. A. Lee, L. Gu, and R. W. Henry, Distinct mechanisms for repression of RNA polymerase III transcription by the Retinoblastoma tumor suppressor protein, Mol Cell Biol 24 (2004) 5989-5999.

A. A. Gridasova and R. W. Henry, The p53 tumor suppressor protein represses human snRNA gene transcription by RNA polymerases II and III independently of sequence-specific DNA binding, Mol Cell Biol 25 (2005) 3247-3260.

Z. Ullah, M. S. Buckley, D. N. Arnosti, and R. W. Henry, Retinoblastoma protein regulation by the COP9 signalosome, Mol Biol Cell 18 (2007) 1179-1186.

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P. Acharya, N. Raj, Buckley M. S., L. Zhang, Duperon, S., G. Williams, R. W. Henry, and D. N. Arnosti, Paradoxical instability-activity relationship defines a novel regulatory pathway for Retinoblastoma proteins, Mol Biol Cell (2010) In press.

Susanne Hoffmann-Benning

Education-Graduate and Postgraduate

Vordiploma in Biology, Albert-Ludwigs University, Freiburg, Germany, 1985

Diploma in Biology, plant physiology, biochemistry and genetics, Albert-Ludwigs University, Freiburg, Germany, 1988

Ph.D., Genetics, MSU-DOE-Plant Research Laboratory. 1993

Postdoctoral Research, Institute of Genbiological Research, Berlin, Germany, 1993

Academic Appointments

Visiting Scholar, Institute of Genbiological Research, Berlin, Germany, 1996

Visiting Research Associate, MSU-DOE Plant Research Laboratory, 1998

Co-Manager, Mass Spectrometry Facility, MSU, 2002

Assistant Research Professor, Biochemistry and Molecular Biology, MSU, 2004

Assistant Professor, Biochemistry and Molecular Biology, MSU, 2010

Areas of Research Interests

Plant Biochemistry; Phloem-mediated mechanisms of plant growth and development; Identification of factors which regulate plant growth through changes in cell wall and cuticle biosynthesis.

Publications and/or Patents (Five considered the most significant)

Andrea Bräutigam , Susanne Hoffmann-Benning , and Andreas P.M. Weber (2008) Comparative proteomics of chloroplasts envelopes from C3 and C4 plants reveals specific adaptations of the plastid envelope to C4 photosynthesis and candidate proteins required for maintaining C4 metabolite fluxes. Plant Physiol.148: 568-579

Guelette, BS, Chamberlin,B, Benning, UF, and Hoffmann-Benning, S (2007) Indications of lipid signaling pathways in the phloem exudate of Arabidopsis thaliana and Perilla ocymoides. Proceedings of the 17th International Symposium of Plant Lipids. C.Benning, J. Ohlrogge eds; Michigan State University; E. Lansing, USA; p.92-95.

Hoffmann-Benning, S., Gage, D.A., McIntosh, L., Kende, H., Zeevaart, J. A. D. (2002). Comparison of peptides in the phloem sap of flowering and non-flowering Perilla and lupine plants using michrobore HPLC followed by matrix-assisted laser desorption/ ionization time-of-flight mass spectrometry. Planta 216:140-147.

Cosgrove, D. J., Li, L. C., Cho, H. T., Hoffmann-Benning, S., Moore,

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R. C., Becker, D. (2002). The growing world of expansins. Plant Cell Physiol. 43: 1436-1444.

Doermann, P., Hoffmann-Benning, S., Balbo, I., and Benning, Christoph (1995): Isolation and characterization of an Arabidopsis mutant deficient in the thylakoid lipid digalactosyl diacylglycerol. Plant Cell 7 (11): 1801-1810.

John F. Holland

Education – Graduate and Postgraduate
- B.A., Chemistry, Macalester College, 1951
- B.S., Mathematics, St. Cloud State University, 1952
- M.S., Chemistry, University of Wisconsin, 1952
- Ph.D., Chemistry, MSU, 1972

Academic Appointments
- Instructor, Biochemistry, MSU, 1964
- Assistant Professor, Biochemistry, MSU, 1973
- Associate Professor, Biochemistry, MSU, 1975
- Professor, Biochemistry, MSU, 1980
- Professor Emeritus, Biochemistry, MSU, 1996

Areas of Research Interest
UV absorption spectrometry; Emission spectroscopy; General instrumentation - theory and development - design of analog and digital systems for data collection and reduction; Flame emission spectrometry; Mass spectrometry; Fluorescence spectrometry; Electrochemistry; Interactive Laser Cytometry

Honors
Vaaler Award for Chemical Instrumentation, 1973
Arnold O. Beckman Award, 1975
Member of Nobel Faculty, Nobel Awards, Stockholm, Sweden, December 1975
Member of Advisory Board on Instrumentation Analytical Chemistry 1985-1988
Annual Achievement Award, Instrument Society of America, Northeastern Michigan Section, 1988.
Sigma Xi, Senior Scientist Award, Michigan State University Chapter, 1989.

Publications (Five considered the most significant)

Holland, J. F., Newcome, B., Tecklenburg, R. E. Jr, Davenport, M., Allison, J., Watson J. T., Enke, C. G., Design, Construction and Evaluation of an Integrating Transient Recorder For Data Acquisition in Capillary Gas Chromatography/Time of Flight Mass Spectrometry. Rev Sci Inst 62, 69-76 (1991)

Holland, J. F., Enke, C. G., Allison J., et al. Mass-Spectrometry on the Chromatographic Time Scale - Realistic Expectations. Analytical Chemistry 55, A997-& (1983)

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Schindler, M., Allen, M. L., Olinger, M. R., Holland, J. F. Automated Analysis and Survival Selection of Anchorage Dependent Cells Under Normal Growth Conditions. Cytometry 6, 368 (1985)

Holland, J. F., Soltmann, B, Sweeley, C. C. A Model for Ionization Mechanisms in Field Desorption Mass Spectrometry. Biomed Mass Spectrom., 3, 340 (1976)

Holland, J. F., Teets, R. E., Timnick, A. Unique Computer Centered Instrument for Simultaneous Absorbance and Fluorescence Measurements , Analytical Chemistry 45, 145-153 (1973)

Table of Contents

Rawle I. Hollingsworth

Education-Graduate and Postgraduate

B. Sc. Chemistry (Physics Biochem) University of the West Indies, 1978

Ph.D. Chemistry, University of the West Indies, 1983

Research Associate, Microbiology/Biochemistry, MSU, 1983

Academic Appointments

Visiting Assistant Professor, Biochemistry, MSU, 1987

Assistant Professor, Chemistry and Biochemistry, MSU, 1988

Associate Professor, Chemistry and Biochemistry, MSU, 1993

Professor, Chemistry and Biochemistry, MSU, 1997-

Director, Center for Renewable Resource, Chemistry, MSU, 2004 –

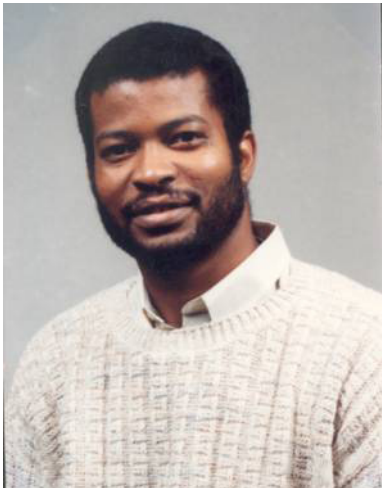
Areas of Research Interest

K-12 Michigan curriculum development; Transformative aspects of science working with state and local agencies on technology commercialization and programs for scientific innovation; working with Chambers of commerce, community groups, University organizations and the Board of Govenors, Michigan Biotechnology Research Commercialization Center and the Governor's Green Chemistry Roundtable advisory board.

Publications and/or Patents (Five considered the most significant)

R. I. Hollingsworth (1999) "Taming Carbohydrate Complexity: A Facile, High-Yield Route to Chiral 2,3-Dihydroxybutanoic Acids and 4-Hydroxytetrahydrofuran-2-ones with Very High Optical Purity from Pentose Sugars". J. Org. Chem. 64 7633-7634.

R. I. Hollingsworth, and G. Wang (2000) "Optically-active three-carbon synthons: another milestone in the creation of a general carbohydrate chiral technology platform" Chimica Oggi 18 (9) 40-42.



X. Song and R.I. Hollingsworth (2003) Remote site bromination via a cascade rearrangement involving two bridging dioxonium species during oxidative cleavage of a benzylidene acetal" Carbohyd. Res. 338 (4) 369-373

R. Root-Bernstein, P.F. Dillon and R.I. Hollingsworth (2008) "PF A tethered ascorbate-norepinephrine compound, 4-UT, displays long-acting adrenergic activity on rabbit aortic smooth muscle" Drug. Dev. Res. 69 (5) 242-250.

M. A. Ponder, S. J. Gilmour, P. W. Bergholz, C. A. Mindock, R. .I. Hollingsworth, M. F. Thomashow and J. M. Tiedje (2008) "Characterization of potential stress responses in ancient Siberian permafrost psychroactive bacteria" FEMS Microbiol. Letts. 53 (1) 103-115.

Table of Contents

Charles G. Hoogstraten

Education-Graduate and Postgraduate
- B. S. Chemistry, MSU, 1990
- B. S. Biochemistry, MSU, 1990
- Ph.D. Biochemistry, University of Wisconsin-Madison, 1995
- Helen Hay Whitney Postdoctoral Fellow, Chemistry and Biochemistry, University of Colorado, 1995
- Postdoctoral, Chemistry, University of California, Davis, 1998
- Research Specialist, Chemistry, University of California, Davis, 2000

Academic Appointments
- Assistant Professor, Biochemistry & Molecular Biology, MSU, 2002
- Associate Professor Biochemistry & Molecular Biology, MSU, 2008

Areas of Research Interest
Biophysical studies of RNA catalysis and RNA-protein interactions; Macromolecular NMR and pulsed EPR methods and applications; RNA recognition by trypanosomal pentatricopeptide proteins.

Honors
- Robert Clark Kedzie Award to the Outstanding Chemistry Major, MSU, 1990
- Board of Trustees' Scholarship Award, MSU, 1990
- Howard Hughes Medical Institute Predoctoral Fellowship, 1990-1995
- Helen Hay Whitney Foundation Postdoctoral Fellowship, 1995-98

Publications and/or Patents (Five considered most significant)

Johnson, J. E., Jr. & Hoogstraten, C.G. (2008). Extensive Backbone Dynamics in the GCAA RNA Tetraloop Analyzed Using 13C NMR Spin Relaxation And Specific Isotope Labeling. Journal of the American Chemical Society 130, 16757-16769. PMCID: PMC2729180.

Julien, K. R., Sumita, M., Chen, P.-H., Laird-Offringa, I. A., & Hoogstraten, C.G. (2008) Conformationally Restricted Nucleotides as a Probe of Structure-Function Relationships in RNA. RNA 14, 1632-1643. PMCID: PMC2491483.

Johnson, J.E., Jr., Julien, K.R., & Hoogstraten, C.G. (2006) Alternate-Site Isotopic Labeling of Ribonucleotides for NMR Studies of Ribose Conformational Dynamics in RNA. J. Biomolec. NMR 35, 261-274.

Hoogstraten, C.G., Grant, C.V., Horton, T.E., DeRose, V.J., & Britt, R.D. (2002) Structural Analysis of Metal Ion Ligation to Nucleotides and Nucleic Acids Using Pulsed EPR Spectroscopy. J. Am. Chem. Soc. 124, 834-842.

Hoogstraten, C.G., Wank, J.R., & Pardi, A. (2000) Active Site Dynamics in the Lead-Dependent Ribozyme. Biochemistry 39, 9951.

Table of Contents

Carl A. Hoppert

Education:-Graduate and Postgraduate
B.S. Biochemistry, University of Wisconsin, 1920
M.S. Biochemistry, University of Wisconsin, 1923
Ph.D. Biochemistry, University of Wisconsin, 1925
Kaiser Wilhelm Institute, Berlin, 1924

Academic Appointments
Instructor, Agricultural Chemistry, University of Wisconsin, 1920-1926
Director, Chemistry and Nutrition, Soft wheat Millers Association, Tennessee, 1926-1928
Associate Professor, Biological Chemistry Division, Chemistry, MSU, 1928
Professor, Biological Chemistry Division, Chemistry, MSU, 1937
Professor, Biochemistry, MSU, April 1, 1961-July 1, 1962
Professor Emeritus, MSU, 1961

Areas of Research Interests
Nutrition of dogs; Genetics and nutrition of tooth decay in rats; Vitamin and mineral metabolism in rats; Relation of fiber containing foods to laxation in humans

Publications and/or Patents (Five considered the most significant.)
A Study of the Distribution and Retention of Cadmium-115 in the Albino Rat, Decker, C. F., Byerrum, R. U., Hoppert, C. A., Archives of Biochemistry and Biophysics 66, 140-145 (1957)

Multiplicity of Cellulolytic Enzymes of Myrothecium-Verrucaria, Grimes, R. M., Duncan, C. W., Hoppert, C. A., Archives of Biochemistry and Biophysics 68, 412-424 (1957)

Absorption And Distribution of Cr-51 in the Albino Rat, Mackenzie, R. D., Anwar, R. A., Byerrum, R. U., Hoppert, C. A., Archives of Biochemistry and Biophysics 79, 200-205 (1959)

Chronic Toxicity Studies .3. Chronic Toxicity of Cadmium and Chromium in Dogs, Anwar, R. A., Byerrum, R. U., Hoppert, C. A., Langham, R. F., Alfredson, B. V., Archives of Environmental Health 3, 456-& (1961)

Effect on Caries of Cross-Breeding Caries-Resistant and Caries-Susceptible Rats, Rosen, S, Hunt, H. R., Hoppert, C. A., Sawant, A. C., Coleman, G. T., Journal of Dental Research 41, 1033-& (1962)

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Gregg A. Howe

Education-Graduate and Postgraduate

B. A. Biology, East Carolina University, Greenville, NC. 1983
M.S., Biology , East Carolina University, Greenville, NC. 1987
Ph.D., Biology, University of California, Los Angeles, CA. 1993
Postdoctoral, Institute of Biological Chemistry, Washington State University, Pullman, 1993

Academic Appointments

Assistant Professor, DOE Plant Research Laboratory and Department of Biochemistry and Molecular Biology, MSU, 1997
Associate Professor, DOE Plant Research Laboratory and Department of Biochemistry and Molecular Biology, MSU, 2003
Professor, DOE Plant Research Laboratory and Department of Biochemistry and Molecular Biology, MSU, 2007

Areas of Research Interest

Regulation of plant defense responses; Plant hormone synthesis and action; Plant-insect interactions.

Honors

Distinguished Faculty Award, MSU, 2010

Publications (Five considered most significant)

Chen, H., Wilkerson, C. G, Kuchar, J. A,, Phinney, B. S., Howe, G. A. (2005) Jasmonate-inducible plant enzymes degrade essential amino acids in the herbivore midgut. Proc. Natl. Acad. Sci. USA 102:19237-19242.

Thines, B., Katsir, L., Melotto, M., Niu, Y., Mandaokar, A., Liu, G., Nomura, K., He, S. Y., Howe, G. A., Browse, J. (2007) JAZ repressor proteins are targets of the SCFCOI1 complex during jasmonate signaling. Nature 448: 661-665

Katsir, L., Schilmiller, A. L., Staswick, P. E., He, S. Y., Howe, G. A. (2008). COI1 is a critical component of a receptor for jasmonate and the bacterial virulence factor coronatine. Proc Natl Acad Sci USA. 105:7100-7105

Howe, G. A., Jander, G. (2008) Plant immunity to insect herbivores. Annu. Rev. Plant Biol. 59: 41-66

Chung, H. S., Howe, G. A. (2009) A critical role for the TIFY motif in repression of jasmonate signaling by a stabilized splice variant of the JASMONATE ZIM-domain protein JAZ10 in Arabidopsis. Plant Cell 21:131-145.

Table of Contents

Arthur Daniel Jones (Dan)

Education-Graduate and Postgraduate
- B. S., Chemistry, Harvey Mudd College, Claremont, CA, 1976
- Ph.D., Chemistry, Pennsylvania State University, University Park, PA, 1983

Academic Appointments
- Visiting Assistant Professor, Chemistry, Harvey Mudd College, Claremont, CA, 1984
- Assistant Research Spectroscopist and Acting Director, Facility for Advanced Instrumentation, University of California, Davis, 1984
- Assistant Adjunct Professor, Department of Molecular Biosciences, School of Veterinary Medicine, University of California, Davis, 1989
- Director and Academic Administrator, Facility for Advanced Instrumentation, University of California, Davis, 1989
- Senior Scientist, Department of Chemistry, The Pennsylvania State University, University Park, PA, 1998
- Research Professor, Department of Chemistry, The Pennsylvania State University, University Park, PA, 2002
- Director, RTSF Mass Spectrometry Core, MSU, 2005
- Professor, Biochemistry & Molecular Biology and Chemistry, Center for Integrative Toxicology, Genetics Graduate Program, MSU, 2005

Honors
- James H. Meyer Distinguished Achievement Award - University of California, Davis, Academic Federation, 1996
- American Chemical Society Division of Environmental Chemistry Outstanding Paper Award
- Sigma Xi
- Phi Kappa Phi

Areas of Research Interest
Metabolomics and metabolite profiling; Specialized bioactive metabolites; Natural products chemistry; Mass spectrometry and analytical chemistry; Metabolomics of stress responses in plants and microbes; Functional genomics of plant-insect and plant-pathogen interactions; Posttranslational modification of proteins in aging, toxicity, development, and disease

Publications and/or Patents (Five considered most significant)

B. A. Bruenner, A. D. Jones, and J. B. German, Direct characterization of protein adducts of the lipid peroxidation product 4-hydroxy-2-nonenal using electrospray ionization mass spectrometry, Chemical Research in Toxicology, 8: 552-559 (1995).

A. E. Mitchell, D. Morin, M. W. Lamé, and A. D. Jones, Purification, mass spectrometric characterization, and covalent modification of murine glutathione S transferases, Chemical Research in Toxicology, 8:1054-1062 (1995).

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B. Borhan, A. D. Jones, F. Pinot, D. F. Grant, M. J. Kurth, and B. D. Hammock, Mechanism of soluble epoxide hydrolase: formation of an □-hydroxy ester-enzyme intermediate through Asp-333, Journal of Biological Chemistry, 270: 26923-26930 (1995).

J. P. Eiserich, M. Hristova, C. E. Cross, A. D. Jones, B. A. Freeman, B. Halliwell, and A. van der Vliet, Formation of nitric oxide-derived inflammatory oxidants by myeloperoxidase in neutrophils, Nature 391: 393-396 (1998).

A. Schilmiller, F. Shi, J. Kim, A. Charbonneau, D. Holmes, A. D. Jones, and R. L. Last. Mass spectrometry screening reveals widespread diversity in trichome specialized metabolites of tomato chromosomal substitution lines, Plant Journal, 62: 391-403 (2010).

Donald B. Jump

Education – Graduate and Postgraduate
- B .S., Biology, Delaware State College, Dover, DE 1971
- M.S., Biology, Rutgers University, Camden, NJ, 1974
- Ph.D, Biochemistry, Georgetown University, Washington, D.C., 1979
- Postdoctoral, Molecular Endocrinology, University of Minnesota, 1979-1981

Academic Appointments
- Assistant Professor, Department of Medicine, University of Minnesota, Minneapolis, 1981
- Assistant Professor, Department of Medicine, Genetics and Cell Biology, Univ. of Minnesota, 1982
- Assistant Professor, Physiology, MSU, 1985
- Associate Professor, Physiology, MSU, 1990-1995
- Associate Professor, Biochemistry, MSU, 1992-95
- Professor, Physiology, Biochemistry and Molecular Biology, MSU, 1995
- Professor, Nutrition and Exercise Sciences, Oregon State University, Corvallis, 2007

Areas of Research Interest
Regulation of glycolytic and lipogenic gene expression; Dietary fat regulation of hepatic gene expression; PUFA regulation of inflammation.

Honors
- Keynote Speaker, National Academy of Science, National Research Council, Washington DC, 1998
- Keynote Speaker, 1st Lipidomic Congress, Paris, France, 2003
- Osborne and Mendel Award, American Society of Nutritional Sciences, 2005

Publications and/or Patents (Five considered most significant).

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Jump, D. B. and Clarke, S. D. (1999) Regulation of gene expression by dietary fat. Annual Review Nutrition 19: 63-90.

Ren, B., Thelen, A., Peters, J., Gonzalez, F. and Jump, D.B. (1997) Polyunsaturated fatty acid suppression of hepatic fatty acid synthase and S14 gene expression does not . Journal Biological Chemistry 272: require Peroxisome Proliferator Receptor 26827-26832.

Jump, D. B., Clarke, S. D., Thelen, A. and Liimatta, M. (1994) Coordinate regulation of glycolytic and lipogenic gene expression by polyunsaturated fatty acids. Journal of Lipid Research 35: 1076-1084.

Mater, M. K., Thelen, A. T., Pan, D. A., and Jump, D. B. (1999). Sterol regulatory element binding protein 1c is involved in the PUFA control of S14 gene transcription. Journal of Biological Chemistry 274:32725-32732.

Tripathy, S., Torres-Gonzalez, M. and Jump, D.B. (2010) Elevated hepatic fatty acid elongase-5 (Elovl5) activity corrects dietary fat induced hyperglycemia in obese C57BL/6J mice. Journal of Lipid Research 51: 2642-2654.

Table of Contents

Jon M. Kaguni

Education-Graduate and Postgraduate
- B.S., Biology, University of Notre Dame, Notre Dame, Indiana, 1974
- Ph.D., Molecular Biology, University of California, Los Angeles, 1980
- Postdoctoral Research, Stanford University, 1980

Professional Appointments
- Assistant Professor, Dept. of Biochemistry, MSU, 1984
- Associate Professor, Dept. of Biochemistry, MSU, 1988
- Professor, Dept. of Biochemistry, MSU, 1994
- Graduate Programs Director, Biochemistry & Molecular Biology, MSU, 2001-

Areas of Research Interest
DNA replication; Protein-nucleic acid interactions; Nucleic acid enzymology

Honors
- Damon Runyon-Walter Winchell Cancer Fund Fellow, 1980-1982
- Teacher-Scholar Award, Michigan State University, 1991

Publications and/or Patents (Five considered most significant)

Makowska-Grzyska, M., Kaguni, J. M.. Primase Directs the Release of DnaC from DnaB. Mol Cell. (2010) 37(1):90-101.

Felczak, M. M., Kaguni, J. M.. DnaAcos hyperinitiates by circumventing regulatory pathways that control the frequency of initiation in Escherichia coli. Mol Microbiol. (2009) 72:1348-63.

Chodavarapu, S., Gomez, R., Vicente, M., Kaguni, J. M. Escherichia coli Dps interacts with DnaA protein to impede initiation: a model of adaptive mutation. Mol Microbiol. (2008) 67(6):1331-46.

Simmons, L. A., Breier, A. M., Cozzarelli, N. R., Kaguni, J. M. Hyperinitiation of DNA replication in Escherichia coli leads to replication fork collapse and inviability. Mol Microbiol. (2004) 51(2):349-58.

Sutton, M. D., Kaguni, J. M. The Escherichia coli dnaA gene: four functional domains. J Mol Biol. (1997) 274(4):546-61.

Table of Contents

Laurie S. Kaguni

Education-Graduate and Postgraduate
- B.A., Biology, University of California, San Diego, La Jolla, 1974
- Ph.D., Biology, University of California, Los Angeles, 1980
- Postdoctoral Fellow, Biochemistry, Stanford University, Stanford, 1980

Academic Appointments
- Assistant Professor, Department of Biochemistry, MSU, 1984
- Associate Professor, Department of Biochemistry, MSU, 1988
- Professor, Department of Biochemistry, MSU, 1994
- Director, NSF Undergraduate Summer Research Program, Biochemistry, 1996-2001
- Director, Research Trainee Program, Biochemistry, MSU, 1998
- Director, Center for Mitochondrial Science and Medicine, MSU, 2007

Areas of Research Interests
Enzymology of mitochondrial DNA replication and transcription; Organization and structure of mitochondrial DNA replication origins and promoters; DNA-protein interactions; Regulation of DNA and RNA synthesis during Drosophila development.

Honors
- Distinguished Faculty Award, College of Natural Science, MSU, 2002, 2003
- Invited Lecturer and Instructor, Protein-Nucleic Acid Machines, Murikka Summer School in Molecular Biology, Teisko, Finland, 2004
- University Distinguished Professorsor, MSU, 2007
- NIH Director's WALS Lecturer, 2008
- Honorary Finnish Distinguished Professor, FinMIT Academy of the Finnish Centre of Excellence, Institute of Medical Technology, Tampere, Finland, 2009-2010
- Finnish Distinguished Professor, 2010-2015

Publications (Five considered most significant)

Wernette, C.M., and Kaguni, L.S. (1986) A mitochondrial DNA polymerase from embryos of Drosophila melanogaster: Purification, subunit structure and partial characterization. J. Biol. Chem. 261, 14764-14770.

Lewis, D.L., Farr, C.L., Farquhar, A.L., and Kaguni, L.S. (1994) Sequence, organization and evolution of the A + T region of Drosophila melanogaster mitochondrial DNA. Mol. Biol. Evol. 11, 523-538.

Ruiz de Mena, I., Lefai, E., Garesse, R., and Kaguni, L.S. (2000) Regulation of mitochondrial single-stranded DNA-binding protein gene expression links nuclear and mitochondrial DNA replication in Drosophila. J. Biol. Chem. 275, 13628-13636.

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Kaguni, L.S. (2004) DNA polymerase □, the mitochondrial replicase. Ann. Rev. Biochem. 73, 293-320.

Ziebarth, T.D., Farr, C.L., and Kaguni, L.S. (2007) Modular architecture of the hexameric human mitochondrial DNA helicase. J. Mol. Biol. 367, 1382-1391.

Kenneth Keegstra

Education-Graduate and Postgraduate
- B. A. Chemistry, Hope College, Holland, Michigan, 1967
- Ph. D. Biochemistry, University of Colorado, Boulder, Colorado, 1971
- Postdoctoral Fellow, Biology, Massachusetts Institute of Technology , Cambridge, 1971

Academic Appointments
- Assistant Professor, Microbiology, State University of New York, Stony Brook, 1973
- Assistant Professor, Botany, University of Wisconsin, Madison, 1977
- Associate Professor, Botany, University of Wisconsin, Madison, 1979
- Professor, Botany, University of Wisconsin, Madison, 1983
- Chair, Botany, University of Wisconsin-Madison, 1991-1992

Professor, Biochemistry and Molecular Biology and Plant Biology, MSU, 1993

Director, DOE Plant Research Laboratory, MSU, 1993-2006
Scientific Director, Great Lakes Bioenergy Research Center, 2007-present

Honors:
George Olmsted Award, (Research Award of the American Paper Institute) 1973
Fulbright Senior Research Scholar, 1986
University Distinguished Professor, MSU, 1998
Stephen Hales Prize, American Society of Plant Biology, 2006
Fellow, American Association for the Advancement of Science, 2006
Fellow, American Society of Plant Biology, 2007

Areas of Research Interest:
Chloroplast Biogenesis; Plant Cell Wall Structure, Function and Biosynthesis

Publications and/or Patents (Five considered the most significant)

Keegstra, K., Talmadge, K. W., Bauer, W. D., Albersheim, P. (1973) The structure of plant cell walls. III. A model of the walls of suspension-cultured sycamore cells based on the interconnections of the macromolecular components. Plant Physiol 51: 188-196

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Smeekens, S., Bauerle, C., Hageman, J., Keegstra, K., Weisbeek, P. (1986) The role of the transit peptide in routing of precursors towards different compartments. Cell 46: 365-375

Olsen, L. J., Theg, S. M., Selman, B. R., Keegstra, K. (1989) ATP is required for the binding of precursor proteins to chloroplasts. J Biol Chem 264: 6724-6729

Perrin, R. M., DeRocher, A. E., Bar-Peled, M., Zeng, W., Norambuena, L., Orellana, A., Raikhel, N. V., Keegstra, K. (1999) Xyloglucan fucosyltransferase, an enzyme involved in plant cell wall biosynthesis. Science 284: 1976-1979

Cavalier, D. M., Lerouxel, O., Neumetzler, L., Yamauchi, K., Reinecke, A., Freshour, G., Zabotina, O., Hahn., M. G., Burgert, I., Pauly, M., Raikhel, N. V., Keegstra, K. (2008) Disruption of two *Arabidopsis thaliana* xylosyltransferase genes results in plants deficient in xyloglucan, a major primary cell wall component. Plant Cell 20: 1519-1537.

Table of Contents

Gordon L. Kilgour

Education-Graduate and Postgraduate
- B. A., Honours Chemistry ,University of British Columbia, 1951
- M. S., Chemistry,University of British Columbia, 1953
- Ph. D., Biochemistry, University of Washington, 1956
- Junior Research Biochemist, Biochemistry, University of California, 1956

Academic Appointments
- Assistant Professor, Chemistry, MSU, 1957
- Assistant Professor, Biochemistry, MSU, 1961
- Associate Professor, Chemistry, California State Northridge, 1966
- Professor, Chemistry, California State Northridge 1966
- Professor, Chemistry, Portland State University, 1968
- Head, Department of Chemistry, Portland State University 1968-1971
- Professor Emeritus, Chemistry, Portland State University, 1994

Areas of Research Interest
Chemistry and biochemistry of phosphorylated inositols and related compounds; Mode of biosynthesis of myo-inositol polyphosphates; Isolation, synthesis, and enzymatic activity of flavin nucleotides and their analogues

Publications and/or Patents (Five considered the most significant)

Kilgour, G. L., Felton, S. P., Huennekens, F. M. Flavin Nucleotides and Flavoproteins: Paper Chromatography of Flavins and Flavin Nucleotides, Journal of the American Chemical Society, 79, 2254-2256 (1957)

Kilgour, G. L., Ballou, C. E., Inositol Phosphates - Pinitol 4-Phosphate and (-)-Inositol 3-Phosphate, Journal of the American Chemical Society, 80, 3956-3960, (1958)

Walker, G. A., Kilgour, G. L., Pyridine Nucleotide Oxidizing Enzymes of Lactobacillus Casei .1. Diaphorase, Archives of Biochemistry and Biophysics, 111, 529-& (1965)

Walker, G. A., Kilgour, G. L., Pyridine Nucleotide Oxidizing Enzymes of Lactobacillus Casei .2. Oxidase And Peroxidase. Archives of Biochemistry and Biophysics, 111, 534-& (1965)

Elwood, J. K., Herbst, R. M., Kilgour, G. L., Tetrazole Analogues Of Glutamic Acid .I. Reaction With Glutamic Dehydrogenase, Journal of Biological Chemistry, 240, 2073-& (1965

Table of Contents

Paul K. Kindel

Education – Graduate and Postgraduate
B.S. – Chemistry, University of Wisconsin, June, 1956
Ph.D. – Biochemistry, Cornell University, November, 1961
NIH Postdoctoral Fellow, Max-Planck Institut für Zellchemie, 1961-1963

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1963
Associate Professor, Biochemistry, MSU, 1970
Professor, Biochemistry, MSU, 1976
Professor Emeritus, MSU, 2000

Areas of Research Interest
Chemical structure of plant polysaccharides, particularly pectic polysaccharides; Enzymes involved in pectic polysaccharide formation
Molecular basis of winter hardiness in commercial cereals

Publications (five considered most significant)
Hart, D. A. and Kindel, P. K. (1970) Isolation and Partial Characterization of Apiogalacturonans from the Cell Wall of Lemna minor, Biochemical Journal, 116, 569-579.

Hart, D. A, and Kindel, P. K. (1970) A Novel Reaction Involved in the Degradation of Apiogalacturonans from Lemna minor and Isolation of Apibiose as a Product, Biochemistry, 9, 2190-2196.

Kindel, P. K. and Watson, R. R. (1973) Synthesis, Characterization and Properties of Uridine 5'-(alpha-D-Apio-D-furanosyl Pyrophosphate), Biochemical Journal, 133, 227-241.

Gustine, D. L., Yuan, D. H.-F. and Kindel, P. K. (1975) Uridine Diphosphate D-Glucuronic Acid Cyclase and Uridine Diphosphate D-Glucuronic Acid Carboxy-lyase I from Lemna minor. Purification, Characterization, and Separation from Uridine Diphosphate D-Glucuronic Acid Carboxy-lyase II, Arch. Biochem. Biophys., 170, 82-91.

Cheng, L. and Kindel, P. K. (1997) Detection and Homogeneity of Cell Wall Pectic Polysaccharides of Lemna minor, Carbohydrate Research, 301, 205-212.

Table of Contents

Hyram Kitchen

Education-Graduate and Postgraduate
B.S.- University of California, Davis, 1954
DVM-University of California, Davis, 1956
Ph.D.-Biochemistry, University of Florida, 1965

Academic Appointments
Instructor, Biochemistry and Medicine, University of Florida, 1965
Assistant Professor, Biochemistry and Medicine, University of Florida, 1966
Associate Professor, Biochemistry and Associate Director, Center for Laboratory Animal Resources, MSU, 1969
Professor, Biochemistry and Associate Director, Center for Laboratory Animal Resources, MSU, 1973
Professor, College of Veterinary Medicine, University of Tennesee, 1975
Dean, College of Veterinary Medicine, University of Tennessee, 1979

Areas of Research Interest
Comparative structure of animal hemoglobins; Control of biosynthesis of hemoglobins; Comparative hematology and medicine

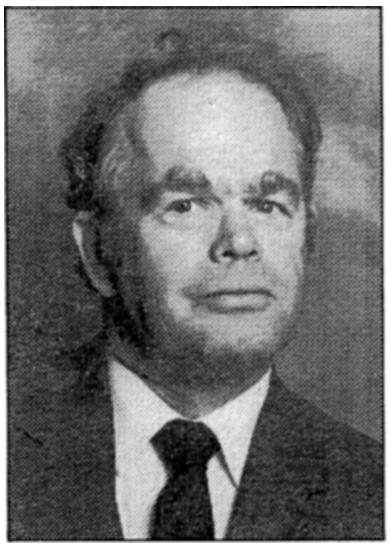
Publications and or Patents (Five considered most significant)
Kouba, E. O., Kitchen, H., Comparative Structural Study on Hemoglobins in Macaca-Speciosa, Archives of Biochemistry and Biophysics, 140, 415-& (1970)

Bunn, H. F., Kitchen, H., Hemoglobin Function In Horse - Role Of 2,3 diphosphoglycerate in Modifying Oxygen Affinity of Maternal and Fetal Blood, Blood, 42, 471-479 (1973)

Kitchen, H., Animal Hemoglobin Heterogeneity, Annals of The New York Academy of Sciences, 241, 12-24 (1974)

Kitchen, H., Brett, I., Embryonic and Fetal Hemoglobin in Animals, Annals of The New York Academy of Sciences, 241, 653-671 (1974)

Hammerbe,.B., Brett, I., Kitchen, H., Ontogeny of Hemoglobins in Sheep, Annals of The New York Academy of Sciences, 241, 672-682 (1974)



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Rodger D. Kobes

Education:- Graduate and Postgraduate
B.A. Chemistry, Hope College, Holland, MI 1963
M.S. Biological Chemistry, University of Michigan, Ann Arbor, MI 1964
Ph.D. Biological Chemistry, University of Michigan, Ann Arbor, 1967
Postdoctoral, Biochemistry, University of Washington, Seattle, 1967
M.D. University of Miami, Florida, 1974
Internship, Internal Medicine, Butterworth Hospital, Grand Rapids, MI, 1974-1975
Residency in Psychiatry, Michigan State University, 1975-1978

Academic Appointments
Assistant Professor, Chemistry, Wayne State University, Detroit, MI 1969-1972
Assistant Professor, Psychiatry and Biochemistry, MSU, 1978-1982

Areas of Research Interest
Schizophrenia; momoamine oxidase, mechanism of action of psychopharmacologic drugs; psychiatric services in rural settings;

Publications (Five considered the most significant.)
2-Keto-4-Hydroxyglutarate Aldolase of Bovine Liver - Schiff-Base Formation with 2-Keto-4-Hydroxyglutarate, Pyruvate, And Glyoxylate. Kobes, R. D, Dekker, E. E. Biochemistry 10, 388-& (1971)

Magnetic Resonance Studies of Role of Divalent Cation in Mechanism of Yeast Aldolase. Mildvan, A. S., Kobes, R. D., Rutter, W. J., Biochemistry 10, 1191-& (1971)

Role of Metals in Class-II Aldolases - Spectral Studies of Cobalt Yeast Aldolase. Simpson, R. T., Kobes, R. D., Erbe, R. W., et al., Biochemistry 10, 2466-& (1971)

Studies on Mechanism of Action of Delta-Aminolevulinate Dehydratase from Bovine and Rat-Liver. Gurba, P. E., Sennett, R. E., Kobes, R. D. Archives of Biochemistry and Biophysics. 150, 130-& (1972)

Colorimetric Assay for Monoamine-Oxidase in Tissues Using Peroxidase and 2,2'-Azinodi(3-Ethylbenzthiazoline-6-Sulfonic Acid) As Chromogen. Szutowicz, A., Kobes, R. D., Orsulak, P. J. Analytical Biochemistry 138, 86-94 (1984)

A photograph of Rodger D. Kobes was not available.

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David Mark Kramer

Education – Graduate and Postgraduate
- M. S. Cell Biology, Biology, University of Dayton, Ohio, 1986
- Ph.D. Biophysics, Physiology and Biophysics,University of Il linois, Urbana, 1990
- McKnight Foundation Postdoctoral Fellow, Physiology and Bio physics, University of Illinois, 1990-91
- Postdoctoral Research Associate, Biophysics Division, University of Illinois, 1991-93
- NSF/NATO Postdoctoral Fellow, Institute de Biologie Physico-Chimique, Paris, 1993-94

Academic Appointments
- Research Assistant Professor of Biophysics, U. of Illinois, 1994-95
- Assistant Professor/Assistant Fellow, Institute of Biological Chem-istry, Washington State University, Pullman, WA. 1995-
- Graduate Faculty, Biochemistry/Biophysics and School of Molecu lar Biosciences, Washington State University, Pullman, 2000-
- Associate Professor/Associate Fellow, Institute of Biological Chemistry, Washington State University, Pullman, 2000-
- Associate Faculty, School of Molecular Biosciences, Washington State University, Pullman, 2000
- Associate Faculty, Chemistry, Washington State University, 2000
- Professor/Fellow, Institute of Biological Chemistry, Washington State University, Pullman, WA. Associate Faculty, School of Molecular Biosciences, Washington State University Associate Faculty, Department of Chemistry, Washington State University 2004-
- Chair, Graduate Program in Molecular Plant Sciences 2005-2008
- Visiting scientist, Laboratoire de Bioénergétique et Ingén ierie des Protéines, Insttut de Biologie Structurale et Microbiologie, CNRS, France 2006
- Hannah Distinguished Professor, Plant Research Laboratory and of Biochem-istry and Molecular Biology, MSU, 2010

Areas of Research Interest
Biochemistry and bioenergetics of biological energy transduc-tion, with emphasis on photo-synthesis

Honors
- Scholarship for Academic Excellence, U. of Dayton, 1979
- Hallmark Award for fine arts 1979
- Sigma Xi Research Society 1985
- McKnight Foundation Graduate Fellowship 1987
- McKnight Foundation Postdoctoral Fellowship 1991
- NATO-NSF Post-doctoral Fellowship 1992
- College de France Lecturer 1993
- Distinguished visiting scientist, CNR, Italy, 1995
- Herman Frasch Young Investigator Award, 1997
- Plenary Lecture, International Congress on Photosynthesis, 2007
- Keynote Speaker, 2008 WSU Faculty Orientation: How to be Produc-tive in Science, 2008

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Plenary Lecture, Arizona Workshop on Renewable Energy, 2008
Keynote speaker, Integrated Plant Sciences Retreat, Washington State University, 2009
WSU Innovator, Washington State. October 20, 2009
Patriotic Employer Award, Washington National Guard, 2010
Keynote Speaker, Fourth International Symposium on Signals, Sensing and Plant Primary Production, Potsdam 10/2010
External Advisory Committee, Department of Energy, Energy Frontier Research Center grant, ASU has established the Center for Bio-Inspired Solar Fuel Production, Arizona State University, 2010
Keynote speaker, 10th Nordic Photosynthesis Congress in Tartu, Estonia, October 2010

Publication and/or Patents (Five considered the most significant)

Livingston, A.K., Cruz, J.A., Kohzuma, K., Dhingra, A., Kramer, D.M. (2010) An Arabidopsis mutant with high cyclic electron flow around photosystem I (hcef) involving the NDH complex, Plant Cell 22 221-233.

Cape, J.L., Bowman, M.K., Kramer, D.M. (2007) A semiquinone intermediate generated at the Qo site of the cytochrome bc1 complex. Importance for the Q-cycle and superoxide production, Proc Natl Acad Sci U S A 104 7887–7892.

Cape, J.L., Strahan, J.R., Lenaeus, M.J., Yuknis, B.A., Le, T.T., Shepherd, J.N., Bowman, M.K., Kramer, D.M. (2005) The respiratory substrate rhodoquinol induces Q-cycle bypass reactions in the yeast cytochrome bc1 Complex, J Biol Chem 280 34654–34660.

Avenson, T., Cruz, J.A., Kramer, D. (2004) Modulation of energy dependent quenching of excitons (qE) in antenna of higher plants, Proc Natl Acad Sci U S A 101 5530-5535.

Kanazawa, A., Kramer, D.M. (2002) In vivo modulation of nonphotochemical exciton quenching (NPQ) by regulation of the chloroplast ATP synthase, Proc Natl Acad Sci USA 99 12789–12794.

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Lee Kroos

Education-Graduate and Postgraduate
- B.S., Chemistry and Biology, Bowling Green State University, Bowling Green, OH, 1981
- Ph.D., Biochemistry, Stanford University, Stanford, CA, 1986
- Postdoctoral, Molecular Biology, Harvard University, Cambridge, MA, 1986-1988

Academic Appointment
- Assistant Professor, Biochemistry and Microbiology, MSU, 1988
- Associate Professor, Biochemistry and Microbiology, MSU, 1993
- Professor, Biochemistry and Molecular Biology and Microbiology and Molecular Genetics, MSU, 1998
- Assistant to the Chairperson, Biochemistry and Molecular Biology, MSU, 2002-2003
- Associate Chairperson, Biochemistry and Molecular Biology, MSU, 2003-2008

Areas of Research Interest
Temporal and spatial regulation of gene expression during Bacillus sporulation; intramembrane-cleaving metalloproteases; Role of cell-cell interactions in controlling gene expression during Myxococcus development; evolution of social behaviors.

Honors
- Michigan State University College of Natural Science Teacher-Scholar Award, 1994
- Bowling Green State University Department of Chemistry Distinguished Alumnus Award, 1995
- Bowling Green State University College of Arts and Sciences Accomplished Graduate Award, 2001

Publications and/or Patents (Five considered the most significant.)

Zhou, R. and L. Kroos (2004). BofA inhibits intramembrane proteolysis of pro-□K in an inter-compartmental signaling pathway during Bacillus subtilis sporulation. Proc. Natl. Acad. Sci. USA 101:6385-6390.

Viswanathan, P., T. Ueki, S. Inouye, and L. Kroos (2007). Combinatorial regulation of genes essential for Myxococcus xanthus development involves a response regulator and a LysR-type regulator. Proc. Natl. Acad. Sci. USA 104:7969-7974.

Imamura, D., R. Zhou, M. Feig, and L. Kroos (2008). Evidence that the Bacillus subtilis SpoIIGA protein is a novel type of signal-transducing aspartic protease. J. Biol. Chem. 283:15287-15299.

Mittal, S., and L. Kroos (2009). A combination of unusual transcription factors binds cooperatively to control Myxococcus xanthus developmental gene expression. Proc. Natl. Acad. Sci. USA 106:1965-1970.

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Zhou, R., C. Cusumano, D. Sui, R.M. Garavito, and L. Kroos 2009. Intramembrane proteolytic cleavage of a membrane-tethered transcription factor by a metalloprotease depends on ATP. Proc. Natl. Acad. Sci. USA 106:16174-16179.

Leslie A. Kuhn

Education-Graduate and Postgraduate
- B. A., Computer Mathematics, University of Pennsylvania, Philadelphia, 1984
- Ph.D., Biophysics, University of Pennsylvania, Philadelphia, 1989
- Postdoctoral Research Fellow, The Scripps Research Institute, La Jolla, CA 1989-92
- Research Associate, The Scripps Research Institute, La Jolla, CA, 1992-94

Academic Appointments
- Assistant Professor, Biochemistry, MSU. 1994
- Adjunct Assistant Professor, Physics and Astronomy, MSU, 1999
- Co-Founder and Research Scientist for MolFlex, a biotechnology software company, 1997 – 1999
- Senior Scientist, Computational Chemistry, Pfizer Global Research and Development, La Jolla, CA, 2002 (during leave of absence from MSU)
- Associate Professor, Biochemistry and Molecular Biology, MSU, 2000
- Adjunct Associate Professor, Physics and Astronomy, MSU, 2000
- Founding Director, Research Excellence Fund Center for Biological Modeling, MSU, 2000–2001 and 2003 – 2004
- Co-Director, Quantitative Biology and Modeling Initiative, MSU, 2004 – 2007
- Professor, Biochemistry and Molecular Biology, MSU, 2004
- Adjunct Professor, Department of Physics and Astronomy, MSU, 2004
- Professor, Computer Science and Engineering, MSU, 2005

Publications and/or Patents (Five considered the most significant)

M. L. Raymer, P.C. Sanschagrin, W. F. Punch, S. Venkataraman, E. D. Goodman, and L. A. Kuhn (1997) “Predicting Conserved Water-Mediated and Polar Ligand Interactions in Proteins Using a K-nearest-neighbors Genetic Algorithm", J. Mol. Biol. 265, 445-464.

V. Schnecke, C. A. Swanson, E. D. Getzoff, J. A. Tainer, and L. A. Kuhn (1998) "Screening a Peptidyl Database for Potential Ligands to Proteins Including Side-chain Flexibility", Proteins: Struct., Funct., Gen., 33, 74-87.

L. Fan, P. C. Sanschagrin, L. S. Kaguni, and L. A. Kuhn (1999) "The Accessory Subunit of Mitochondrial DNA Polymerase Shares Structural Homology with a Domain in Aminoacyl tRNA Synthetases: Implications for a Dual Role as a Primer Recognition Factor and Processivity Clamp", PNAS USA 96, 9527-9532.

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M. I. Zavodszky, M. Lei, M. F. Thorpe, A. R. Day, and L. A. Kuhn (2004) “Modeling Correlated Main-chain Motions in Proteins for Flexible Molecular Recognition”, Proteins: Struct. Funct. Bioinf., 57, 243-261.

S. C. K. Sukuru, T. Crepin, Y. Milev, L. C. Marsh, J. B. Hill, R. J. Anderson, J. C. Morris, A. Rohatgi, G. O'Mahony, M. Grotli, F. Danel, M. G. P. Page, M. Hartlein, S. Cusack, M. A. Kron, and L. A. Kuhn (2006) “Discovering New Classes of Brugia malayi Asparaginyl tRNA Synthetase Inhibitors and Relating Specificity to Conformational Change", J. Comp.-Aided Molec. Design 20, 159-178.

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Kung, Hsing-Jien

Education – Graduate and Postgraduate
B. S. - Chemistry, National Taiwan University, 1969
Ph. D. - Molecular Biology, California Institute of Technology, 1975
Postdoctoral, Molecular Virology, University of California, San Francisco, 1976

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1978
Associate Professor, Biochemistry, MSU, 1982
Associate Professor, Molecular Biology & Microbiology, Case Western Reserve University (CWRU) School of Medicine, 1984
Professor, Molecular Biology & Microbiology, CWRU School of Medicine, 1988
Professor, Medicine, CWRU School of Medicine, 1989-1998
Associate Director of Basic Science, CWRU Cancer Center, 1990-
Professor, Biochemistry and Molecular Medicine, UC Davis, School of Medicine, 1998-2008
Deputy Director and Director of Basic Research, UC Davis Cancer Center, 1998-
Distinguished Professor, Dept. Biochemistry and Molecular Medi cine, UC Davis, School of Medicine, 2008-

Areas of Research Interest
Chicken retroviruses, Marek's disease virus, Human c-src proto-onocogene. Retroviral insertional mutagenesis, erbB/EGFR oncogene, Marek's disease virus oncogene Meq, Retrovirus integration into herpesviruses, tyrosine kinases, Magic vs Bird. Prostate cancer and biololgy, Androgen receptor, autophagy, therapeutics, tyrosine kinases, histone demthylases, Kaposi's sarcoma herpesvirus, viral SUMO ligase.

Honors
Auburn Community Cancer Endowment Chair in Basic Science, UC Davis 2007
Joan Oettinger Memorial Award in Lung and Cancer Research, 2006
Society of American Asian Scientists in Cancer Research (SAASCR), recipient of annual award-2006
UC Davis School of Medicine Faculty Research Award, 2005
Goodman-Blum Professor in Cancer Research, CWRU
Honorary Distinguished Fellow, NHRI, Taiwan
Academia Sinica Fellow, Taiwan
NCI Merit Award
Faculty Research Award, American Cancer Society, 1983-1987

Publications and/or Patents (Five considered the most significant)
Qiu, Y., Ravi, L, and Kung, H. J. Requirement of erbB2 for IL6 signaling in prostate carcinoma cells. Nature, 9: 83-85 (1998)

Isfort, R., Jones, D., Kost, R., Witter, R. and Kung, H.-J. Retrovirus insertion into herpesvirus in vitro and in vivo. Proc. Natl. Acad. Sci. 89:991-995 (1992)

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T.W. Nilsen, P.A. Maroney, R.G. Goodwin, F. Rottman, L. Crittenden, M.A. Raines and H.-J. Kung. c-erbB activation in ALV-induced erythroblastosis: Novel RNA processing and promoter-insertion result in the expression of an amino-truncated EGF receptor. Cell 41:719 (1985)

Y.K. Fung, W. Lewis, L.B. Crittenden and H.-J. Kung. LT insertion-activation of c-erbB: The molecular basis of avian leukosis virus-induced erythroblastosis. Cell 33:357 (1983)

H.-J. Kung, S. Hu, W. Bender, J.M. Bailey, N. Davidson, M.O. Nicholson and R.M. McAllister. RD114, baboon and wooly monkey viral RNAs compared in size and struc¬tures. Cell 7:609 (1976)

Table of Contents

Min-Hao Kuo

Education – Graduate and Postgraduate
- B.S. - Medical Technology, National Taiwan University, Taiwan. 1982
- Ph.D. - Biology, University of Rochester; 1988
- Postdoctoral associate, Biochemistry, University of Rochester. 1995
- Postdoctoral associate, Biology, University of Rochester 1996
- Research Associate, Biochemistry and Molecular Genetics University of Virginia, 1998

Academic Appointments
- Assistant Professor, Biochemistry and Molecular Biology, MSU 1999
- Associate Professor, Biochemistry and Molecular Biology, MSU 2006

Areas of Research Interests
Dynamic changes, modifications, and functions of chromatin; Proteomic interactions involving posttranslational modifications; Lipase, triacylglycerol, and longevity of yeast; Development of new technologies for posttranslational modification research.

Honors
Early Promise Research Excellence Award, College of Osteopathic Medicine, MSU, 2005

Publications and/or Patents (Five considered the most significant)

Patent:
Autocatalysis/two-hybrid system to identify protein-protein interactions involving post-translational modifications. US Patent 7291464, issued 11/6/2007

Significant papers:
Luo, J., Xu, X., Hall, H., Hyland, E.M., Boeke, J.D., Hazbun, T., and Kuo, M.-H. (2010) Histone H3 exerts key function in mitotic checkpoint control. Mol. Cell. Biol. 30:537-549. (Featured in Spotlight)

Liu, Y., Xu, X., and Kuo, M.-H. (2010) Snf1p regulates Gcn5p transcriptional activity by antagonism of Spt3p. Genetics 184:91-105.

Guo, D, Hazbun, T., Xu, X., Ng, S.-L., Fields, S., and Kuo, M.-H. (2004) A tethered catalysis two-hybrid system to identify protein-protein interactions requiring post-translational modifications. Nature Biotech. 22:888-892.

Kuo, M.-H., J. Zhou, P. Jambeck, M. Churchill, and C.D. Allis (1998). Histone acetyltransferase activity of yeast Gcn5p is required for the activation of target genes in vivo. Genes Dev. 12:627-639.

Table of Contents

John J. La Pres

Education-Graduate and Postgraduate
B. S. Chemistry, University of Michigan, 1988
Secondary Teaching Certificate, University of Michigan, 1989
Ph.D., Pharmacology and Toxicology, Northwestern University, 1997
Post-Doctoral Research, McArdle Laboratory for Cancer Research, University of Wisconsin, Madison, WI 1997

Academic Appointments
Assistant Professor, Biochemistry and Molecular Biology and The National Food Safety and Toxicology Center, MSU, 2000
Associate Professor, Biochemistry and Molecular Biology and The National Food Safety and Toxicology Center. MSU, 2006

Areas of Research Interest
The role of hypoxia signaling in metal-induced toxicity; Modulation of hypoxia signaling and tumorigenesis; Systems biology and hypoxia signaling; Aryl hydrocarbon receptor proteomics and its role in hepato- and immuno-toxicity.

Honors
College of Osteopathic Medicine: Golden Apple Award- Fall 2002

Publications and/or Patents (Five considered the most significant)
Vengellur, A., Woods, B.G., Ryan, H.E., Johnson, R.S., and LaPres, J.J. (2003) Gene Expression profiling of the hypoxia signaling pathway in hypoxia-inducible factor 1 null mouse embryonic fibroblasts, Gene Expression 11, 181-197.

Vengellur, A. and LaPres, J.J. (2004) The role of Hypoxia inducible factor 1 in metal induced toxicity. Toxicological Sciences, 82(2):638-646.

Lee, K.A., Burgoon, L.D., Gier, L.E., Dere, E., Zacharewski, T.R., Hogenesch, J.B., and LaPres, J.J. (2006) Identification and characterization of genes susceptible to transcriptional cross-talk between the hypoxia and dioxin signaling cascades. Chem. Res. Toxicology 19(10): 1284-93.

Saini, Y., Harkema, J. R., LaPres, J.J., (2008) HIF1α is essential for normal intrauterine differentiation of alveolar epithelium and surfactant production in the newborn lung of mice. J. Biological Chemistry 283(48): 33650-33657.

Saini, Y., Kim, KY., Lewandowski, R., Bramble, LA., Harkema, JR., LaPres, JJ (2009) The Role of Hypoxia Inducible Factor 1{alpha} (HIF1{alpha}) in Modulating Cobalt Induced Lung Inflammation. Am. J. Physiology-Lung Cell and Molecular Physiology 98(2):L139-47.

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Robert M. Larkin

Education - Graduate and Postgraduate
B. S. Biochemistry, University of Arizona, Tucson, AZ, 1988
Ph. D. Biochemistry, University of Missouri, Columbia, MO, 1996
Postdoctoral Research Associate, University of Missouri, Columbia, MO, 1996
Postdoctoral Fellow, Salk Institute for Biological Studies, La Jolla, CA, 1997

Academic Appointments
Assistant Professor, DOE Plant Research Laboratory and Biochemistry and Molecular Biology, MSU, 2003
Research Professor, DOE Plant Research Laboratory, MSU, 2010

Areas of Research Interest
Signaling networks and processes that contribute to organelle biogenesis and function in plants, especially chloroplast biogenesis and function; Light and plastid signals — two main regulators of chloroplast biogenesis; Chlorophyll biosynthesis; a novel regulator of chlorophyll biosynthesis named GUN4; Mg-chelatase, the enzyme that commits porphyrins to chlorophyll biosynthesis; Membrane-tethered transcription factors that promote organelle function by contributing to intracellular signaling.

Publications and/or Patents (Five considered the most significant)

A membrane-tethered transcription factor defines a branch of the heat stress response in Arabidopsis thaliana. Gao, H, Brandizzi, F, Benning, C, and Larkin, RM. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 105:16398-16403 (2008)

Plastid signals remodel light signaling networks and are essential for efficient chloroplast biogenesis in Arabidopsis. Ruckle, M. E., DeMarco, S. .M, Larkin, R. M. PLANT CELL 19, 3944-3960 (2007)

Structure of the Mg-chelatase cofactor GUN4 reveals a novel hand-shaped fold for porphyrin binding. Verdecia, M. A., Larkin, R. M., Ferrer, J. L., et al. PLOS BIOLOGY 3, 777-789 (2005).

GUN4, a regulator of chlorophyll synthesis and intracellular signaling. Larkin, R. M., Alonso, J. M., Ecker, J. R., et al. SCIENCE 299, 902-906 (2003)

Two small subunits in Arabidopsis RNA polymerase II are related to yeast RPB4 and RPB7 and interact with one another. Larkin, R. M., Guilfoyle, T. J. JOURNAL OF BIOLOGICAL CHEMISTRY 273, 5631-5637 (1998)

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Robert L. Last

Education – Graduate and Postgraduate
- BA in Chemistry and Biology, Ohio Wesleyan University, Delaware, OH; 1980
- PhD in Biological Sciences, Carnegie-Mellon University, Pittsburgh, PA; 1986
- Postdoctoral Fellow Whitehead Institute for Biomedical Research, 1986

Academic Appointments
- Assistant, Associate and Tenured Senior Plant Molecular Geneticist, Boyce Thompson Institute for Plant Research, Ithaca, NY, 1989
- Director of Discovery Genomics, Cereon Genomics LLC, Cambridge, MA: 1998
- Senior Visiting Research Scientist, Max Planck Institute for Chemical Ecology, Jena, Germany 2002
- Program Director, Plant Genomics Research Program, National Science Foundation, 2003
- Professor, Biochemistry and Molecular Biology and Plant Biology, MSU, 2004

Areas of Research Interest
Arabidopsis and tomato functional genomics; Regulation of plant metabolic pathways for nutritionally important molecules; Plant stress tolerance mechanisms; Metabolic engineering of plants

Honors
Fellow, American Association for the Advancement of Science (AAAS), 2009
Fellow, American Society of Plant Biologists, 2009
NSF Director's Award for Excellence in Program Management, 2004
Monsanto Fellow, 2002
NSF Presidential Young Investigator, 1990

Publications and/or Patents (Five considered the most significant)

Last, R.L. and G.R. Fink. 1988. Tryptophan-requiring mutants of the plant Arabidopsis thaliana. Science 240:305-310.

Li, J., T.-M. Ou-Lee, R. Raba, R.G. Amundson and R.L. Last. 1993. Arabidopsis flavonoid mutants are hypersensitive to UV-B irradiation. Plant Cell 5:171-179.

Conklin, P.L., S.R. Norris, G.L. Wheeler, E. H. Williams, N. Smirnoff, and R.L. Last. 1999. Genetic evidence for the role of GDP-mannose in plant ascorbic acid (Vitamin C) biosynthesis. Proc. Natl. Acad. Sci. U.S.A. 96:4198-4203.

Jander, G, S.R. Norris, S. Rounsley, I. Levin, and R.L. Last. 2002. Arabidopsis map-based cloning in the post-genome era. Plant Physiol., 129: 440-450.

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Schilmiller, A.L., I. Schauvinhold, M. Larson, R. Xu, A.L. Charbonneau, A. Schmidt, R.L. Last and E. Pichersky 2009. Monoterpenes in the glandular trichomes of tomato are synthesized via a neryl diphosphate intermediate rather than geranyl diphosphate. Proc. Natl. Acad. Sci. U.S.A. 106:10865-70

Hans A. Lillevik

Education-Graduate and Postgraduate
- B. A., St. Olaf College, 1938
- M. S., Biochemistry, University of Minnesota, 1940
- Ph. D., Biochemistry, University of Minnesota, 1946
- Postdoctoral Fellow, Carlsberg Laboratory, Copenhagen, 1947

Academic Appointments
- Associate Professor, Department of Chemistry, MSU, 1948
- Associate Professor, Department of Biochemistry, MSU, 1961
- Professor, Department of Biochemistry, MSU, 1978
- Professor Emeritus, MSU, 1986

Areas of Research Interest
Proteolytic enzymes; Mechanism of protein transformations as in blood or milk clotting; Protein isolations and characterization by electrophoresis and physico-chemical methods; Human blood serum metal-protein complexes; Plant antibiotics isolation and chemical characterization.

Publications and/or Patents (Five considered the msot significant)
Prediction of Protein Efficiency Ratio of Peas From Their Albumin Content, Bajaj, S., Mickelsen,O., Lillevik, H. A., Baker, L. R., Bergen, W. G., Gill, J. L. Crop Science, 11, 813 (1971)

Nomenclature of Proteins of Cows, Thompson, M. P., Tarassuk, N. P., Jenness, R., Lillevik, H.A, Ashworth, U. S., Rose, D. Journal of Dairy Science, 48, 159 (1965)

Physical parameters of K-Casein From Cows Milk, Swaisgood, H. E., Brunner, J. R., Lillevik, H. A., Biochemistry, 3, 1616 (1964)

Abiotic Synthesis of Amino Groups, Steinman, G. D., Lillevik, H. A., Archives of Biochemistry and Biophysics, 105, 303 (1964)

The Position of the Primary Amino Group in The Steroidal Alkaloid Solanocapsine, Boll, P. M., Lillevik, H. A., Acta Chemica Scandinavica, 13, 2039 (1959)

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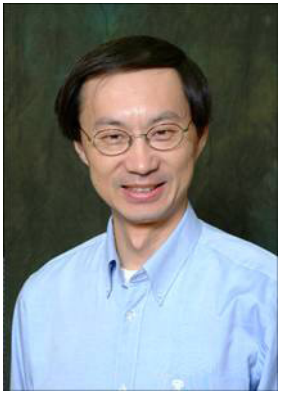
Aizhuo Liu



Education-Graduate and Postgraduate:

B. S. Physics, Jilin University, Changchun, China, 1984

M. S. Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun, China, 1984-1987

Ph. D. – Molecular Biology and Biophysics, ETH Zurich, Switzerland, 1995-1999

Postdoctoral, Cellular Biochemistry and Biophysics, Memorial Sloan-Kettering Cancer Center, New York, 1999-2000

Academic Appointments:

Assistant Professor, Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China, 1987-1994

Associate Professor, Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China, 1994-1995

Visiting Scholar, Swiss Federal Institute of Technology Zurich (ETHz), Switzerland, 1995-1996

Group Leader, Structural Biology Department, Tularik Inc. South San Francisco, 2000-2003

Biomolecular NMR Director, Biochemistry and Molecular Biology, MSU, 2003-2009

Assistant Professor, Biochemistry and Molecular Biology, MSU, 2003-2009

Research Professor, Biochemistry and Molecular Biology, MSU, 2010-

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Areas of Research Interest:

Development of NMR spectroscopy and its applications to molecular recognition and structural and dynamical characterizations of biomacromolecules; Solution structures of enzymes, proteins involved in signal transduction pathways and integral membrane proteins; molecular structure-function relationships; location and time scales of protein dynamic processes; location and kinetics of protein-ligand interactions; Application of new NMR parameters and techniques to the characterization of protein-small molecule interactions, critical for drug development.

Publications and/or Patents (Five considered the most significant):

Zahn R, Liu A, Lührs T, Riek R, von Schroetter C, López-García F, Billeter M, Calzolai L, Wider G, Wüthrich K. NMR solution structure of the human prion protein. Proc. Nat. Acad. Sci. USA. 2000; 97: 145-150.

Liu A, Majumdar A, Hu W, Kettani A, Skripkin E, Patel DJ. NMR direct detection of HN•••C=O hydrogen bonds in 13C, 15N-labeled nucleic acids. J. Am. Chem. Soc. (2000) 122: 3206-3210.

Liu A, Majumdar A, Jiang F, Chernichenko N, Skripkin E, Patel DJ. NMR detection of intermolecular NH•••N hydrogen bonds in the human T cell lenkemia virus-RNA aptamer complex. J. Am. Chem. Soc. (2000) 122: 11226-11227.

Yao L, Li Y, Wu Y, Liu A, Yan H. Product release is rate-limiting in the activation of the prodrug 5-fluorocytosine by yeast cytosine deaminase. Biochemistry (2005) 44: 5940-5947.

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Liu A, Lu Z, Wang J, Yao L, Li Y, Yan H. NMR detection of bifurcated hydrogen bonds in large proteins. J. Am. Chem. Soc. (2008) 130: 2428-2429.

Richard W. Luecke

Education-Graduate and Postgraduate
B. A., Chemistry and Physics, Maca1ester Co11ege 1939
M. S., Biochemistry, University of Minnesota, 1941
Ph. D., Biochemistry Physiology, University of Minnesota 1943

Academic Appointments
Assistant Professor, Texas A and M College, 1943-1945
Associate Professor, Agricultural Chemistry, MSU, 1945
Professor, Agricultural Chemistry, MSU, 1949
Professor, Biochemistry, MSU, 1961
Professor Emeritus, MSU, 1988

Areas of Research Interest
Mineral metabolism particularly as it relates to the deleterious effects of excessive amounts of dietary calcium; Relationship of dietary factors to antibody production; Role of polysaccharides in nutrition and their effects on the production of volatile fatty acids; Effects of erythropoietin on the utilization of iron and in certain types of anemia

Awards and Honors
Nutrition Award, American Society of Animal Production, 1956

Publications and/or Patents (Five considered the most significant)
Delayed-Type Hypersensitivity In Zinc-Deficient Adult Mice - Impairment and Restoration of Responsivity To Dinitrofluorobenzene, Fraker, P. J., Zwickl, C. M., Luecke, R. W., Journal of Nutrition, 112, 309-313 (1982)

Regeneration Of T-Cell Helper Function In Zinc-Deficient Adult Mice. Fraker, P. J., Depasquale-jardieu, P., Zwickl, C. M., et al., Proceedings of The National Academy of Sciences 75, 5660-5664, (1978)

Effect of Restricted Dietary Intake on Antibody Mediated Response of Zinc-Deficient A-J Mouse, Luecke, R. W., Simonel, C. E., Fraker, P. J., Journal of Nutrition, 108, 881-887 (1978)

Effect of Zinc-Deficiency on Immune-Response Of Young-Adult A-J Mouse, Fraker, P. J., Haas, S. M., Luecke, R. W., Journal of Nutrition, 107, 1889-1895 (1977)

Biochemical Effects of Zinc Deficiency - Changes in Activities of Zinc-Dependent Enzymes and Ribonucleic Acid and Deoxyribonucleic Acid Content of Tissues, Prasad, A. S., Oberleas, D., Miller, E. R., Luecke, R. W., Journal of Laboratory And Clinical Medicine, 77, 144-& (1971)

Table of Contents

Veronica M. Maher

Education-Graduate and Postgraduate
- B.S. Biology, Marygrove College, Detroit, Michigan, 1951
- M.S. Biology, University of Michigan, Ann Arbor, 1958
- Ph.D. Molecular Biol., University of Wisconsin, Madison, McArdle Laboratory for Cancer Research,1968
- Research Associate, Yale University, School of Medicine, New Haven, Connecticut, 1968-1969
- Postdoctoral Fellow, Department of Oncology, McArdle Laboratory, University of Wisconsin, Madison, May 1968-September 1968
- Research Associate, Johns Hopkins University, School of Public Health, Baltimore, Maryland, 1970

Academic Appointments
- Assistant Professor, Biology, Marygrove College, Detroit, MI, 1969
- Research Associate, Human Genetics, University of Michigan, Ann Arbor, 1969
- Research Associate, Biological Sciences, Johns Hopkins University, Baltimore, Maryland, 1970
- Research Scientist, Department of Biology, Michigan Cancer Foundation, Detroit, Michigan, 1970
- Chief, Carcinogenesis Laboratory, Division of Biological Sciences, Michigan Cancer Foundation, Detroit, Michigan, 1973
- Associate Professor, Co-Director, Carcinogenesis Laboratory, College of Osteopathic Medicine, MSU, 1976-1980
- Associate Professorsor (with tenure), Microbiology and Public Health and Biochemistry, MSU, 1978-1980
- Professor, Co-Director, Carcinogenesis Laboratory, College of Osteopathic Medicine, and Microbiology and Molecular Genetics and Biochemistry and Molecular Biology, MSU, 1980
- Director, D.O.-Ph.D. Dual-Degree Program, College of Osteopathic Medicine, MSU, 1986-2009
- Associate Dean for Graduate Studies, College of Osteopathic Medicine, MSU, 1987
- Professor Emeritus, MSU, 2010

Areas of Research Interest

Molecular Mechanisms of Mutagenesis; Role of DNA Repair in Mutagenesis of Human Cells; Molecular Mechanisms of Carcinogenesis; Environmental Toxicology; Molecular Biology Genetics

Honors
- Baccalaureate - Summa cum laude - Marygrove College, Detroit, 1951
- American Men and Women of Science, 1978
- Councilor, Environmental Mutagen Society, 1979-1983
- Member, NCI Cancer Special Projects Advisory Council (Program

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Projects Study Section), 1980-1987.
Member, Board of Trustees, Marygrove College, Detroit, 1983-1989
Chairperson, Trustees Committee, Marygrove College, 1984-1989
The World Who's Who of Women, 8th edition, 1984-1985
MSU Women's Achievements Award, 1985
Michigan State University Distinguished Faculty Award, 1988
Michigan Association of Governing Boards Distinguished Faculty Award, 1989
Michigan State University Distinguished Professor Award, 1992
Environmental Mutagen Society Award for Lifetime Accomplishments, 1995
Irvin M. Korr Award for Outstanding Basic Science Research, American Osteopathic Association, 2000
College of Osteopathic Medicine, MSU, Research Excellence Award, 2001, 2003
Member, DHHS, Public Health Service NIH (Chemical Pathology Study Section), 1999 -2002
Marygrove Distinguished Alumni Award, Marygrove College, 2002 (First Award Recipient)

Publications and/or Patents (five considered the most significant)

Y. Wang, R. Woodgate, T.P. McManus, S. Mead, J.J. McCormick, and V.M. Maher. (2007) Evidence that in xeroderma pigmentosum variant cells, which lack DNA polymerase □, DNA polymerase □ causes the very high frequency and unique spectrum of UV-induced mutations. Cancer Res. 67, 3018-3026.

Z. Li, W. Xiao, J. J. McCormick and V. M. Maher. (2002) Identification of a protein essential for a major pathway used by human cells to avoid UV-induced DNA damage Proc. Natl. Acad. Sci., USA, 99, 4459-4464.

W.G. McGregor, D. Wei, V.M. Maher, and J.J. McCormick. (1999) Abnormal, error-prone bypass of photoproducts by xeroderma pigmentosum variant cell extracts results in extreme strand bias for the kinds of mutations induced by ultraviolet light. Mol. Cell. Biol. 19, 147-154.

V.M. Maher, L.M. Ouellette, R.D. Curren, and J.J. McCormick.(1976) Frequency of ultraviolet light induced mutations is higher in xeroderma pigmentosum variant cells than in normal human cells. Nature 261, 593 595.

V.M. Maher, E.C. Miller, J.A. Miller, and W. Szybalski.(1968) Mutations and decreases in density of transforming DNA produced by derivatives of the carcinogens 2-acetylamino-fluorene and N-methyl-4-aminoazobenzene. Mol. Pharmacol. 4, 411-426.

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Diana Ida Marinez

Education – Graduate and Postgraduate

B.A., Chemistry, Incarnate Word College, San Antonio, Texas 1963
Ph. D. Biochemistry, Indiana University Medical Center, Indianapolis, Indiana 1968
Institute of Marine Science, University of Miami, Florida 1968
Postdoctoral, Department of Dairy Science, MSU, 1969

Academic Appointments

Assistant Professor, Department of Natural Science, MSU, 1971
Associate Professor, Department of Natural Science, MSU, 1978
Professor, Department of Natural Science, MSU, 1983
Chairperson, Department of Natural Science, MSU, 1984-1989
Professor, Department of Biochemistry, MSU, 1989-1995

Areas of Research Interest

Regulation of protein synthesis in bacteria and ruminant tissues; Teaching science to non-science majors and general public; Teaching science bilingually/biculturally; Teaching women science

Honors

Hispanic Educator of the Year Award, State Board of Education 1986
Distinguished Faculty Award for Excellence in Teaching, MSU, 1981

Publications and/or Patents (Two considered the most significant)

Marinez, D. I., Ricks, C. A., Cook, R. M., Utilization of Volatile Fatty-Acids In Ruminants .8. Acetate Activation in Mammary Tissue, Journal of Agricultural and Food Chemistry, 24, 927-935 (1976)

Marinez, D. I., Cook, R. M., Acetyl-Coa Synthetase Activity In Nonlactating And Lactating Heifer Mammary Gland, Journal of Dairy Science, 54, 781-& (1971)

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David Graham McConnell

Education – Graduate and Postgraduate
- A.B. – Liberal Arts, Columbia College, 1949
- A.M. – Philosophy, Columbia College, 1949
- Ph.D. – Experimental Psychology, Indiana University, 1957
- Research Associate, Laboratory of Comparative and Physiological Psychology, Ohio State University, 1957
- Research Associate, Institute for Research in Vision and Department of Chemistry, Ohio State University, 1960
- Postdoctoral, Enzyme Institute, University of Wisconsin, Madison, 1964-66

Academic Appointments
- Associate Professor, Institute for Research in Vision, Ohio State University, 1962
- Associate Professor, Biophysics, Ohio State University, 1965
- Associate Professor, Biochemistry and Molecular Biology, Ohio State University, 1967
- Professor, Biochemistry and Biophysics, Ohio State University, 1971
- Professor, Biochemistry and Biomechanics, MSU 1973
- Professor, Biochemistry, MSU, 1982
- Professor Emeritus, MSU, 2000
- Visiting and Adjunct Professor of Biochemistry, Coppin State College, Baltimore, MD, 1994-2006

Areas of Research Interest
Learning and Memory; Neurochemistry; Retinal Biochemistry; Photobiology; Mitochondriophage virus in muscle cell cultures

Publications and/or Patents (Five considered the most significant)

McConnell, D.G. The isolation of retinal outer segment fragments. J. Cell Biol. 27, 459 (1965)

McConnell, D.G., C.N. Rafferty, and R.A. Dilley. The light induced proton uptake in bovine retinal outer segment discs. J. Biol. Chem. 243, 5820 (1968).

McConnell, D.G., M.C. Beal, U. Dinnar, J.P. Goodridge, W.L. Johnston, Z. Karni, J.E.Upledger and G. Blum. Low agreement of findings in neuromusculoskeletal examinations by a group of osteopathic physicians using their own procedures. J. Amer. Osteopathic Assoc. 79, 441 (1980).

Kohnken, R.E., Chafouleas, J.G., Eadie, D.M., Means, A.R. and McConnell, D.G. Calmodulin in bovine rod outer segments. J. Biol. Chem. 256, 12517 12522 (1981).

Gehm, B.D. and McConnell, D.G., Phosphatidylinositol-4,5-bis-phosphate phospholipase C in bovine rod outer segments. Biochemistry 29,5447-5452 (1990).

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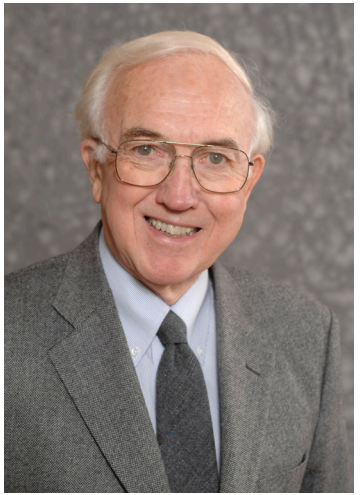
J. Justin McCormick

Education-Graduate and Postgraduate
- B.S. – Philosophy, St. Paul's College, Washington, D.C., 1957
- M.A. – Theology, St. Paul's College, Washington, D.C., 1960
- M.S. – Biology, Catholic University of America, Washington, D.C., 1963
- Ph.D. – Cell Physiology, Catholic University of America, Washington, D.C., 1967
- Postdoctoral Fellow, McArdle Laboratory for Cancer Research, University of Wisconsin, Madison, WI, 1967
- Research Associate, McArdle Laboratory for Cancer Research, University of Wisconsin, Madison, WI, 1970

Academic Appointments
- Research Scientist, Michigan Cancer Foundation, Detroit, MI, 1971
- Chief, Molecular Biology Laboratory, Division of Biological Sciences, Michigan Cancer Foundation, Detroit, MI, 1973
- Associate Professor, Co-Director, Carcinogenesis Laboratory, College of Osteopathic Medicine, MSU, 1976
- Associate Professor, Microbiology and Department of Biochemistry, MSU, 1978
- Professor, Co-Director, Carcinogenesis Laboratory, College of Osteopathic Medicine, MSU, 1980
- Professor, Microbiology and of Biochemistry, MSU, 1980
- Associate Dean for Research, College of Osteopathic Medicine, MSU, 1987
- Associate Director, Cancer Etiology Program, The Cancer Center, MSU, 1990 to 1998
- Director, D.O.-Ph.D. Dual-Degree Program, College of Osteopathic Medicine, MSU, 2009
- Associate Dean for Graduate Studies, College of Osteopathic Medicine, MSU, 2009



Areas of Research Interests
Cellular and Molecular Mechanisms of Carcinogenesis; Chemical and Radiation Carcinogenesis; DNA Repair; Mutagenesis and Transformation of Human Cells; Environmental Toxicology

Honors
- Selected by N.C.I. as a representative of the U.S. at the U.S. Japan Cooperative Cancer Research Program, Kyoto, Japan, 1977.
- Selected by N.I.E.H.S. as a representative of the U.S. at the Fifth Soviet American Symposium on Environmental Concerns, Baku, U.S.S.R., 1978.
- Member of the Department of Energy's Health and Environmental Research Advisory Committee reporting to the Secretary of the Department, 1989 to 1994.
- The Catholic University of America, 1990 Alumni Achievement Award for the Field of Science.
- Distinguished Faculty Award, MSU, 1990.
- University Distinguished Professor Award, MSU, 1992
- Kenneth P. Dubois Award, Midwest Regional Chapter, Society of

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Toxicology, 1997.
Irvin M. Korr Award for Outstanding Basic Science Research, American Osteopathic Association, 2000.
Research Excellence Award, College of Osteopathic Medicine, MSU, 2002.
Invited by MSU President, Lou Anna K. Simon, and Michigan Governor, Jennifer Granholm, as a speaker for the Life Science Seminar on Perspectives on Life
Sciences and Discovery and Business Applications, Osaka Japan, July 2005.
Darryl A. Beehler, D.O. - Research Mentor of the Year Award, American Osteopathic Association, 2005.

Publications and/or Patents (Five considered the most significant)

P. Lito, B.D. Mets, S. Kleff, S. O'Reilly, V.M. Maher, and J.J. McCormick. (2008) Evidence that Sprouty 2 is necessary for sarcoma formation by H-Ras oncogene-transformed human fibroblasts. J. of Biol. Chem. 283, 2002-2009.

Z. Lou, S. O'Reilly, H. Liang, V. M. Maher, S.D. Sleight, and J. J. McCormick. (2005) Down-regulation of overexpressed Sp1 protein in human fibrosarcoma cell lines inhibits tumor formation. Cancer Research. 65, 1007-1017.

H. Liang, S. O'Reilly, Y. Liu, R. Abounader, J. Laterra, V.M. Maher, and J. J. McCormick. (2004) Sp1 regulates expression of MET, and ribozyme-induced down-regulation of MET in fibrosarcoma-derived human cells reduces or eliminates their tumorigenicity. International. Journal of Oncology. 24:1057-1068.

M. A. Battle, V. M. Maher, and J. Justin McCormick. (2003) ST7 is a novel low-density lipoprotein receptor-related protein (LRP) with a cytoplasmic tail that interacts with proteins related to signal transduction pathways. Biochemistry 42, 7270-7282.

J. Qing, V.M. Maher, H. Tran, W.S. Argraves, R.W. Dunstan, and J.J. McCormick. (1997) Suppression of anchorage-independent growth and matrigel invasion and delayed tumor formation by elevated expression of fibulin-1D in human fibrosarcoma-derived cell lines. Oncogene 15, 2159-2168.

Table of Contents

Estelle J. McGroarty

Education – Graduate and Postgraduate
B. S. – Microbiology, Purdue University, 1967.
Ph. D. – Molecular Biology, Purdue University, 1971
Lecturer, Biology, Purdue University, 1971-72
Postdoctoral, Biochemistry, MSU, 1972

Academic Appointments
Assistant Professor, Biophysics, MSU, 1973
Acting Chairperson, Biophysics, MSU, 1975-76
Associate Professor, Biophysics, 1978
Associate Professor, Biochemistry, MSU, 1981
Professor, Biochemistry, MSU, 1987
Director of Undergraduate Programs, Biochemistry, MSU, 1990-1994
Associate Dean for Student and Academic Affairs, College of Natural Science, MSU, 1994-2000
Senior Associate Dean for Research Budgets, Planning and Administration, College of Natural Science, MSU, 2000-2006
Interim Dean, College of Natural Science, 2007
Assistant Vice President for Research and Graduate Studies & Assistant Vice Provost for Libraries, Computing and Technology, 2007-2009
Associate Vice President for Research and Graduate Studies NS Assistant Vice Provost for Libraries, Computing and Technology, 2009

Areas of Research Interest
Membrane structure; Interactions of lipids and proteins in membrane systems; Use of on-line learning tools.

Honors
Outstanding Supervisor Award – 2006

Publications and/or Patents (Five considered the most significant)
Coughlin, R.T., S. Tonsager and E.J. McGroarty. Quantitation of metal cations bound to membranes and extracted lipopolysaccharide of Escherichia coli. Biochemistry 22, 2002 2007 (1983).

Peterson, A.A. and E.J. McGroarty. High molecular weight components in lipopolysacch¬rides of Salmonella typhimurium, Salmonella minnesota and Escherichia coli. J. Bacteriol. 162, 738 745 (1985).

Rivera, M., R.E.W. Hancock, L.E. Bryan, and E.J. McGroarty. Heterogeneity of lipopoly¬saccharide from PAO 1 strains Pseudomonas aeruginosa. Analysis of lipopolysac¬charide chain length. J. Bacteriol. 170, 512 521 (1988).

Rivera, M. and E.J. McGroarty. Analysis of a common antigen lipopolysaccharide from Pseudomonas aeruginosa. J. Bacteriol. 171, 2244 2248 (1989).

McGroarty E, Parker J, Heidemann M, Lim H, Olson M, Long T, Merrill J, Riffell S, Smith J, Batzli J, Kirschtel D. Supplementing Introductory Biology with online curriculum, Biochemical and Molecular Biology Education 32, 20-26 (2004).

Table of Contents

Lee McIntosh

Education – Graduate and Postgraduate
- B.Sc., Developmental and Cell Biology, University of California, Irvine, 1972
- Ph.D., Botany, University of Washington, Seattle, 1977
- Postdoctoral Fellow, The Biological Laboratories, Harvard University, 1977

Academic Appointments
- Assistant Professor, DOE-MSU Plant Research Laboratory/Biochemistry, MSU, 1981
- Associate Professor, DOE-MSU Plant Research Laboratory/Biochemistry, MSU, 1986
- Professor, DOE-MSU Plant Research Laboratory/Biochemistry, MSU, 1990-2005

Areas of Research Interest
Molecular basis controlling the development of photosynthetic competence in higher plants; developmental genetics of plant mitochondria.

Honors
- Distinguished Faculty Award, College of Natural Science, 2001

Publications and/or Patents (Five considered the most significant)

Elthon, T. E., Nickels, R. L., McIntosh, L., Monoclonal-Antibodies to The Alternative Oxidase of Higher-Plant Mitochondria, Plant Physiology, 89, 1311-1317 (1989)

Vanlerberghe, G. C., McIntosh, L., Lower Growth Temperature Increases Alternative Pathway Capacity and Alternative Oxidase Protein in Tobacco, Plant Physiology, 100, 115-119 (1992)

McIntosh, L., Molecular-Biology of The Alternative Oxidase. Plant Physiology, 105, 781-786 (1994)

Newman, T., Debruijn, F. J., Green, P., Keegstra. K., Kende, H., McIntosh, L., Ohlrogge, J., Raikhel, N., Somerville. S., Thomashow, M., Retzel, E., Somerville, C., Genes Galore - A Summary Of Methods For Accessing Results From Large-Scale Partial Sequencing of Anonymous Arabidopsis CDNA Clones, Plant Physiology, 106, 1241-1255 (1994)

Vanlerberghe, G. C., Day, D.A., Wiskich, J.T., Vanlerberghe, A.E., McIntosh, L., Alternative Oxidase Activity In Tobacco Leaf Mitochondria - Dependence on Tricarboxylic-Acid Cycle-Mediated Redox Regulation And Pyruvate Activation. Plant Physiology, 109, 353-361 (1995)

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Olaf Mickelsen

Education – Graduate and Postgraduate
- BS, Chemistry, Rutgers University, 1935
- MS, Biochemistry, University of Wisconsin, 1937
- PhD, Biochemistry, University of Wsiconsin, 1939
- Post graduation, Chemist, University of Minnesota Hospitals and Medical School 1939-1942

Academic Appointments
- Associate Professor, Biochemistry and Physiological Hygiene, University of Minnesota, 1942
- Chemist, U. S. Public Health Service, Division of Chronic Disease, 1948
- Chief, Laboratory of Nutrition and Endocrinology, National Institute of Arthritis and Metabolic Diseases, 1952
- Professor, Biochemistry and Foods and Nutrition, MSU, 1962-1974
- Professor, Foods and Nutrition, MSU, 1974-1979

Areas of Research Interest
Human Nutrition; Obesity

Honors
- Emmett J. Culligan Award of the World Water Society in 1972
- Sigma Xi Senior Research Award in 1973
- MSU Distinguished Faculty Award in 1974
- Elected Fellow of the American Institute of Nutrition in 1983

Publication and/or Patents (Five considered the most significant)

Dietary Obesity In Rats - Body Weight And Body Fat Accretion In 7 Strains of Rats, Schemmel R, Mickelsen.O, Gill J., Journal of Nutrition 100, 1041 (1970)

Carcinogenic Properties of Nuts From Cycas Circinalis L. Indigenous To Guam, Laqueur G., Whiting M., Mickelsen O. et al., Journal of the National Cancer Institute 31, 919 (1963)

A Method For Preparing Intact Animals For Carcass Analyses, Mickelsen O, Anderson A., Journal of Laboratory and Clinical Medicine 53, 282-290 (1959)

Experimental Obesity .1. Production of Obesity In Rats By Feeding High-Fat Diets, Mickelsen O, Takahashi S, Craig C., Journal of Nutrition 57, 541-554 (1955)

Diet And Serum Cholesterol In Man - Lack of Effect Of Dietary Cholesterol, Keys A, Anderson J. Mickelsen O, et al., Journal of Nutrition 59, 39-56 (1956)

Table of Contents

Beronda L. Montgomery

Education-Graduate and Postgraduate
- A.B., Biology, Washington University, St. Louis, 1994
- M.S., Biology, University of Central Arkansas, Conway, 1996
- Ph.D., Plant Biology, University of California, Davis, 2001
- Postdoctoral Research Fellow, Biology, Indiana University, 2001

Academic Appointments
- Assistant Professor, DOE Plant Research Laboratory and Biochemistry and Molecular Biology, MSU, 2004
- Cell and Molecular Biology Graduate Program, College of Natural Science, MSU, 2004
- Genetics Graduate Program, College of Natural Science, MSU, 2004

Areas of Research Interests
Molecular basis of organ-specific phytochrome responses in higher plants; Light-regulated development in cyanobacteria.

Honors
- Golden Key International Honour Society, Elected 1992
- Research Council Award, University of Central Arkansas, 1996
- Member of Sigma Xi, Elected 2002
- NSF CAREER Award, 2007

Publications and/or Patents (Five considered the most significant)

Pattanaik, B., Montgomery, B.L. (2010). FdTonB is involved in the photoregulation of cellular morphology during complementary chromatic adaptation in Fremyella diplosiphon, Microbiology, 156(3): 731–741

Warnasooriya, S. N., Montgomery, B. L. (2010). Investigating tissue- and organ-specific phytochrome responses using FACS-assisted cell-type specific expression profiling in Arabidopsis thaliana, J Vis Exp, http://www.jove.com/index/details.stp?id=1925, doi: 10.3791/1925.

Warnasooriya, S. N, Montgomery, B. L., (2009) Detection of spatial-specific phytochrome responses using targeted expression of biliverdin reductase in Arabidopsis thaliana. Plant Physiol 149: 424-433

Bordowitz, J. R., Montgomery, B. L., (2008) Photoregulation of cellular morphology during complementary chromatic adaptation requires sensor-kinase-class protein RcaE in Fremyella diplosiphon. J Bacteriol 190: 4069-4074

Montgomery, B. L. (2007). Sensing the Light: Photoreceptive Systems and Signal Transduction in Cyanobacteria. Mol Microbiol, 64: 16–27

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Allan J. Morris

Education:-Graduate and Postgraduate
B.A., Education, Iowa State University, 1955
M.A., Biochemistry, University of Utah, 1957
Ph.D., Biochemistry, University of Utah, 1959
Postdoctoral Fellow, City of Hope Hospital, Duarte, CA, 1959-1960
Postdoctoral Fellow, Medical School, University of Kentucky, 1960-1962
Postdoctoral Fellow, National Institute of Medicine, London, 1962-1963

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1963
Associate Professor, Biochemistry, MSU, 1969
Professor, Biochemistry, MSU, 1972
Professor Emeritus, MSU, 1988

Areas of Research Interests
Genetics and Molecular Biology of Hemoglobin biosynthesis; Metabolism of nucleotides in red blood cells

Publications and/or Patents (Five considered the most significant)
Selective Inhibition of Protein Assembly by Gougerotin, Casjens, S. R., Morris, A. J., Biochimica et Biophysica Acta 108, 677-& (1965)

Purification and Properties of a Nucleoside Triphosphate Pyrophosphohydrolase from Red Cells of Rabbit, Chern, C. J., Macdonald, A. B., Morris, A. J., Journal of Biological Chemistry 244, 5489-& (1969)

Purification of Peptidyl Transfer Ribonucleic Acid from Rabbit Reticulocyte Ribosomes Slabaugh, R. C., Morris, A. J., Journal of Biological Chemistry 245, 6182-& (1970)

Gel Chromatographic Analysis of Nascent Globin Chains - Evidence of Nonuniform Size Distribution, Protzel, A., Morris, A. J., Journal of Biological Chemistry 249, 4594-4600 (1974)

Nonuniform Size Distribution of Nascent Peptides - Effect of Messenger-RNA Structure Upon The Rate of Translation, Chaney, W. G., Morris, A. J., Archives of Biochemistry and Biophysics 194, 283-291 (1979)

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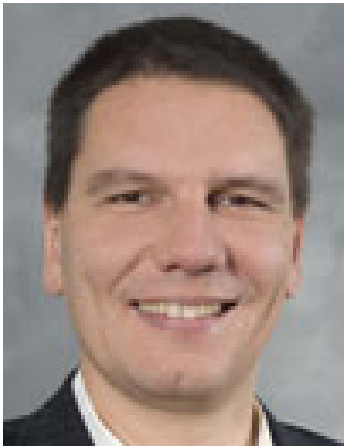
Markus Pauly

Education-Graduate and Postgraduate
- Diplom (Masters in Biology), RWTH Aachen, Germany , 1993
- Dr. rer. nat. (Doctor of Science), Technical University (RWTH) Aachen, Germany, 1998

Academic Appointments
- Assistant Research Professor, Royal Veterinary and Agricultural University, Copenhagen, Denmark, 1998
- Marie Curie Fellow at Unilever, Colworth Research Station, Bedford, United Kingdom, 2000
- Independent Research Group Leader, Max-Planck Institute for Molecular Plant Physiology (MPI-MP), Golm, Germany, 2001
- Associate Professor, Biochemistry & Molecular Biology/Genetics, DOE-Plant Research Laboratory, MSU, 2006
- Associate Professor, Plant and Microbial Biology, University of Berkeley, Berkeley, 2010

Areas of Research Interest
Biosynthesis, structure, function and design of plant cell walls; Elucidate the plant molecular machinery that synthesizes wall polysaccharides and relate the structural features present in the complex polysaccharide networks of plant cell walls to the diversity of functions that this extracellular matrix is responsible for. What is the necessary molecular protein machinery to synthesize these wall heteroglycans? What regulates the carbon flow into particular polysaccharide structures? What structural parameters make the wall recalcitrant to enzymatic degradation? What structural parameters contribute to what material property of such a sophisticated biocomposite? What are the specific functions of the various networks down to specific polysaccharide sidechains?



Honors
Underwood Fellowship, BBSRC, UK, 2005
Borchert Plate of the RWTH Aachen, 1999
Springorum Award of the RWTH Aachen, 1993

Publications and/or Patents (Five considered the most significant)
Gille S, Haensel U, Ziemann M, Pauly M. (2009), Identification of plant cell wall mutants by means of a forward chemical genetic approach using hydrolases, Proc. Nat. Academy Sciences U.S.A. 106 (34), 14699-14704

Obel N, Erben V, Schwarz T, Kuehnel S, Fodor A, Pauly M. (2009), Microanalysis of plant cell wall polysaccharides, Molecular Plant 2 (5), 922-932

Pauly M, Keegstra K. (2008), Tear down this wall, Current Opinion in Plant Biology 11 (3), 233-235

Pauly M, Albersheim P, Darvill AG, York WS, (1999), Molecular domains of the cellulose/xyloglucan network in the cell walls of higher plants, Plant Journal, 20 (6), 629-639

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Pauly M, Anderson, L. N., Kauppinen, S., Kofod, L. V., York, W. S., Albersheim, P. and Darvill, A. G. (1999) A xyloglucan specific endo-□-1,4-glucanase from *Aspergillus aculeatus*: expression cloning in yeast, purification and characterization of the recombinant enzyme. Glycobiology 9 (1), 93-100

Jack Preiss

Education-Graduate and Postgraduate

B.S., Chemistry, City College of New York, New York, 1953
Ph.D., Biochemistry, Duke University, Durham, NC, 1957
Postdoctoral Fellow, Biochemistry, Duke University, Durham, NC, 1956.
Postdoctoral Fellow, Microbiology, Washington University, St. Louis, MO, l958
Postdoctoral Fellow, Biochemistry, Stanford School of Medicine, Palo Alto, California, l959.

Academic Appointments

Scientist, National Institutes of Health, Bethesda, Maryland, 1960
Assistant Professor, Biochemistry and Biophysics, University of California, Davis, l962
Associate Professor, Biochemistry and Biophysics, University of California, Davis, l965
Professor, Biochemistry and Biophysics, University of California, Davis, l968-l985; Chairperson, l97l-74; 77-8l.
Professor and Chairperson, Biochemistry, MSU, l985-l989.
Professor, Biochemistry, 1989
Professor Emeritus, MSU, 2009

Areas of Research Interest

Genetic and allosteric regulation of the bacterial glycogen and plant starch biosynthetic enzymes; Protein chemistry, structure, function of catalytic and effector sites of the glycogen biosynthetic enzymes; Cloning of the E. coli and other bacterial glycogen and plant starch biosynthetic structural genes.

Honors

Fulbright Scholar 1969-70
American Chemical Society, Charles Pfizer Award in Enzyme Chemistry, 1971.
Camille and Henry Dreyfus Distinguished Scholar of California State University, Los Angeles, CA, October 10-14, 1983.
Alexander Von Humboldt-Stiftung Senior U.S. Scientist Award 1984.
Alsberg-Schoch Memorial Lectureship Award of the American Association of Cereal Chemists. 1990
American Society of Microbiology and Foundation for Microbiology Lecturer, 1991-93.
Distinguished Faculty Award, MSU, 1994
College of Natural Science Alumni Association Distinguished Faculty Award, 1996
Michigan Association of Governing Boards Distinguished Faculty Award 1997

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Impression 5 Science Center Michigan Scientist of the Year Award 1997
Sixteenth Loomis Lecturer, Iowa State University, March 5, 1998.
PABMB Award Lecturer, Spanish Biochemical Society, Granada, Spain 2000
University Distinguished Professor, MSU, 2001
Institute for Scientific Information Highly Cited Researcher in the Plant and Animal category 2004
Fellow of the American Association for the Advancement of Science, elected 2007
Fellow of the American Society of Plant Biology, elected 2008

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日本澱粉学会特別賞がJack Preiss博士に授与される

平成4年度日本澱粉学会特別賞がJack Preiss博士に平成4年9月10日に授与された。同賞は澱粉科学の分野で卓越した業績を挙げたものに与えられる。今回はPreiss博士の卓越した澱粉の合成機構に関する業績に対して与えられた。Preiss博士は澱粉と細菌グリコーゲンの生合成に関する研究で著名である。Preiss博士はNew York City Collegeを1953年に卒業後、Duke UniversityのDepartment of BiochemistryのPhilip Handler博士の許でPh.D.を1957年に取られた。1960年にNIHに就職し、1962年にUniversity of California at DavisのDepartment of Biochemistry and Biophysicsに移り、以来、澱粉と細菌のグリコーゲンの生合成の研究に打ち込んでこられた。現在はMichigan State University, East Lansingに在職。

Distinguished Award of the Japanese Society of Starch Science 1992

Publications (Five considered as the most significant)

Preiss, J., and P. Handler. Biosynthesis of DPN. I. Identification of intermediates. J. Biol. Chem. 233, 488 (l958)

Preiss, J., P. Berg, J. Ofengand, F.H., Bergmann, and M. Dieckmann. The chemical nature of the RNA-amino acid compound formed by amino acid-activating enzymes. Proc. Nat. Acad. Sci. 45, 319 (l959).

Lin, T.P., Caspar, T., Somerville, C. and Preiss, J. Isolation and characterization of a starchless mutant of Arabidopsis thaliana (L) Henyh lacking ADPglucose pyrophosphoylase activity. Plant Physiol. 86, l13l-l135 (1988)

Stark, D.M.,Timmerman, K.P., Barry, G.F., Preiss, J. and Kishore, G.M. Role of ADPglucose Pyrophosphorylase in regulating starch levels in plant tissues.Science 258: 287-292 (1992).

Stark, D. M., Timmerman, K.P., Barry, G. F., Preiss, J. Kishore, G. M., Regulation of the Amount of Starch In Plant-Tissues by ADP Glucose Pyrophosphorylase , Science 258, 287-292 (1992)

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Natasha V. Raikhel

Education:-Graduate and Postgraduate
M.S., Leningrad State University, USSR, Biology, 1970
Ph.D., Cell Biology, Institute of Cytology, Academy of Sciences, Leningrad, USSR, 1975
Assistant Research Scientist, Cytology of Unicellular Organisms, Institute of Cytology, USSR, 1975
Postdoctoral, Cell Biology, University of Georgia, Athens, 1979

Academic Appointments
Assistant Research Scientist, Botany, University of Georgia, Athens, 1984
Assistant Professor, DOE Plant Research Laboratory and Botany, MSU, 1986
Associate Professor, DOE Plant Research Laboratory and Botany, MSU, 1990
Professor, DOE Plant Research Laboratory and Botany, MSU, 1994
Distinguished Professor, DOE Plant Research Laboratory and Biochemistry, MSU, 1997
Distinguished Professor, Botany and Plant Sciences, University of California, Riverside, 2002
Director, Center for Plant Cell Biology, University of California, Riverside, 2002
Director, Institute for Integrative Genome Biology, University of California, Riverside, 2006

Areas of Research Interest
Understanding the mechanisms of endosomal and vacuolar trafficking in plant cells using a combination of cellular, molecular, genetic, proteomics, chemical genomics, bioinformatics and genomic technologies.

Honors
The Guggenheim Fellowship, 1996
The Japan Society for Promotion of Science Fellowship for Research in Japan, 1996
Recipient of WICB Senior Achievement Award, American Society for Cell Biology, 2002
American Association for the Advancement of Science (AAAS) Fellow, 2002
Stephen Hales Prize of American Society of Plant Biologists, 2004
Fellow of American Society of Plant Biology, 2007

Publications and/or Patents (Five considered the most significant)
Sohn, E. J., Rojas-Pierce, M., Pan, S., Carter, C., Serrano-Mislata, A., Madueno, F., Rojo, E., Surpin ,M., Raikhel, N. V. (2007) The shoot meristem identity gene TFL1 is involved in flower development and trafficking to the protein storage vacuole. Proc Natl Acad Sci USA 104: 18801-18806.

Rojas-Pierce, M., Titapiwatanakun, B., Sohn, E. J., Fang, F., Larive, C. K., Blakeslee, J., Cheng, Y., Cutler, S., Peer, W. A., Murphy, A. S. and Raikhel, N. V. (2007) Arabidopsis P-Glycoprotein19 Participates

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in the Inhibition of Gravitropism by Gravacin. Chem & Biol 14: 1366-1376.

Robert, S., Chary, S. N., Drakakaki, G., Yang, Z., Raikhel, N. V. and Hicks, G. R. (2008) Endosidin1 defines a compartment involved in endocytosis of the brassinosteroid receptor BRI1 and the auxin transporters PIN2 and AUX1. Proc Natl Acad Sci USA 105:8464-8469.

Hicks, G. R. and Raikhel, N. V. (2009) Opportunities and Challenges in Plant Chemical Biology. Nature Chemical Biology 5:268-272.

Rosado, A., Sohn, E-J., Drakakaki, G., Pan, S., Swidergal, A., Xiong, Y., Kang, B-H., Bressan, R. A., Raikhel, N. V. (2010) Auxin-Mediated Ribosomal Biogenesis Regulates Vacuolar Trafficking in Arabidopsis. The Plant Cell 22: 1-16.

Gavin Edmund Reid

Education-Graduate and Postgraduate

Associate Diploma of Applied Science - (Laboratory Technology). Swinburne, College of TAFE., 1991

Post Graduate Diploma in Science, Chemistry, University of Melbourne, 1997

Ph.D., Chemistry, University of Melbourne, 2000

Post Doctoral Associate, Chemistry, Purdue University, West Lafayette, IN, 2000

Honorary Fellow. Chemistry and Surgery, University of Melbourne, Parkville, Victoria, Australia, 2003

Academic Appointments

Assistant Member (tenure track appointment). Joint Proteomics Laboratory. The Ludwig Institute for Cancer Research. Parkville, Victoria, Australia, 2002

Assistant Professor, Chemistry and Biochemistry and Molecular Biology, MSU, 2004

Associate Professor, Chemistry and Biochemistry and Molecular Biology, MSU, 2004

Areas of Research Interest

Mass Spectrometry, gas-phase ion chemistry, proteomics and lipidomics

Honors

The Monica Reum Memorial Prize, Chemistry. University of Melbourne, 2001

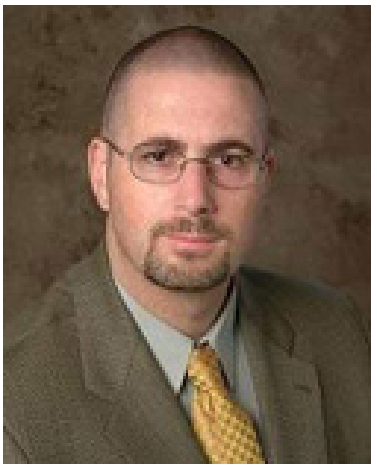
Victorian Young Tall Poppy Award, Australian Institute of Policy and Science, 2002

National Science Foundation Ca reer award, 2006

Sigma Xi Meritorious Junior Faculty Award (MSU Chapter), 2006

American Society for Mass Spectrometry Research Award, 2007

Teacher-Scholar Award, College of Natural Sciences, MSU, 2008



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Publications and/or Patents (Five considered the most significant)

Palumbo, A.M and Reid, G.E. (2008) Evaluation of Gas-Phase Rearrangement and Competing Fragmentation Reactions on Protein Phosphorylation Site Assignment using CID-MS/MS and MS3. Anal. Chem. 80: 9735-

Kapp, E.A., Schütz, F., Reid, G.E., Eddes, J.S., Moritz, R.L., O'Hair, R.A.J., Speed, T.P. and Simpson, R.J. (2003) Mining a tandem mass spectrometry database to determine the trends and global factors influencing peptide fragmentation. Anal. Chem. 75: 6251-6264.

Reid, G.E., Shang, H., Hogan, J., Lee, G.U. and McLuckey S.A. (2002) Gas-phase concentration, purification and identification of whole proteins from complex mixtures. J. Am. Chem. Soc. 124: 7353-7362.

Verhagen, A.M., Ekert, P.G., Pakusch, M., Silke, J., Connolly, L.M., Reid, G.E., Moritz, R.L., Simpson, R.J. and Vaux, D.L. (2000) Identification of DIABLO, a mammalian protein that promotes apoptosis by binding to and antagonizing IAP proteins. Cell. 102: 43-53.

Simpson, R.J. Connelly, L.M., Eddes, J.S., Pereira, J.J., Moritz, R.L. and Reid, G.E. (2000) Proteomic analysis of the human colon carcinoma cell line (LIM 1215): Development of a membrane protein database. Electrophoresis. 21: 1707-1732.

Table of Contents

Arnold Revzin

Education – Graduate and Postgraduate
- B.S.E. Chemical Engineering and Engineering Mathematics, University of Michigan, Ann Arbor, 1964
- Ph.D. Physical Chemistry, University of Wisconsin, Madison 1969
- Project Associate, Institute for Enzyme Research, University of Wisconsin 1969-1970
- Postdoctoral Fellow, Polymer Department, Weizmann Institute of Science, Rehovot, Israel, 1970
- Postdoctoral Fellow, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany, 1972
- Research Associate, Institute of Molecular Biology, University of Oregon, Eugene, 1973

Academic Appointments
- Assistant Professor, Department of Biochemistry, MSU, 1975
- Associate Professor, Department of Biochemistry, MSU, 1981
- Professor, Department of Biochemistry, MSU, 1986 1998
- Associate Dean, College of Natural Science, MSU, 1987-1991
- Assistant Vice President for Research Services, MSU, 1991-1998
- Professor Emeritus of Biochemistry, 1998
- Scientific Review Officer, National Institutes of Health, 1998

Areas of Research Interests

DNA-protein interactions; Conformational changes in rRNA; Biophysics of nucleic acid-protein interactions involved in the control of transcription

Honors

National Science Foundation, Outstanding Employee Achievement Award (1985)

Publications and/or Patents (five considered the most significant)

Cook, D.I. and A. Revzin. Intracellular Location of Catabolite Activator Protein of Escherichia-Coli. J. Bacteriol. 141, 1279–1283 (1980)

Garner, M.M. and A. Revzin. A Gel-Electrophoresis Method For Quantifyin g The Binding Of Proteins To Specific Dna Regions - Application To Components Of The Escherichia-Coli Lactose Operon Regulatory System. Nucl. Acids Res., 9, 3047–3060 (1981)

Garner, M. M. and A. Revzin, Stoichiometry Of Catabolite Activator Protein Adenosine Cyclic 3',5'-Monophosphate Interactions At The Lac Promoter of Escherichia-Coli. Biochemistry, 21, 6032-6036 (1982)

Shanblatt, S.H. and A. Revzin. Catabolite Activator Protein Molecules Bind to the Galactose Promoter Region of Escherichia-Coli in the Presence of RNA-Polymerase Proc. Natl. Acad. Sci. (U.S.A.) 80, 1594–1598 (1983)

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Lorimer, D. D., J. Cao and A. Revzin. Specific Sequences Downstream From -6 Are Not Essential For Proper and Efficient Invitro Utilization of the Escherichia-Coli Lactose Promoter J. Mol. Biol. 216, 275–287 (1990)

Robert A. Ronzio

Education – Graduate and Postgraduate
- B. A., Chemistry, Reed College, 1960
- Ph.D., Biochemistry, University of California, Berkeley, 1966
- Postdoctoral, Tufts University School of Medicine, 1965-66
- Postdoctoral, Cornell University Medical College, 1966
- Postdoctoral, University of Washington School of Medicine, 1967

Academic Appointments
- Acting Assistant Professor, U. Washington School of Medicine, 1968
- Associate Professor, Biochemistry, MSU, 1969
- Professor, Biochemistry, MSU, 1975-1977
- The Evergreen State College. Core Faculty: Science and the Citizen, Community Nutrition and Public Health. 1980
- Professor and Chair, Medical Sciences, Bastyr University, Seattle, WA, 1985
- Technical Director, Meridian Valley Clinical Laboratory, Kent, WA. 1992
- Certified General Supervisor and Technical Supervisor (Washington State Dept. of Health 1992
- Director of Educational Services. Great Smokies Diagnostic Laboratory, Asheville, NC.1993-94
- Laboratory Director. Biotics Research Corporation, Houston. 1994
- Consultant, Certified Nutrition Specialist, 2000-

Honors
- Phi Beta Kappa, Reed College. 1960
- Sigma Xi, Tufts University School, 1967
- Scientific representative, Edgar Snow Scientific and Cultural Exchange Delegation. The People's Republic of China 1980
- Fellow, American Institute of Chemists. 1987
- Honorary Doctor of Naturopathic Medicine, Bastyr University (1990)
- Diplomate in Nutritional Counseling, American Board of Nutritional Medicine 1991

Publications (Five considered the most significant)

Sandoval, M. Ronzio, R.A., Muanza, D.M., Clark D.A., Miller, M.J.S. Protective Action of Legume-Derived Antioxidants (Phytolens) Against Peroxynitrite-Induced Apoptosis in T84 and RAW 264.7 Cells. Nitric Oxide: Biology, Chemistry, (1998);1:476-83.

Force M, Sparks WS, Ronzio, RA. Inhibition of enteric parasites by emulsified oil of oregano in vivo. Phytother Res (2000);14(3):213-4

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Ronzio, Robert A. The Encyclopedia of Nutrition and Good Health, Facts on File, NY (1997). Second edition, Ronzio, Robert A. with Kennedy Associates, (2003).

Ronzio RA, Ripley S, Cozad D. Fibromyalgia – Advances in Diagnosis and Treatment. Today's Therapeutic Trends (2002);20(2):135-258.

Ronzio, R. A. Naturally Occurring Antioxidants. The Textbook of Natural Medicine. Murray M and Pizzorno J., eds. Harcourt-Brace, 3rd edition, (2005).

Table of Contents

Fritz M. Rottman

Education – Graduate and Postgraduate
B.A., Chemistry, Calvin College, Grand Rapids, Michigan, 1959
Ph.D., Biochemistry, University of Michigan, Ann Arbor, MI, 1963
Postdoctoral Fellow, Biochemical Genetics, National Institutes of Health, 1963

Academic Appointments
Assistant Professor of Biochemistry, MSU, 1966
Associate Professor of Biochemistry, MSU, 1970
Professor of Biochemistry, MSU, 1974
Professor and Chairman of Molecular Biology and Microbiology, Case Western Reserve University (CWRU),1981 to 1999
Professor Emeritus, Case Western Reserve University, 1999

Areas of Research Interest
Structure and synthesis of Nucleic Acids; Elements of the Genetic Code; 5'- and 3'- structure of mRNA; Bovine Growth Hormone – a molecular model

Honors
Reinberger Endowed Professorship in Molecular Biology, Case Western Reserve University, 1998
Distinguished Alumni, Calvin College, 2007

Publications and/or Patents (Five considered most significant.)

Nirenberg, M., P. Leder, M. Bernfield, R. Brimacombe, J. Trupin, F. Rottman and C. O'Neal. On the general nature of the RNA code. Proc. Natl. Acad. Sci. USA 53:1161 (1965).

Desrosiers, R., K. Friderici and F. Rottman. Identification of methylated nucleosides in messenger RNA Novikoff hepatoma cells. Proc. Natl. Acad. Sci. USA 71:3971 (1974).

Rottman, F., A.J. Shatkin and R.P. Perry. Sequences containing methylated nucleotides at the 5´-termini of messenger RNAs: Possible implications for processing. Cell 3:197 (1974).

Woychik, R.P., S.A. Camper, R.L. Lyons, S. Horowitz, E.C. Goodwin and F.M. Rottman. Cloning and nucleotide sequencing of the bovine growth hormone gene. Nucleic Acids Research 10:7197 (1982).

Narayan, P. and F.M. Rottman. Development of an in vitro system that accurately methylates internal adenosine residues in mRNA. Science 242:1159-1162 (1988).

Table of Contents

Robert L. Salsbury

Education:-Graduate and Postgraduate
B.A., University of British Columbia, 1942
Ph.D., Animal Nutrition, MSU, 1955

Academic Appointments
Assistant Professor, Agricultural Chemistry, MSU, 1955
Associate Professor, Animal Science and Agricultural Chemistry, MSU, 1961
Associate Professor, Animal Science and Biochemistry, MSU, April 1, 1961-August 31, 1961
Professor, Animal Science and Agricultural Chemistry, University of Delaware, 1961

Areas of Research Interests
Mineral balance of poultry diets; Interactions among dietary ingredients; Physiological effects of ionophores in poultry

Publications and/or Patents (Five considered the most significant.)
The Effect of High Levels of Cobalt on The in vitro Digestion of Cellulose by Rumen Microorganisms. Salsbury, R. L., Smith, C. K., Huffman, C. F. Journal of Animal Science 15, 863-868 (1956)

The Effect of Starvation and Subsequent Refeeding on Some Activities of Rumen Microorganisms In vitro, Meiske, J. C., Salsbury, R. L, Hoefer, J. A., Luecke, R. W., Journal of Animal Science 17, 774-781 (1958)

Utilization of Methionine and Methionine Hydroxy Analog by Rumen Microorganisms in-vitro. Salsbury, R. L., Marvil, D. K., Woodmans,.C. W., Haenlein, G. F., Journal of Dairy Science 54, 390-& (1971)

Production of Methanethiol and Dimethyl Sulfide by Rumen Microorganisms, Salsbury, R. L., Merricks, D. L., Plant and Soil 43, 191-209 (1975)

Dimethyl Sulfide in Milk of Lactating Dairy-Cows Fed Various Sulfur-Compounds, Clark, W. A., Salsbury, R. L., Journal of Dairy Science 63, 375-378 (1980)

A photograph of Professor Salsbury was not available.

Table of Contents

Melvin S. Schindler

Education – Graduate and Postgraduate
- B.S., Physics, City College of New York, 1968
- M.S., Bioengineering-Biophysics, Polytechnic Institute of Brooklyn, 1972
- Ph.D., Biophysics, Weizmann Institute of Science, Rehovot, Israel, 1976
- Guest Scientist, Max Planck Institut Fur Virus Forschung, Tubingen, Germany, 1976
- Guest Scientist, Department of Microbiology, Biozentrum, Basel, Switzerland, 1980

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1980
- Associate Professor, Biochemistry, MSU, 1985
- Professor, Biochemistry, MSU, 1989
- Professor Emeritus, MSU, 2006

Areas of Research Interest
Techniques to pursue single cell fluorescence analysis and imaging in living cells; Multi-drug resistance in tumor cells; Measurements of tension in the actin network using optical traps; Rhizobial-legume interactions – The binding event; Nanobiotechnology (nanofibers and nanoparticles); Biophysical instrumentation (fluorescence based imaging and quantitative; Measurements); Cell culture (two and three dimensional); Cell biology; Cell and membrane biophysics; Cell sorting/isolation; Biomaterials (in vitro and in vivo); Cancer/tumor biology (drug resistance)

Honors
McKnight Research Fellow

Publications and/or Patents (Five considered the most significant)
Schindler, M., and Sharon, N. A transition state analog of lysozyme catalysis prepared from the bacterial cell wall tetrasaccharide. J. Biol. Chem. 251, 4330 (1976).

Sheetz, M., Schindler, M., and Koppel, D. The lateral mobility of integral membrane proteins is increased in spectrin-deficient erythrocytes. Nature 285, 510 (1980).

Schindler, M., Allen, M.L., Olinger, M.R., Holland, J.H. Automated Analysis and Survival Selection of Anchorage-Dependent Cells Under Normal Growth Conditions. Cytometry 6, 368-374 (1985).

Schindler M., Ahmed, I., Kamal, J., Nur-E-Kamal, A., Grafe, T. H., Chung, H.Y., Meiners, S., Three dimensional nanofibrillar surfaces promote in vivo-like organization and morphogenesis for cells in culture. Biomaterials 26: 5624-5631 (2005).

US Patent 7,704,740 B2- Nanofibrillar Structure and Applications Including Cell And Tissue Culture

Table of Contents

Karel R. Schubert

Education – Graduate and Postgraduate
B.S., Chemistry, West Virginia University, 1971
M.S., Biochemistry, University of Illinois, 1973
Ph.D., Biochemistry, University of Illinois, 1975
Postdoctoral Fellow, Oregon State University, 1975

Academic Appointments
Assistant Professor, Biochemistry, MSU, 1976
Associate Professor, Biochemistry, MSU, 1981-1983
Research Director and Science Fellow, Monsanto, St. Louis, MO, 1983

Areas of Research Interest
Biochemical and genetic factors which affect the efficiency and cost of nitrogen assimilation; Partitioning in nitrogen-fixing leguminous and non-leguminous plants; Investigations of the biochemical and genetic basis for the formation of an effective nitrogen-fixing symbiosis between leguminous plants and Rhizobium; Elucidation of the biochemical pathways of carbon and nitrogen assimilation in nitrogen-fixing plants.

Publications and/or Patents (Five considered the most significant)
Hydrogen Reactions of Nodulated Leguminous Plants. Effects on Dry-Matter Accumulation and Nitrogen-Fixation, Schubert, K. R, Jennings, N. T., Evans, H. J., Plant Physiology 61, 398-401 (1978)

Carbon-Dioxide Fixation in Soybean Roots and Nodules .1. Characterization and Comparison with N_2 Fixation and Composition of Xylem Exudate during Early Nodule Development, Coker, G. T., Schubert, K. R., Plant Physiology 67, 691-696 (1981)

Localization of Enzymes of Ureide Biosynthesis in Peroxisomes and Microsomes of Nodules, Hanks, J. F., Tolbert, N. E., Schubert, K. R., Plant Physiology 68, 65-69 (1981)

Sub-Cellular Organization of Ureide Biogenesis From Glycolytic-Intermediates and Ammonium in Nitrogen-Fixing Soybean Nodules, Boland Mj, Hanks Jf, Reynolds P. H. S., Blevins, D. G., Tolbert, N. E., Schubert, K. R. Planta 155, 45-51 (1982)

Products of Biological Nitrogen-Fixation in Higher-Plants - Synthesis, Transport, and Metabolism, Schubert, . K. R., Annual Review of Plant Physiology and Plant Molecular Biology 37, 539-574 (1986)

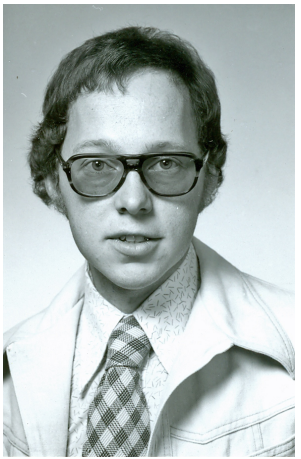

Table of Contents

Harold M. Sell

Education-Graduate and Postgraduate
- A. B., Chemistry, North Central College, 1929
- M. S., Organic Chemistry, Michigan State University, 1931
- General Foods Corporation Research Chemist, Organic Division, 1931-1935
- Ph. D., Biochemistry, University of Wisconsin, 1938
- Postdoctorate Resident Assistant, Biochemistry, University of Wisconsin, 1938-1939

Academic Appointments
- Associate Chemist, U. S. Department of Agriculture, 1939
- Professor, Department of Agricultural Chemistry, MSU, 1945
- Professor, Department of Biochemistry, MSU, 1961
- Professor Emeritus, Department of Biochemistry, MSU, 1975

Honors
- Phi Kappa Phi, MSU, 1961
- Centennial Medallion, MSU, 1975

Areas of Research Interest
Effect of natural and synthetic substances on the growth of plants; Synthesis of biological substances and their effect on plant growth; Study of organic constituents derived from plants.

Publications and/or Patents (Five considered the most significant)

Hertel, R., Evans, M. L., Leopold, A. C., Sell, H. M,, Specificity of Auxin Transport System, Planta, 85, 238-& (1969)

Ritzert, R. W., Bukovac, M. J., Sell, H. M., et al., Indole-3-Acetic Acid Oxidase Activity From Developing Peach Seeds And Its Inhibition By Extractable Catechin, Journal of The American Society For Horticultural Science, 97, 48-& (1972)

Byers, R. E., Baker, L. R., Sell, H. M., Et Al., Proceedings of The National Academy of Sciences of The United States of America, 69, 717-& (1972)

Rudich, J., Baker, L. R., Scott, J. W., Sell. H. M., Phenotypic Stability and Ethylene Evolution in Androdiecious Cucumber, Journal of the American Society for Horticultural Science, 101, 48-51 (1976)

Hayashi, F., Boerner, D. R., Peterson, C. E., Sell, H. M., Relative Content of Gibberellin In Seedlings of Gynoecious and Monoecious Cucumber (Cucumis-Sativus), Phytochemistry, 10, 57-& (1971)

Table of Contents

Thomas D. Sharkey

Education-Graduate and Postgraduate
- B.S., Biology, Lyman Briggs College, MSU, 1974
- Ph.D., Botany and Plant Pathology, MSU, 1980
- Post doctoral Fellow, Research School of Biological Sciences, Australian National University, Canberra, 1980

Academic Appointments
- Assistant Director/Assistant Research Professor, Biological Sciences Center, Desert Research Institute, Reno, Nevada, 1982
- Associate Director/Associate Research Professor, Biological Sciences Center, Desert Research Institute, Reno, Nevada, 1984
- Associate Professor, Biology, University of Nevada, Reno, 1986
- Assistant Professor, Botany, University of Wisconsin Madison, 1987
- Associate Professor, Botany, University of Wisconsin Madison, 1988
- Professor, Botany, University of Wisconsin, Madison, 1991
- Chair of Botany, University of Wisconsin, Madison, 1992
- Director, University of Wisconsin, Madison, Biotron, 1993
- Director, UW-Madison Institute for Cross-college Biology Education. 2004
- Professor and Chair, Biochemistry and Molecular Biology, MSU, 2008

Honors
- Kellet Mid-Career Award for Research 1999, UW-Madison ($60,000 research prize)
- Listed in Who's Who in America and American Men and Women of Science
- Listed as a "Highly Cited" researcher by the Institute for Scientific Information

Areas of Research Interest
Engineering plants to produce easily degradable biopolymers, such as starch & fructans; Gas Exchange Photosynthetic carbon fixation from carbon dioxide; Isoprene emission by the methyl erythritol 4-phosphate (MEP) pathway that is unique to bacteria and plastids of plants; The effects of temperature and development on the expression of all of the genes in the MEP pathway, plus isoprene synthase; Thermotolerance in plants

Publications and/or Patents (Five considered the most significant)
Sharkey,T.D., S. Yeh, A.E. Wiberley, T.G. Falbel, D. Gong, D.E. Fernandez. (2005) Evolution of the isoprene biosynthetic pathway in kudzu. Plant Physiology 137:700-712

Lu Y., T.D. Sharkey (2004) The role of amylomaltase in maltose metabolism in the cytosol of photosynthetic cells. Planta 218: 466-473

Sharkey, T.D. and E.L. Singsaas. (1995) Why plants emit isoprene. Nature 374:769

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Sharkey, T.D. (1985) Photosynthesis in intact leaves of C3 plants: physics, physiology and rate limitations. The Botanical Review 51:53 105

Farquhar, G.D. and T.D. Sharkey (1982) Stomatal conductance and photosynthesis. Annual Review of Plant Physiology 33:317 345

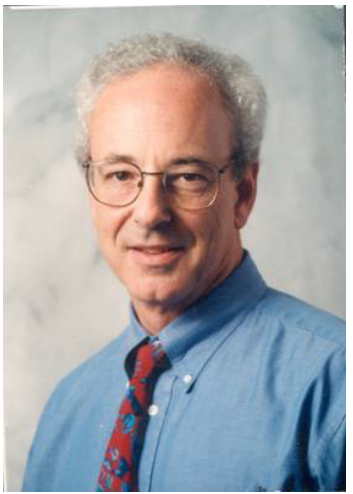
William L. Smith

Education – Graduate and Postgraduate
- B.A., Chemistry, University of Colorado, 1967
- Ph.D., Biochemistry, University of Michigan, 1971
- Postdoctoral, Biochemistry, University of California, Berkeley, 1971

Academic Appointments
- Senior Scientist, Mead Johnson and Company, Evansville, IN, 1974
- Assistant Professor, Biochemistry, MSU, 1975
- Associate Professor, Biochemistry, MSU, 1979
- Professor, Biochemistry, MSU, 1983
- Professor, Physiology and Biochemistry, MSU, 1985
- Chairperson, Biochemistry, MSU, 1994
- Chairperson, Biochemistry, University of Michigan, Ann Arbor, 2003

Areas of Research Interest
Signal Transduction – Prostaglandin Receptors; Prostaglandins and Renal Function; Molecular Biology of Prostaglandin Biosynthetic Enzymes

Honors
Faculty Teaching Award, Osteopathic Medicine, MSU, 1981
MSU Research Excellence Award, Golden Key Society, 1989
Carleton Treadwell Award, George Washington Univ., 1991;
Distinguished Faculty Award, Mich. State Univ., 1992;
Abraham White Distinguished Scientific Achievement Award, George Washington Univ., 1996;
American Heart Assoc. (MI), Pres.-elect/Pres., 1996-98;
Senior Aspirin Award, Bayer Corp., 1997;
Biochemistry Chairs Assoc., Pres.-elect/Pres., 1999-2001;
University Distinguished Professor, MSU, 2001;
ASBMB Avanti Award in Lip ids, 2004;
ASBMB William C. Rose Award in Biochemistry, 2006;
AAAS Fellow, 2004;
Berzelius Lecturer, Karolinska Institute, 2004;
Osama Hayaishi Lecturer, Hamamatsu University, 2006;
Robert Olsen Lecture, St. Louis University, 2007



Publications and/or Patents (Five considered the most significant)
DeWitt, D. L., and Smith, W. L. Primary structure of prostaglandin

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G/H synthase from sheep vesicular gland determined from complementary DNA sequence. Proc. Natl. Acad. Sci. 85, 1412-1416 (1988)

DeWitt, D.L., El-Harith, E.A., Kraemer, S.A., Yao, E.F., Armstrong, R.L., and Smith, W. L. The aspirin site and the heme binding site of prostaglandin endoperoxide synthase. J. Biol. Chem. 265, 5192-5198 (1990)

Malkowski, M. G., Ginell, S., Smith, W. L., and Garavito, R. M. The x-ray structure of prostaglandin endoperoxide H synthase-1 complexed with arachidonic acid. Science 289, 1933-1937 (2000)

Yuan, C., Rieke, C.J., Rimon, G., Wingerd, B.A., and Smith, W. L. Partnering between monomers of cyclooxygenase-2-homodimers. Proc. Natl. Acad. Sci. U.S.A. 103, 6142-6147 (2006)

J. Rimon, G., R.S. Sidhu, D.A. Lauver, Lee, J.Y., Sharma, N.P., Yuan, C., Fieler, R.A., Trievel, R.C., Lucchesi, B.R. and Smith, W.L. Crystallographic evidence that coxibs interfere with the action of aspirin by binding tightly to one monomer of cyclooxygenase-1. Proc. Natl. Acad. Sci. U.S.A., 107, 28-33 (2010)

John C. Speck, Jr.

Education-Graduate and Postgraduate
- B. S., Chemistry, University of Illinois, 1939
- Ph. D., Chemistry, University of North Carolina, 1943
- Research Associate, Chemistry, Indiana University, 1943

Academic Appointments
- Assistant Professor, Department of Chemistry, MSU, 1945
- Associate Professor, Department of Biochemistry, MSU, 1961
- Professor, Department of Biochemistry, MSU 1965
- Professor Emeritus, MSU, 1988

Areas of Research Interest
Mechanisms of carbohydrate transformations with special emphasis on those occurring in biological systems; Synthesis of model enzyme systems; Elucidation of enzyme structure and mechanisms of enzyme catalysis.

Publications and/or Patents (Five considered the most significant)

Fraker, P. J. and Speck, J. C., Protein and Cell-Membrane Iodinations With a Sparingly Soluble Chloramide, 1,3,4,6-Tetrachloro-3a,6a-Diphenylglycoluril, Biochemical And Biophysical Research Communications, 80, 849-857 (1978)

Larue, J. N. And Speck, J. C.,Turkey Egg White Lysozyme - Preparation of Crystalline Enzyme and Investigation of Amino Acid Sequence, Journal of Biological Chemistry, 245, 1985-& (1970)

Speck, J. C. and Rynbrandt, D. J., A Convenient Method For Isolating Disaccharide and Tetrasaccharide in

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Muramidase Digests of Micrococcus Lysodeikticus Cell Walls, Analytical Biochemistry, 19, 426-& (1967)

Speck, J. C,, Rowley, P. T., Horecker, B.L., Identity of Synthetic N6-Beta-Glyceryllysine And C14-Labeled Amino Acid Obtained on Sodium Borohydride Reduction and Hydrolysis of a Complex From C14-Fructose 6-Phosphate-Transaldolase Interaction, Journal of the American Chemical Society, 85, 1012-& (1963)

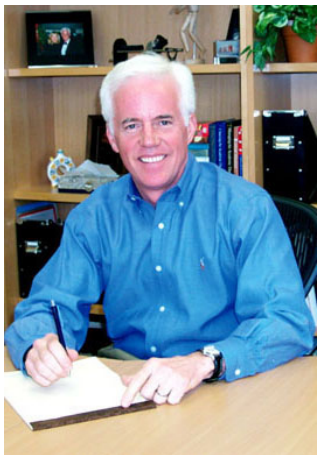
Kinetics of the Amino Acid-Catalyzed Dealdolization of Diacetone Alcohol. Speck, J. C., Forist, A. A., Journal of the American Chemical Society 79, 4659-4660 (1957)

William S. Spielman

Education-Graduate and Postgraduate
- B.A. - Biology, Westminster College, Fulton, MO, 1969
  -Zoology, University of Tulsa, Tulsa, OK, 1970
- Ph.D. - Physiology, University of Missouri, Columbia, MO, 1974
- Academy of Health Sciences, U.S. Army Medical Service Corps, Fort Sam Houston, Texas, 1974-75
- Postdoctoral, Physiology, University of North Carolina, Chapel Hill, NC, 1975-77
- Postdoctoral, Physiology and Biophysics, Mayo Foundation, Rochester, MN, 1977-78

Academic Appointments
Instructor, Physiology, University of North Carolina, 1976
Mayo Research Fellow and Minnesota Heart Association Fellow, Mayo Foundation, 1977
Assistant Professor, Physiology and Biophysics, Mayo Foundation, 1978
Assistant Professor, Physiology, MSU, 1980
Associate Professor, Physiology, MSU, 1982
Director of Graduate Studies, Physiology, MSU, 1990-1992
Professor, Physiology, MSU, 1987
Director, Renal Pharmacology, SmithKline Beecham Pharmaceuticals, 1992-1993
Chairperson, Physiology, MSU, 1993-present
Professor, Physiology and Biochemistry, 1997-2003
Director, Michigan Life Sciences Corridor, Office of Research and Graduate Studies MSU, 1999-2000
Director, Division of Human Pathology, MSU, 2002-present

Areas of Research Interest
Molecular biology/signal transduction - adenosine, angiotensin, and vasopressin receptors; Hormonal, autocoid, and neural control of renal and cardiovascular function; Glomerular (mesangial) cell biology: proliferation and apotosis; Molecular/cellular aspects of cardiorenal biology



Honors
President, Association of Chairs of Departments of Physiology, 2006-2007

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Fellow, CIC Academic Leadership Program, 1995-96
2nd Annual William Doyle Lectureship, Mt. Desert Island Biological Laboratory, 1995
Chairperson, NIH Special Study Section, General Medicine B, 1991
Research Career Development Award, NHLBI, Metabolic Control of Renal Function, 7/1/81-6/30/86
Individual National Research Service Award. Mechanisms of Salt and Water Retention in Heart Failure, University of North Carolina, 1975-1977

Publications and/or Patents (Five considered most significant)

Osswald, H., Spielman, W. S., Knox, F. G., Mechanism of Adenosine-Mediated Decreases in Glomerular-Filtration Rate in Dogs Circulation Research, 43, 465-469 (1978)

Chimoskey, J. E., Spielman, W. S., Brandt, M. A., et al., Cardiac Atria of Bio-14.6 Hamsters Are Deficient In Natriuretic Factor, Science, 223, 820-822 (1984)

Arend, L. J., Sonnenburg, W. K., Smith, W. L., Spielman, W. S., Adenosine-A1 And Adenosine-A2 Receptors In Rabbit Cortical Collecting Tubule Cells - Modulation of Hormone-Stimulated Camp, Journal of Clinical Investigation, 79, 710-714 (1987)

Arend, L. J., Bakris, G. L., Burnett, J. C., Megerian, C., Spielman, W. S., Role For Intrarenal Adenosine in The Renal Hemodynamic-Response To Contrast-Media, Journal of Laboratory and Clinical Medicine, 110, 406-411 (1987)

Burnatowskahledin, M. A., Spielman, W. S., Vasopressin V1 Receptors on The Principal Cells of The Rabbit Cortical Collecting Tubule - Stimulation of Cytosolic Free Calcium and Inositol Phosphate Production Via Coupling to a Pertussis Toxin Substrate, Journal Of Clinical Investigation, 83, 84-89 (1989)

Table of Contents

Clarence H. Suelter

Education-Graduate and Postgraduate
- B. S., Chemistry, Kansas State University 1951
- M. S., Biochemistry and Nutrition, Kansas State University 1953
- Ph. D., Biochemistry, Iowa State University, 1959
- NIH Postdoctoral Fellow, University of Minnesota, 1959

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1961
- Associate Professor, Biochemistry, MSU, 1965
- Professor, Biochemistry, MSU, 1968
- Director, Division of Science Education, MSU, 1987
- Professor Emeritus, Biochemistry, MSU, 1994
- Director Emeritus, Division of Science Education, MSU, 1996

Areas of Research Interest
Mechanism of enzymatic catalysis; Mechanisms of phosphate activation; Role of monovalent cations in enzymatic catalysis; Comparative enzymology of normal and dystrophic tissue; Science Education

Honors
- Research Career Development Award, NIH, 1965-1975
- Editorial Board, Analytical Biochemistry, 1982-1993
- Distinguished Alumnus, Biochemistry and Biophysics, Iowa State University, 1987
- Distinguished Alumni Faculty Award, College of Natural Science, MSU, 1988
- Distinguished Faculty Award, College of Natural Science, MSU, 1990

Distinguished Faculty Award, MSU, 1990
State of Michigan Teaching Excellence Award, 1990

Publications and/or Patents (Five of the most significant)

Kayne, F. J., Suelter, C. H., Effects of Temperature Substrate And Activating Cations on Conformations of Pyruvate Kinase in Aqueous Solutions, Journal of the American Chemical Society 87, 897-& (1965)

Suelter, C. H., Enzymes Activated By Monovalent Cations, Science, 168, 789-& (1970)

Yun. S. L, Suelter, C. H., Simple Method For Calculating Km And V From A Single Enzyme Reaction Progress Curve, Biochimica et Biophysica Acta 480, 1-13 (1977)

Brooks, S. P. J., Suelter, C. H., Compartmented Coupling of Chicken Heart Mitochondrial Creatine-Kinase to the Nucleotide Translocase Requires The Outer Mitochondrial-Membrane, Archives of Biochemistry and Biophysics 257, 144-153 (1987)

Suelter, C. H., A Practical Guide to Enzymology, John Wiley and Sons, 1985, 288 pages

Table of Contents

Charles C. Sweeley

Education – Graduate and Postgraduate
- B.S. Chemistry, University of Pennsylvania, 1952
- Ph.D. Chemistry, University of Illinois, 1955
- Commissioned Officer, U.S. Public Health Service, Laboratory of Natural Products, NIH, 1955-1957
- Civil Service Commission Appointment, Laboratory of Chemistry of Natural Products, National Heart Institute, 1957-1960

Academic Appointments
- Assistant Research Professor, Biochemistry and Nutrition, University of Pittsburgh, 1960
- Associate Professor, Biochemistry and Nutrition, University of Pittsburgh, 1963
- Professor, Biochemistry and Nutrition, University of Pittsburgh, 1966
- Professor, Biochemistry, MSU, 1968
- Assistant Dean for Research, College of Human Medicine, MSU, 1973-1977
- Professor and Chairperson, Biochemistry, MSU, 1979-1985
- Professor Emeritus, MSU 1992

Areas of Research Interest
Chemistry of glycosphingolipids; Lysosomal enzymes of glycosphingolipid metabolism; Enzyme replacement therapy in genetic diseases of sphingolipid metabolism; Post translational processing reactions involved in lysosomal enyzme synthesis; Effects of tumor promoters on glycolipid metabolism; Regulation of glycolipid metabolism in normal and transformed cells in culture; Metabolic profiling analysis of organic acids and steroids by GC MS; Isolation and characterization of glycolipid tumor antigens.

Honors
- Merit Award, Chicago Gas Chromatography Discussion Group, 1969
- Guggenheim Fellowship, 1971
- One of 300 most quoted scientists in the world literature, Institute for Scientific Information (1961-1975)
- MSU College of Natural Science Distinguished Alumni Award (1980)
- Honorary Doctor Honoris Causa in Pharmaceutical Sciences, University of Ghent, Belgium (1982)
- Dreyfus Lecturer, Bucknell University, June 20-24, 1983.
- President, Society for Complex Carbohydrates, 1985.
- Distinguished Faculty Award, MSU, 1986.
- Michigan Scientist of the Year, 1988
- University Distinguished Professor, MSU, 1990

Publications and/or Patents (Five considered the most significant)

Sweeley, C. C., Bentley, R., Makita, M., and Wells, W. W. (1963) Gas-liquid chromatography of trimethylsilyl derivatives of sugars and related substances. J. Am. Chem. Soc. 85, 2497-2507.

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Sweeley, C. C., and Klionsky, B. (1963) Fabry's disease: classification as a sphingolipidosis and partial characterization of a novel glycolipid. J. Biol. Chem. 238, 3148-3150.

Sweeley, C. C., Elliott, W. H., Fries, I., and Ryhage, R. (1966) Mass spectrometric determination of unresolved components in gas chromatographic effluents. Anal. Chem. 38, 1549-1553.

Roller, H., Dahm, K.H., Sweeley, C.C., and Trost, B.M. (1967) The structure of the juvenile hormone. Angew. Chem. (Intl. Ed.) 6, 179-180.

Higashi, Y., Strominger, J.L., and Sweeley, C.C. (1967) Structure of a lipid intermediate in cell wall peptidoglycan synthesis: A derivative of a C55 isoprenoid alcohol. Proc. Natl. Acad. Sci. (U.S.). 57, 1878-1884.

Table of Contents

Hideki Takahashi

Education - Graduate and Postgraduate
- B.S., Biochemical Engineering, Kyoto University, Japan, 1990
- Ph.D., Pharmaceutical Sciences, Chiba University, Japan, 1998

Academic Appointments
- JSPS Postdoctoral Fellow, Chiba University, Japan, 1998 - 1999
- JSPS Postdoctoral Fellow, Carnegie Institution of Washington, USA, 1999
- Team Leader, RIKEN Plant Science Center, Japan, 2000 - 2010
- Adjunct Professor, Yokohama City University, Japan, 2008
- Assistant Professor, Biochemistry and Molecular Biology, MSU, 2010

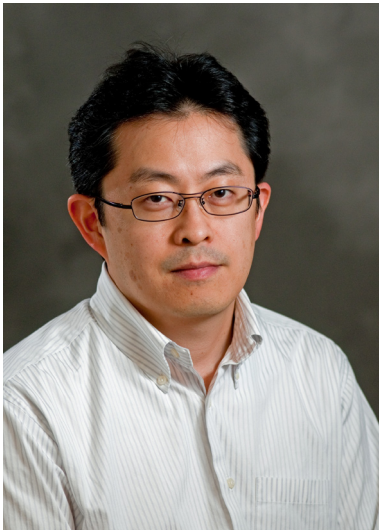
Areas of Research Interest
Nutrient sensing, transport and metabolism in plants

Honors
- The Japanese Society of Plant Physiologists Young Investigator Award, 2005

Publication and/or Patents (Five considered the most significant)

Yoshimoto, N., Inoue, E., Watanabe-Takahashi, A., Saito, K., and Takahashi, H. Post-transcriptional regulation of high-affinity sulfate transporters in Arabidopsis by sulfur nutrition. Plant Physiol. 145, 378-388 (2007).

Yuan, L., Loqué, D., Kojima, S., Rauch, S., Ishiyama, K., Inoue, E., Takahashi, H., and von Wirén, N. The organization of high-affinity ammonium uptake in *Arabidopsis* roots depends on the spatial arrangement and biochemical properties of AMT1-type transporters. Plant Cell 19, 2636–2652. (2007).



Maruyama-Nakashita, A., Nakamura, Y., Tohge, T., Saito, K., and Takahashi, H. *Arabidopsis* SLIM1 is a central transcriptional regulator of plant sulfur response and metabolism. Plant Cell 18, 3235-3251 (2006).

Kataoka, T., Watanabe-Takahashi, A., Hayashi, N., Ohnishi, M., Mimura, T., Buchner, P., Hawkesford, M.J., Yamaya, T., and Takahashi, H. Vacuolar sulfate transporters are essential determinants controlling internal distribution of sulfate in Arabidopsis. Plant Cell 16, 2693-2704 (2004).

Ishiyama, K., Inoue, E., Watanabe-Takahashi, A., Obara, M., Yamaya, T., and Takahashi, H. Kinetic properties and ammonium-dependent regulation of cytosolic isoenzymes of glutamine synthetase in Arabidopsis. J. Biol. Chem. 279, 16598-16605 (2004).

Table of Contents

David P. Thorne

Education – Graduate and Postgraduate
- A.A.S. Sinclair Community College, Dayton, OH, 1977
- B.S. Chemistry, Wright State University, Dayton, OH, 1979
- Certificate of Completion, Medical Technology, St. Elizabeth's Hospital, Dayton, OH, 1980
- Ph.D. Pharmacology/Toxicology, Wright State University, Dayton, OH, 1990

Academic Appointments
- Assistant Professor, Medical Technology and Biochemistry, MSU, 1991
- Specialist, Medical Technology, MSU, 1998

A Photograph of Dr. David Thorne was not available.

Areas of Research Interest
Medical Technologies

Publication and/or Patents (Five considered the most significant)

Proteolytic Processes of Myocardium, One Insensitive to Thiol Reactive Agents and Thiol Protease Inhibitor. Thorne, D. P., Lockwood, T. D. American Journal of Physiology 265, E10-E19 (1993)

Effect of Zn^{2+} On the Proteolytic Inhibitory-Action of Insulin and Biguanide Antihyperglycemic Drugs. Thorne, D. P., Lockwood, T. D. Diabetes 40, 612-620 (1991)

Effects of Insulin, Biguanide Antihyperglycemic Agents and Beta-Adrenergic Agonists on Pathways of Myocardial Proteolysis. Thorne, D. P., Lockwood,T. D. Biochemical Journal 266, 713-718 (1990)

Table of Contents

Norbert Ed Tolbert

Education-Graduate and Postgraduate
- Two year diploma in Chemistry, University of Idaho, 1939
- B. S., Chemistry, University of California, 1941
- M. S., Biochemistry, University of Wisconsin, 1948
- Ph. D., Biochemistry, University of Wisconsin, 1950
- Research Associate, Radiation Laboratory, University of California, 1950
- Biochemist, Division of Biology and Medicine, U. S. Atomic Energy Commission, Washington, D. C., 1950-1952
- Professional Collaborator, U. S. Department of Agriculture, Bureau Plant Industry, Soils and Agricultural Engineering, Beltsville, Maryland, 1950-1952

Academic Appointments
- Senior Biochemist and Group Leader, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 1952
- Professor, Agricultural Chemistry, MSU, 1958
- Professor, Biochemistry, MSU, 1961
- Professor Emeritus, MSU, 1990

Areas of Research Interest
Plant biochemistry; Plant peroxisomes; Photosynthesis; Plant respiration; Plant growth regulation; Mammalian peroxisomes; Oxidases

Honors
- Distinguished Professor, MSU, 1969
- American Chemical Society Spencer Award, 1979
- Plant Physiology Society Stephen Hale Award, 1981
- 1000 most cited contemporary scientists, 1981-1983
- President, American Society of Plant Physiologists, 1983
- National Academy of Sciences, elected 1984
- Michigan Scientist of the year, 1985
- Outstanding Distinguished Faculty Award, MSU, 1986
- German Humboldt Foundation Senior Scientist Award, 1988
- Sigma Xi Senior Scientist Award, MSU, 1988
- Invited to do research on Russian Research Vessels at Seychelle Islands
- Japanese Marine Biotechnology, 1989
- NASA on life support by algae, 1990
- National Research Council Study Panel on atmospheric CO2 and marine science, 1990

Publications and/or Patents (Five considered the most significant)

Tolbert, N. E., Oeser, A., Kisaki, T., et al., Peroxisomes From Spinach Leaves Containing Enzymes Related To Glycolate Metabolism Journal Of Biological Chemistry, 243, 5179-& (1968)

Lorimer, G. H., Andrews, T. J., Tolbert, N. E.,Ribulose Diphosphate Oxygenase. Further Proof of Reaction-Products and Mechanism of Action, Biochemistry, 12, 18-23 (1973)

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Andrews, T. J., Lorimer, G. H., Tolbert, N. E., Ribulose Diphosphate Oxygenase .1. Synthesis of Phosphoglycolate By Fraction-1 Protein of Leaves, Biochemistry, 12, 11-18 (1973)

Markwell, M. A. K., Haas, S. M., Bieber, L. L., Tolbert, N. E., Modification of Lowry Procedure to Simplify Protein Determination in Membrane and Lipoprotein Samples, Analytical Biochemistry, 87, 206-210 (1978)

Pierce, J., Tolbert, N. E., Barker, R., Interaction of Ribulosebisphosphate Carboxylase-Oxygenase With Transition-State Analogs, Biochemistry, 19, 934-942 (1980)

Steven J. Triezenberg

Education – Graduate and Postgraduate
- B.S., Biology and Education, Calvin College, Grand Rapids, MI, 1979
- Ph.D., Cellular and Molecular Biology, University of Michigan, Ann Arbor, 1984
- Postdoctoral, Carnegie Institution of Washington, Baltimore, MD, 1984-1987

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1987
- Associate Professor, Biochemistry, MSU, 1992
- Professor, Biochemistry, MSU, 1996-2006
- Director, Biochemistry of the Cell Nucleus, Cancer Center, MSU 1994-1998
- Associate Director, Program in Cell and Molecular Biology, MSU, 1999-2006
- Adjunct Professor, Biochemistry and Molecular Biology, MSU, 2006-present
- Scientific Investigator, Van Andel Research Institute (VARI) 2006-2009
- Senior Scientific Investigator, VARI, 2009-present
- Dean, Van Andel Institute Graduate School, 2006-present
- Director, Van Andel Education Institute, 2009-present

Areas of Research Interest

Regulation of gene expression in eukaryotes; Mechanisms of transcariptional activation; Herpes simplex virus; Transcriptional adaptor proteins and histone acetylation in plants.

Honors
- American Cancer Society Junior Faculty Research Award, 1991-1994
- MSU Lilly Endowment Teaching Fellowship, 1991-92
- Teacher Scholar Award, MSU, 1993
- NIH Research Career Development Award, 1994-1999
- Distinguished Faculty Award, College of Human Medicine, 1996

Table of Contents

Golden Apple Teaching Award, College of Osteopathic Medicine, MSU, 1996
Sigma Xi (MSU Chapter) Junior Meritorious Faculty Award, 1997
CIC Academic Leadership Program, Michigan State University, 2003-04

Publications and/or Patents (Five considered the most significant)

S.J. Triezenberg, R.C. Kingsbury, and S.L. McKnight. Functional dissection of VP16, the trans activator of herpes simplex virus immediate early gene expression. Genes and Development 2, 718 729 (1988).

I. Sadowski, J. Ma, S. Triezenberg, and M. Ptashne. GAL4 VP16: an unusually potent transcriptional activator. Nature 335, 563 564 (1988).

W.D. Cress and S.J. Triezenberg. Critical structural elements of the VP16 activation domain. Science 251, 87-91 (1991).

K.E. Vlachonasios, M.F. Thomashow, and S.J. Triezenberg. Disruption mutations of ADA2b and GCN5 transcriptional adaptor genes dramatically affect Arabidopsis growth, development and gene expression. Plant Cell 15: 626-638 (2003).

S.B. Kutluay, S.L. DeVos, J.E. Klomp, and S.J. Triezenberg. Transcriptional coactivators are not required for herpes simplex virus type 1 immediate early gene expression in vitro. J Virol. 83:3436-3449 (2009).

Table of Contents

Alexander Tulinsky

Education – Graduate and Postgraduate
A. B. - Chemistry, Temple University, 1952
Ph. D. - Physical Chemistry, Princeton University, 1956
Research Associate, Polytechnic Institute of Brooklyn 1955-1959

Academic Appointments
Assistant Professor, Chemistry, Yale University, 1959
Associate Professor, Chemistry, MSU, 1965
Associate Professor, Chemistry and Biochemistry, MSU, 1967
Professor, Chemistry and Biochemistry, MSU, 1968
Professor, Chemistry, MSU, 1973
Professor Emeritus, MSU, 1995

Areas of Research Interest
X-ray crystallography; Structure of molecules of biological interest; The porphyrins; Active sites of enzyme molecules; RNA-enzyme complexes; Crystal chemistry of enzymes

Publications and/or Patents (Five considered most significant)
Silvers, S. J., Tulinsky, A.,Crystal and Molecular Structure of Triclinic Tetraphenylporphyrin, Journal of the American Chemical Society, 89, 3331-& (1967)

Timkovic, R., Tulinsky, A., Structure of Aquomagnesium Tetraphenylporphyrin, Journal of the American Chemical Society, 91, 4430-& (1969)

Chen, B. M. L., Tulinsky, A., Redetermination of Structure of Porphine, Journal of the American Chemical Society, 94, 4144-& (1972)

Tulinsky, A., Vandlen, R. L., Morimoto, C. N., et al., Variability in Tertiary Structure of Alpha-Chymotrypsin at 2.8 A Resolution, Biochemistry, 12, 4185-4192 (1973)

Vandlen, R. L., Tulinsky, A., Changes in Tertiary Structure of Alpha-Chymotrypsin with Change in Ph - Ph 4.2-6.7, Biochemistry, 12, 4193-4200 (1973)

Table of Contents

Joseph E. Varner

Education-Graduate and Postgraduate
- B. S., Chemistry, Ohio State University, 1942
- M.S., Chemistry, Ohio State University, 1943
- Ph.D., Biochemistry, Ohio State University, 1949

Academic Appointments
- Assistant Professor, Ohio State University, 1950-1961
- Sr. Staff Scientist, RIAS, Division of Martin Co., 1961
- Professor, Biochemistry and DOE Plant Research Laboratory, MSU, 1965
- Professor, Biology Department, Washington University, St. Louis, 1973-1993

Areas of Research Interests
Organic Acid Metabolism of the succulents; Hormonal control; Enzymology; Gibberelins

Honors
- President, American Society of Plant Physiology, 1970-71
- Editorial Board, Annual Review of Plant Physiology, 1970-75
- Honoris causa degree, University of Nancy, France, 1977
- Elected Member, National Academy of Science, 1984
- Stephen Hales Prize, American Society of Plant Physiology, 1990

Publications and/or Patents (Five considered the most significant)

Jones, R. L., Varner, J. E., Bioassay of Gibberellins, Planta, 72, 155-& (1967)

Chrispeels,.M. J., Varner, J. E., Gibberellic Acid-Enhanced Synthesis and Release of Alpha-Amylase and Ribonuclease by Isolated Barley Aleurone Layers, Plant Physiology, 42, 398-& (1967)

Chrispeels, M. J., Varner, J. E., Hormonal Control of Enzyme Synthesis - On Mode of Action of Gibberellic Acid and Abscisin In Aleurone Layers of Barley, Plant Physiology, 42, 1008-& (1967)

Filner, P., Varner, J. E. A Test For de novo Synthesis of Enzymes - Density Labeling With H_2O_{18} of Barley Alpha-Amylase Induced by Gibberellic Acid, Proceedings of The National Academy Of Sciences of The United States Of America, 58, 1520-& (1967)

Filner, P., Wray, J. L, Varner, J. E., Enzyme Induction in Higher Plants, Science, 165, 358-& (1969)

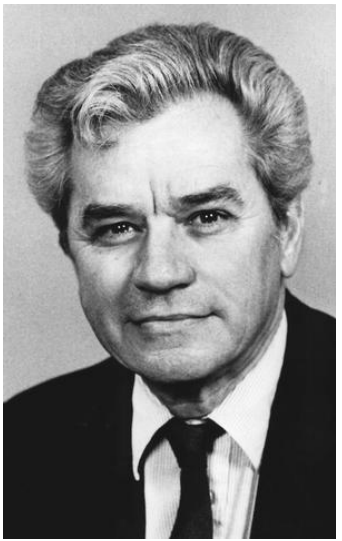


Table of Contents

Claire Vieille

Education-Graduate and Postgraduate
- B.S. Agricultural Engineering, Institut National Agronomique Paris-Grignon, Paris, France, 1986
- M.S. Microbiology, Université Paris 7 at Institut Pasteur, Paris, France, 1986
- Ph.D. Microbiology, Université Paris 7 at Institut Pasteur, Paris, France, 1991
- Postdoctoral research, Département des Biotechnologies, Institut Pasteur, Paris, France, 1991
- Postdoctoral research associate, Zeikus Laboratory, MSU, 1992

Academic Appointments
- Laboratory manager, Zeikus Laboratory, MSU, 1994
- Research Assistant Professor, Zeikus Laboratory, MSU, 1998
- Research Associate Professor, Zeikus Laboratory, Biochemistry and Molecular Biology, MSU, 2005
- Assistant Professor, Microbiology & Molecular Genetics and Biochemistry & Molecular Biology, MSU, 2008

Areas of Research Interests
Protein stability; protein engineering; bacterial metabolism; bacterial metabolic engineering.

Publications and/or Patents (Five considered the most significant)
McKinlay, J.B., and C. Vieille. (2008). 13C-metabolic flux analysis of Actinobacillus succinogenes fermentative metabolism at different $NaHCO_3$ and H_2 concentrations. Metab. Engin. 10:55–68.

.McKinlay, J.B., Y. Shachar-Hill, J.G. Zeikus, and C. Vieille. (2007). Determining Actinobacillus succinogenes metabolic pathways and fluxes by NMR and GC-MS analyses of 13C-labeled metabolic product isotopomers. Metab. Engin. 9:177–192.

Ziegelmann-Fjeld, K.I., Musa, M.M., Phillips, R.S., Zeikus J.G., and C. Vieille. (2007). Thermoanaerobacter ethanolicus secondary alcohol dehydrogenase mutant highly active and stereoselective on phenylacetone and benzylacetone. Protein Engin. Des. Select. 20:47–55.

Savchenko, A., C. Vieille, S. Kang, and J.G. Zeikus. (2002). Pyrococcus furiosus α-amylase is stabilized by calcium and zinc. Biochemistry 41:6193–6201.

Vieille, C., and J.G. Zeikus. (2001). Hyperthermophilic enzymes: sources, uses, and molecular mechanisms for thermostability. Microbiol. Mol. Biology Rev. 65:1–43.

Table of Contents

Kevin D. Walker

Education – Graduate and Postgraduate
- B.S., Chemistry, University of Washington, Seattle, 1988
- Ph.D., Bioorganic Chemistry, University of Washington, Seattle, 1997
- NIH Postdoctoral Fellow, Washington State University, Pullman, 1997

Academic Appointments
- Laboratory Manager, Washington State University, Pullman, 2000
- Assistant Professor, Chemistry and Biochemistry and Molecular Biology, MSU, 2004
- Associate Professor, Chemistry and Biochemistry and Molecular Biology, MSU, 2010

Areas of Research Interest
Enzymology of paclitaxel (Taxol) biosynthesis; Dissecting the pathways of natural products biosynthesis; Structure of acyltransferase and aminomutase enzymes in paclitaxel biosynthesis

Honors
- NSF CAREER Award, Aug 2008- 2013,

Publications and/or Patents (Five considered the most significant)

Wijeratne, S., Byrne, N. A., Walker, K. D. (2010) Separation of α- from β-Arylalanines by Nickel Nitrilotriacetate Chromatography. J. Sep. Sci. 33:1279-1282.

Nawarathne, I. N., Walker, K. D. (2010) Point Mutations (Q19P and N23K) Increase the Operational Solubility of a 2-O-Benzoyltransferase That Conveys Various Acyl Groups from CoA to a Taxane Acceptor. J. Nat. Prod. 73:151-159.

Ondari, M. E., Walker, K. D. (2009) Synthesis of 4-Deacetyl-1-dimethylsilyl-7-triethylsilylbaccatin III. J. Org. Chem. 74:2186-2188.

Cox, B. M., Bilsborrow, J. B., Walker, K. D. (2009) Enhanced conversion of racemic alpha-arylalanines to (R)-beta-arylalanines by coupled racemase/aminomutase catalysis. J. Org. Chem. 74:6953-6959.

Nevarez, D. M., Mengistu, Y. A., Nawarathne, I. N., Walker, K. D. (2009) An N-Aroyltransferase of the BAHD Superfamily Has Broad Aroyl CoA Specificity in Vitro with Analogues of N-Dearoylpaclitaxel. J. Am. Chem. Soc. 131:5994-6002.

Table of Contents

John L. Wang

Education-Graduate and Postgraduate
- A.B., Chemistry, Dartmouth College, Hanover, NH, 1968
- Ph.D., Biochemistry, The Rockefeller University, 1973
- Postdoctoral, Cell Biology, The Rockefeller University, 1975

Academic Appointments
- Assistant Professor, The Rockefeller University, 1975
- Assistant Professor, Biochemistry, MSU, 1977
- Associate Professor, Biochemistry, MSU, 1981
- Professor, Biochemistry, MSU, 1985

Areas of Research Interest

Negative regulators of cell growth; Analysis of carbohydrate-binding proteins in the cell nucleus; Nuclear processing and export of mRNA.

Honors
- Distinguished Faculty Award, MSU, 1996
- Editorial Board, PLANTA, 1990-1996
- National Institutes of Health, Cell Biology and Physiology Study Section, 1988-1992
- American Cancer Society, Peer Review Committee on Molecular and Cell Biology of Cancer, Vice-Chair, 1997; Chair, 1998
- Editorial Board, Journal of Biological Chemistry, 1992-1997; 1998-2003
- Board of Directors, Van Andel Institute Graduate School, Grand Rapids, MI, 2005 – 2009

Publications and/or Patents (Five considered most significant)

Steck, P.A., Voss, P.G., and Wang, J.L. "Growth control in cultured 3T3 fibroblasts. Assays of cell proliferation and demonstration of a growth inhibitory activity," J. Cell Biol. 83: 562-575 (1979)

Metcalf, T.N., Szabo, L.J., Schubert, K.R., and Wang, J.L. "Immunochemical identification of an actin-like protein from soybean seedlings," Nature 285: 171-172 (1980)

Moutsatsos, I.K., Wade, M., Schindler, M., and Wang, J.L. "Nuclear localization of carbohydrate-binding protein 35 in proliferating 3T3 fibroblasts," Proc. Natl. Acad. Sci. USA 84: 6452-6456 (1987)

Dagher, S.F., Wang, J.L., and Patterson, R.J. "Identification of galectin-3 as a factor in pre-mRNA splicing," Proc. Natl. Acad. Sci. USA 92: 1213-1217 (1995)

Haudek, K.C., Voss, P.G., Locascio, L.E., Wang, J.L., and Patterson, R.J. "A Mechanism for incorporation of galectin-3 into the spliceosome through its association with U1 snRNP," Biochemistry 48, 7705-7712 (2009)

Table of Contents

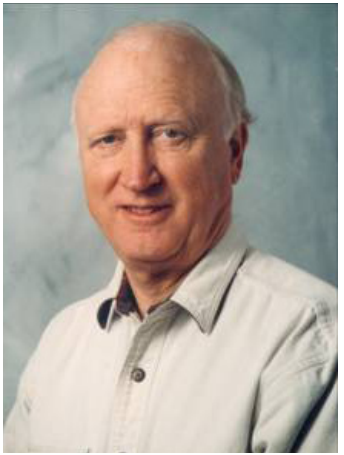
Jack Throck Watson

Education – Graduate and Postgraduate
- B. S., Chemistry, Iowa State University, Ames, 1961
- Ph. D., Analytical Chemistry, Massachusetts Institute of Technology, Cambridge, 1965
- Postdoctoral, Institut de Chimie, Universite de Strasbourg, Strasbourg, France 1968

Academic Appointments
- Assistant Professor, Pharmacology, Vanderbilt University School of Medicine, Nashville, 1969
- Associate Professor, Pharmacology, Vanderbilt University School of Medicine, Nashville, 1973
- Professor, Biochemistry and Chemistry, MSU, 1980
- Professor Emeritus, MSU, 2007

Areas of Research Interest
Instrumentation Development in Gas Chromatography-Mass Spectrometry; Chemical Modification of Drugs, Lipids, Biogenic Amines for Improved Analysis by Mass Spectrometry; Elucidation of Disulfide Structure in Proteins by Mass Spectrometry

Honors
- Outstanding Young Alumnus Award, Iowa State University, 1972
- NIH Career Development Award, Vanderbilt University, 1973-1977
- Citation of Merit, College of Sciences and Humanities, Iowa State University, Ames, 1981
- Pittsburgh Spectroscopy Society Awardee, 1990
- Professeur Invité Ecolé, Normale Superieure, Paris, France, 1992 and 1995
- Professeur Invite', Université des Sci- ences et Technologies, Lille, France, 2000
- Professeur Invite', Université de Nice, Sophia-Antipolis, Nice, France, 2002



Publications and/or Patents (Five considered the most significant)

Holland, J.F., Enke, C.G., Allison, J., Stults, J.T., Pinkston, J.D., Newcome, B., and Watson, J.T.: Mass spectrometry on the chromatographic time scale: Realistic expectations. Anal. Chem., 55: 997A-105A (1983).

Johnson, R.S., Martin, S.A., Biemann, K., Stults, J.T., and Watson, J.T.: Novel fragmentation process of peptides by collision-induced decomposition in a tandem mass spectrometer: Differentiation of Leucine and Isoleucine. Anal. Chem., 59: 2621-2625 (1987).

Yang, Y., Wu, J., and Watson, J.T.: Disulfide Mass Mapping in Proteins Containing Adjacent Cysteines is Possible with Cyanylation/ Cleavage Methodology. J. Am. Chem. Soc., 120:5834-5835 (1998).

Qi,J., Hang, D., Rupp, M., Borges, C.R., Wu, W., Torng, E., and Watson. J.T, Automated Data Interpretation Based on the Concept of 'Negative Signature Mass' for Mass-Mapping Disulfide Structures of Cystinyl Proteins. (2003) J. Amer. Soc. Mass Spectrom. 14(9):1032

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Watson, J.T.: Introduction to Mass Spectrometry, Third Edition, Lippincott/Raven Press, NYC, NY, (1997).

William J. Wedemeyer

Education-Graduate and Postgraduate

B.S., Physics, Massachusetts Institute of Technology, Cambridge, MA, 1988
B.S., Humanities (Music), Massachusetts Institute of Technology, Cambridge, MA, 1988
M.S., Physics, Cornell University, Ithaca, NY, 1993
Ph.D., Physics, Cornell University, Ithaca, NY, 1998
Postdoctoral research, Biochemistry, Cornell University, 1998
Postdoctoral research, Biochemistry, U. Washington, Seattle, 2001

Academic Appointments
Assistant Professor, Biochemistry and Molecular Biology, 2004-2010

Areas of Research Interest
Modeling of proteins de novo and from low-resolution data; structural studies of HIV envelope proteins and the mechanism of HIV cell entry; experimental studies of protein folding; peptide/protein design.

Publications and/or Patents (Five considered the most significant)

Lrrk2 in Parkinson's disease: protein domains and functional insights, Mata IF, Wedemeyer WJ, Farrer MJ, Taylor JP, Gallo K. Trends in Neurosciences 29, 286-293 (2006).

Proline Cis-Trans Isomerization and Protein Folding, Wedemeyer, W. J., Welker, E. and Scheraga, H. A. , Biochemistry, 41,14637-14644 (2002).

Protein Structure Prediction in 2002, Schonbrun, J., Wedemeyer, W. J., and Baker, D., Curr. Opin. Struct. Biol., 12, 348-354 (2002).

Oxidative Folding of Proteins, M. Narayan, E. Welker, W. J. Wedemeyer, and H. A. Scheraga, Accts. Chem. Res., 33, 805-812 (2000).

Disulfide Bonds and Protein Folding, W. J. Wedemeyer, E. Welker, M. Narayan, and H. A. Scheraga, Biochemistry, 39, 4207-4216 (2000); Erratum: 39, 7032 (2000).

Table of Contents

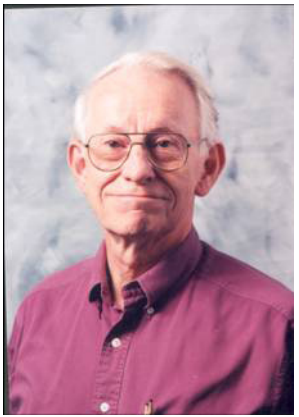
William W. Wells

Education – Graduate and Postgraduate
B.S., Zoology, University of Michigan, 1949
M.S., Biochemistry, University of Michigan, 1951
Ph.D., Biochemistry, University of Wisconsin, 1955
Postdoctoral Fellowship, University of Wisconsin (January, 1955 - June 1955)

Academic Appointments
Instructor, Biochemistry, University of Pittsburgh, 1955
Assistant Professor, Biochemistry, University of Pittsburgh, 1957
Associate Professor, Biochemistry, University of Pittsburgh, 1960
Professor, Biochemistry, MSU, 1965
Professor Emeritus, MSU, 1997

Areas of Research Interest
Sterol metabolism in atherosclerosis; Energy relationships in inborn errors of metabolism; myo Inositol metabolism in growth and development; Neurochemistry; Regulation of lysosome activity; Metabolic regulation of microtubules; Fatty liver and phosphatidylinositol metabolism; Carbohydrate metabolism in mammals; Thiol:disulfide regulation of enzymes; Regeneration of Vitamin C and E; Dehydroascorbate Reductases; Thioltransferases in Normal and Transformed Cells; Cholesterol biosynthesis with discovery of Methostenol (4α-methyl-Δ7-cholesten-3β-ol).; Incorporation of pantothenate into the fatty acid synthetase complex of Baker's yeast.; Discovery of the essential function of ascorbic acid as cofactor for mitochondrial glycerol-3-phosphate dehydrogenase and its role in glucose stimulated insulin release from pancreatic islets.

Honors
Five Year Established Investigatorship, American Heart Association, 1961-66
Distinguished Faculty Award, College of Human Medicine, 1995



Publications and/or Patents (Five considered the most significant)

Wells, W. W., and Neiderhiser, D. H. (1957) Isolation and Synthesis of a New Sterol from Rat Feces. J. Am. Chem. Soc. 79, 6569.

Wells, W. W., Pittman, T.A., Wells, H. J., and Egan, T. J. (1965) The Isolation and Identification of Galactitol from the Brains of Galactosemia Patients. J. Biol. Chem. 240, 1002-1004.

Gan, Z-R., and Wells, W. W. (1987) The Primary Structure of Pig Liver Thioltransferase. J. Biol. Chem. 262, 6699-6703.

Wells, W. W., Dou, C-Z, Dybus, L. N., Jung, C-H., and Kalbach, H.L. (1965) Ascorbic Acid is Essential for the Release of Insulin from Scorbutic Guinea Pig Pancreatic Islets. Proc. Natl. Acad. Sci. USA. 92, 11869-11873.

Wells, W. W., Xu, D.P., Washburn, M.P., Cirrito, H. K., and Olson, L.K. (2001) Polyhydroxybenzoates Inhibit Ascorbic Acid Activation of Mitochondrial Glycerol-3-Phosphate Dehydrogenase. Implications for Glucose Metabolism and Insulin Secretion. J. Biol. Chem. 276, 2404-2410.

Table of Contents

Curtis Wilkerson

Education-Graduate and Postgraduate
- B. S., Zoology, North Carolina State University, 1976
- Ph.D., Botany, University of Georgia, 1984
- Postdoctoral, Cell Biology, The Rockefeller University, 1984

Academic Appointments
- Research Associate, Rockefeller University, 1987
- Research Associate, Worcester Foundation for Experimental Biology, 1989
- Senior Research Associate, Worcester Foundation for Experimental Biology, 1994
- Bioinformatics Specialist, Plant Biology and Biochemistry and Molecular Biology, MSU, 1998
- Bioinformatics Scientist, Ariad Pharmaceuticals, 2000
- Research Assistant Professor, Plant Biology and Biochemistry and Molecular Biology, MSU, 2000
- Research Assistant Professor, Bioinformatics Manager, Plant Biology and Biochemistry and Molecular Biology, MSU, 2001
- Director, Proteomics Facility, MSU, 2005
- Associate Professor, Plant Biology and Biochemistry and Molecular Biology, MSU, 2007

Areas of Research Interest

Plant cell wall biosynthesis; Discovery of hemicellulose biosynthetic enzymes; Transcriptional networks involved in cell wall biosynthesis,; Regulation of Golgi processes related to hemicellulose synthesis and secretion.

Publications and/or Patents (Five considered the most significant)

Cocuron, J-C., Lerouxel, O., Drakakaki, G., Alonso, A., Liepman, A., Keegstra, K., Raikhel, N., Wilkerson, C. G.. (2006) A gene from the cellulose synthase-like C family encodes a xyloglucan synthase. Proc Natl Acad Sci U S A. (2007) May;104(20):8550-0555.

Wilkerson, C. G., King, S. M., Koutoulis, A., Pazour, G. J., Witman, G. B.. The 78,000 M(r) intermediate chain of Chlamydomonas outer arm dynein isa WD-repeat protein required for arm assembly. J Cell Biol. (1995) Apr;129(1):169-78.

Wilkerson, C. G., King, S. M., Witman, G. B.. Molecular analysis of the gamma heavy chain of Chlamydomonas flagellar outer-arm dynein. J Cell Sci. (1994) Mar;107 (Pt 3):497-506.

Brautigam, A., Shrestha, R. P., Whitten, D., Wilkerson, C. G., Carr, K. M., Froehlich, J. E., Weber, A. P.. Low-coverage massively parallel pyrosequencing of cDNAs enables proteomics in non-model species: Comparison of a species-specific database generated by pyrosequencing with databases from related species for proteome analysis of pea chloroplast envelopes. J Biotechnol. (2008) 136, 44-53.

Froehlich, J. E., Wilkerson, C. G., Ray, W. K., McAndrew, R. S., Osteryoung, K. W., Gage, D. A., and Phinney, B. S.. Proteomic Study of the Arabidopsis thaliana Chloroplastic Envelope Membrane Utilizing

Table of Contents

Alternatives to Traditional Two-Dimensional Electrophoresis. Journal of Proteome Research. 2003 Jul-Aug;2(4):413-425.

John E. Wilson

Education – Graduate and Postgraduate
- B. S., Chemistry, University of Notre Dame 1961
- M. S., Biochemistry, University of Illinois 1962
- Ph. D., University of Illinois 1964
- Postdoctoral Fellow, Biochemistry, University of Illinois 1964
- Postdoctoral Experience, Medical Research Laboratory, Edgewood Arsenal, Maryland 1965

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1967
- Associate Professor, Biochemistry, MSU, 1971
- Professor, Biochemistry, MSU, 1975
- Associate Chairperson, Biochemistry, MSU 1985-1989
- Chairperson, Biochemistry, MSU, 1989-1994
- Professor Emeritus, MSU 2004

Areas of Research Interest
Enzyme Catalysis; Brain Hexokinase Structure and Function; Regulation of cerebral energy metabolism; Variation in metabolic patterns of different cell-types in brain, and during brain maturation

Honors
- NIH Javits Neuroscience Investigator Award, 1985 and 1992
- Distinguished Faculty Award, MSU, 1991
- Elected Fellow of the American Association for the Advancement of Science (AAAS) 1995
- Meritorius Faculty Award, College of Natural Science Alumni Association, MSU, 1998

Publications and/or Patents (Five considered the most significant.)

Felgner, P.L., Messer, J.L, and Wilson, J.E. (1979) Purification of a hexokinase binding protein from the outer mitochondrial membrane. J. Biol. Chem. 254, 4946-4949.

Wilson, J.E., and Smith, A.D. (1985) Monoclonal antibodies against rat brain hexokinase: Utilization in epitope mapping studies and establishment of structure-function relationships. J. Biol. Chem. 260, 12838-12843.

White, T.K., and Wilson, J.E. (1989) Isolation and characterization of the discrete N_ and C_terminal halves of rat brain hexokinase: Retention of full catalytic activity in the isolated C-terminal half. Arch. Biochem. Biophys. 274, 375-393.

Wilson, J.E., Hexokinases in Reviews of Physiology, Biochemistry and Pharmacology, Vol. 126, pp. 65-198, Springer-Verlag, Berlin (1995).

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Sui, D., and Wilson, J.E. (1997) Structural determinants for the intracellular localization of the isozymes of mammalian hexokinase: Intracellular localization of fusion constructs incorporating structural elements from the hexokinase isozymes and the green fluorescent protein, Arch. Biochem. Biophys. 345, 111-125.

Willis A. Wood

Education-Graduate and Postgraduate
B. S., Bacteriology, Cornell University, 1940-1943 and 1946-1947
Ph. D., Bacteriology, Indiana University, 1950

Academic Appointments
Assistant Professor, Dairy Science, University of Illinois, 1950
Associate Professor, Dairy Science, University of Illinois, 1955
Professor, Agricultural Chemistry, MSU, 1958
Professor, Biochemistry, MSU, 1961
Chairperson, Biochemistry, MSU, 1968-1974
Founder and first President, Neogen Corporation, 1981-1982
Professor Emeritus, MSU, 1982

Area of Research Interests
Mechanism of electron transport in Pseudomonas fluorescens; Pathways of L-xylose utilization; Mechanisms of isomerase, epimerase and ketolase action; Carbohydrate metabolic pathways in Pseudomonas and Aerobacter; Genetic and enzymatic basis for utilization of unnatural carbohydrates in Aerobacter; Metabolic fate of lactate in bovine rumen fermentation; Discovery and characteristics of alanine racemase in Streptococcus faecalis; Tryptophanase reaction in Escherichia coli; Role of pyridoxal phosphate in tryptophan synthetase, trytophanase, alanine racemase, and threonine dehydrase. Mechanism of 6 phosphogluconic dehydrase; Role of ligand induced oligomerization in allosteric control; Structure and function of a trimeric 2 keto 3 deoxy 6-phosphogluconate aldolase; Electron transport flavorproteins in Peptostreptococcus elsdenii; Localization of enzymes in Pseudomonas; Instrumentation, recording spectrophotometers, amino acid analyzers, and automated equipment for determining enzymatic parameters.

Honors
Eli Lilly Award in Bacteriology and Immunology, 1955
NIH Senior Fellowship, 1963, 1964
Distinguished Faculty Award, MSU, 1970
Senior Sigma Xi Award, MSU, 1971
President, American Society for Microbiology, 1979
Honorary Member, American Society for Microbiology. Elected by membership, 1997

Publications and/or Patents (Five considered the most significant)

Wood, W. A., Gilford, S. R., A System for Automatic Recording of Absorbancy and its Application

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To Enzyme-Catalyzed Reactions, Analytical Biochemistry, 2, 589-& (1961)

Grazi, E., Martinez, G., Wood, W. A., et al., Evidence for Schiff Base Formation in Enzymatic Aldol Condensations, Biochemical And Biophysical Research Communications, 10, 4-& (1963)

Mortlock, R. P., Wood, W. A., Metabolism Of Pentoses and Pentitols By Aerobacter aerogenes .1. Demonstration Of Pentose Isomerase, Pentulokinase and Pentitol Dehydrogenase Enzyme Families, Journal of Bacteriology, 88, 838-& (1964)

Phillips, A. T., Wood, W. A., Mechanism of Action of 5'-Adenylic Acid-Activated Threonine Dehydrase, Journal of Biological Chemistry, 240, 4703-& (1965)

Hammerstedt, R.H., H.J. Mohler, K.A. Decker, and W.A. Wood, Structure of 2-keto-3-deoxy-6-phosphogluconate Aldolase. I. Physical Evidence for a Three-Subunit Molecule. Journal of Biological Chemistry, 246, 2069-& (1971).

Table of Contents

Honggao Yan

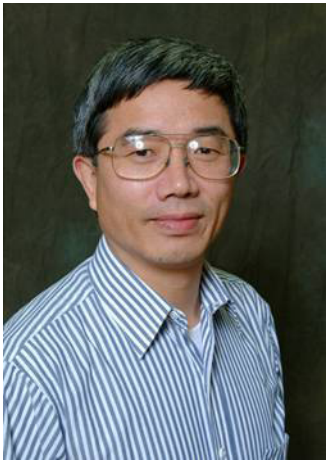
Education – Graduate and Postgraduate
- B.S., Veterinary Medicine, Zhejiang Agricultural University, P.R.C., 1982
- M.S., Biochemistry, Beijing Agricultural University, P.R.C., 1984
- Ph.D., Chemistry/Biochemistry, The Ohio State University, Columbus, Ohio, 1991,
- Human Frontier Science Fellow, Biochemistry and National Mag netic Resonance Facility at the University of Wisconsin, Madison, 1991

Academic Appointments
- Assistant Professor, Biochemistry and Molecular Biology, MSU, 1993
- Associate Professor, Biochemistry and Molecular Biology, MSU, 1999
- Professor, Biochemistry and Molecular Biology, MSU, 2004

Honors
- Phi Kappa Phi Honorary Society, 1990
- Human Frontier Science Program Fellowship, 1991

Areas of Research Interest

Protein biochemistry focusing on protein structure, function, and dynamics with applications to protein engineering and structure-based drug design; Molecular genetics biochemical, bio-organic, biophysical, and computational methods; Enzymes in the folate biosynthetic pathway and the 2-C-methyl-D-erythritol 4-phosphate (MEP) pathway and proteins involved in bacterial evasion of human immunity.



Publications and/or Patents (Five considered most significant)

Lescop, E., Lu, Z., Liu, Q., Xu, H., Li, G., Xia, B., Yan, H., and Jin, C. (2009) Dynamics of the conformational transitions in the assembling of the Michaelis complex of a bisubstrate enzyme: a 15N relaxation study of Escherichia coli 6-hydroxymethyl-7,8-dihydropterin pyrophosphokinase. Biochemistry 48, 302-312.

Liu, A., Lu, Z., Wang, J., Yao, L., Li, Y., and Yan, H. (2008) NMR detection of bifurcated hydrogen bonds in large proteins. J. Am. Chem. Soc. 130, 2428-2429.

Blaszczyk, J., Li, Y., Gan, J., Yan, H., and Ji, X. (2007) Structural basis and catalytic mechanism for the aldolase and epimerase activities of Staphylococcus aureus dihydroneopterin aldolase. J. Mol. Biol. 368, 161-169.

Wang, Y., Scherperel, G., Roberts, K. D., Jones, A. D., Reid, G. E., and Yan, H. (2006) A point mutation converts dihydroneopterin aldolase to a cofactor-independent oxygenase. J. Am. Chem. Soc. 128, 15232-15239.

Li, Y., Gong, Y., Shi, G., Blaszczyk, J., Ji, X., and Yan, H. (2002) Chemical transformation is not rate-limiting in the reaction catalyzed

Table of Contents

by Escherichia coli 6-hydroxymethyl-7,8-dihydropterin pyrophosphokinase. Biochemistry 41, 8777-8783.

Timothy R. Zacharewski

Education – Graduate and Postgraduate

B.S., Chemistry and Microbiology.University of Guelph, Guelph, Ontario, Canada, 1986

Ph.D.–Toxicology, Veterinary Physiology and Pharmacology, Texas A&M University, College Station, Texas, 1990

INSERM U.184, CNRS-LGME, Institut de Chemie Biologique - Faculte de Medecine, 11, Rue Humann, 67085 Strasbourg, France, 1990

Academic Appointments

Assistant Professor , Pharmacology and Toxicology University of Western Ontario, London, Ontario, 1992

Associate Professor, Pharmacology and Toxicology, University of Western Ontario, London, Ontario, 1997

Assistant Professor, Biochemistry and the National Food Safety & Toxicology Center, MSU, 1997

Associate Professor, Biochemistry and the National Food Safety & Toxicology Center, MSU, 2000

Professor, Biochemistry and the National Food Safety & Toxicology Center, MSU, 2005

Areas of Research Interest

Molecular and biochemical toxicology; endocrine disruptors; nuclear receptors-mediated gene expression and metabolomics (toxicogenomics); risk assessment

Publications and/or Patents (Five considered most significant)

Matthews, J.B., Clemons, J.H. and Zacharewski, T., Reciprocal mutagenesis between human a (L349, M528) and rainbow trout (M317, I496) estrogen receptor residues demonstrates their importance in ligand binding and gene expression at different temperatures. Molecular and Cellular Endocrinology, 183(1-2), 167-177 (2001)

Fielden, M.R., Halgren, R.G., Fong, C., Staub, C., Johnson, L., Chou, K., and Zacharewski, T., Gestational and lactational exposure of male mice to diethylstilbestrol causes long-term effects on the testis, sperm fertilizing ability in vitro, and testicular gene expression. Endocrinology, 43(8), 3044-3059 (2002)

Fertuck, K.C., Eckel, J.E., Sun, Y., Gennings, C., and Zacharewski, T., Identification of temporal patterns of gene expression in the uteri of immature, ovariectomized mice following exposure to ethynyl estradiol. Physiological Genomics, 15(2), 127-141 (2003)

Yan, S., Boverhof, D.R., Burgoon, L.D., Fielden, M.R., and Zacharewski, T., Comparativeanalysis of dioxin response elements in human

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mouse and rat genomic sequences. Nucleic Acids Research, 32(15), 4512-4523 (2004)

Boverhof, D. R., Burgoon, L. D., Tashiro, C., Sharratt, B., Chittim, B., Harkema, J. R., Mendrick, D.L., Zacharewski, T. R., Comparative toxicogenomic analysis of the hepatotoxic effects of TCDD in Sprague Dawley rats and C57BL/6 mice. Toxicological Sciences, 94(2), 398-416 (2006)

J. Gregory Zeikus

Education-Graduate and Postgraduate
- B.A. - University of South Florida, Tampa, FL 1967
- M.A.- Indiana University, Bloomington, IN 1968
- Ph.D. - Indiana University, Bloomington, IN 1970
- Postdoctoral, Thermal Biology, West Yellowstone, MT, (Summer 1970)
- Postdoctoral, Microbiology, University of Illinois, Urbana, IL 1970

Academic Appointments
- Assistant Professor, Bacteriology, University of Wisconsin, Madison,1972
- Associate Professor, Bacteriology, University of Wisconsin, Madison, WI, 1877
- Professor, Department of Bacteriology, University of Wisconsin, Madison, WI, 1980
- Executive Director, Michigan Biotechnology Institute; Professor of Biochemistry, MSU, 1984-1986
- President, MBI International; Professor of Microbiology and Bio chemistry, MSU, 1986-2000
- President Emeritus, MBI International, 2000
- Professor Emeritus, MSU, ???

Honors
Honorary Degree, Doctor of Honoris Causa in applied Biological Sciences, University of Gent, Gent, Belgium 1992.
Charles Thom Award in Industrial Microbiology, SIM, 2003

Publications and/or Patents (Five considered the most significant)
Chemical and Fuel Production by Anaerobic-Bacteria, Zeikus, J. G. Annual Review of Microbiology 34, 423-464 (1980)

Publications and/or Patents (Five considered most significant)
Chemical and Fuel Production by Anaerobic-Bacteria, Zeikus, J. G. Annual Review of Microbiology 34, 423-464 (1980)

Gas Metabolism Evidence in Support of the Juxtaposition of Hydrogen-Producing and Methanogenic Bacteria in Sewage-Sludge and Lake-Sediments, Conrad, R., Phelps, T. J., Zeikus, J. G., Applied and Environmental Microbiology 50, 595-601 (1985)

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Control of Interspecies Electron Flow During Anaerobic-Digestion - Significance of Formate Transfer Versus Hydrogen Transfer During Syntrophic Methanogenesis in Flocs, Thiele, J. H., Zeikus, J. G., Applied And Environmental Microbiology 54, 20-29 (1988)

Biotechnology of Succinic Acid Production and Markets For Derived Industrial Products, Zeikus, J. G., Jain, M. K., Elankovan, P., Applied Microbiology and Biotechnology 51, 545-552 (1999)

Improved Fuel Cell and Electrode Designs For Producing Electricity From Microbial Degradation, Park, D. H., Zeikus, J. G., Biotechnology and Bioengineering 81, 348-355 (2003)

Burke K. Zimmerman

Education:-Graduate and Postgraduate
- AB, Harvard College, 1958
- Ph.D., Biophysics, Stanford University, CA 1962
- Postdoctoral Fellow, University of Chicago, 1962
- Staff Biophysicist, Biology Division, Oak Ridge National Laboratory, 1964

Academic Appointments
- Assistant Professor, Biochemistry, MSU, 1966
- Associate Research Biologist, University of California, Santa Cruz, 1968
- Assistant Professor, Biophysics, John Hopkins University School of Medicine, 1969-

Areas of Research Interest
Molecular biology of DNA; Cellular Differentiation in plants and animal cells

Publications and/or Patents (Five considered the most significant.)
Phototropic Dosage-Response Curves For Oat Coleoptiles, Zimmerman, B. K., Briggs, W. R., Plant Physiology 38, 248-& (1963)

Purification and Properties of Deoxyribonucleic acid Polymerase from Micrococcus Lysodeikticus, Zimmerman, B. K., Journal of Biological Chemistry 241, 2035-& (1966)

Cross-Linkages in Collagen - Demonstration of 3 Different Intermolecular Bonds Zimmerman, B. K., Pikkarai J., Fietzek, P. P., Kuhn, K., European Journal of Biochemistry 16, 217-& (1970)

Allophycocyanin forms Isolated From Nostoc SP Phycobilisomes, Zilinskas, B, A., Zimmerman, B. K., Gantt, E., Photochemistry And Photobiology 27, 587-595 (1978)

Phycobilisomes from Blue-Green and Red Algae - Isolation Criteria and Dissociation Characteristics, Gantt, E., Lipschultz, C. A., Grabowski, J., Zimmerman, B. K., Plant Physiology 63, 615-620 (1979)

A photograph of Burke Zimmerman was not available.

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Appendix 7.2

Alphabetical Listing

of
Office Staff

Department of Biochemistry
Department of Biochemistry and Molecular Biology

1961-2011

Table of Contents

Office Staff 1961-2011	Title of Position	Year	Years served
Behney, Susan K.	Secretary	1976-77	1
Behney, Susan K.	Data preparation operator	1977-1979	2
Berning, Melinda	Typist Production/Tech	1988-1999	11
Biehn, Christine	Secretary	2002-2007	5
Bleasdell, Linda	Payroll Clerk	1970-1971	1
Boaks, Linda	Clerk Typist	1968-1969	1
Boog, Carcel G.	Admin Assistant	1978-1979	1
Booher, Lutricia I	Secretary	1970-1976	6
Bradley, Barbara R.	Secretary	1976-1977	1
Brazier, Betty J.	Undergraduate Sec	1969-1971	2
Brazier, Betty J.	Personnel Sec	1971-1977	6
Brazier, Betty J.	Office Assistant	1977-1986	9
Brazier, Betty J.	Accountant	1986-1989	3
Brazier, Betty J.	Administrative Assistant	1989-1990	1
Bretthauer, Donna	Sr. Dept. Secretary	1961-1962	1
Bria, Marilyn J	Bookkeeper	1973-1977	5
Bria, Marilyn J	Accounting Clerk	1977-1978	5
Burch, Mary B.	Clerk Typist	1965-1967	2
Byrne, Dorothy L.	Secretary	1977-1980	3
Cargill, Carrie	Clerk/Receptionist	1998-1999	1
Casale, Rosemarie	Accounting Clerk	1985-1988	3

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Office Staff 1961-2011	Title of Position	Year	Years served
Churchill, Patricia	Secretary	1972-1973	1
Churchill, Patricia	Clerk Typist	1977-1978	1
Clark, Tonya D.	Office Assistant	1998-1999	1
Cobb, Barbara R.	Librarian	1969-1970	1
Cox, Diane	Clerk Receptionist	1990-1991	1
Cox, Diane	Office Assistant	1991-1992	1
Cox, Diane	Accounting Clerk	1992-1996	4
Crane, Jill	Clerk Typist	1984-1990	6
Custer, Cathy	Secretary	1978-1981	3
Custer, Cathy M.	Clerk Typist	1981-1986	5
St. Jacques.Darby	Mass Spec Fac Secretary	1969-1970	1
Davis, Janine	Typist	1986-1987	1
Deford, Karen	Clerk Typist	1982-1984	2
Detwiler, Julie	Secretary	1986-1990	4
Dietrich, Mary Ann	Secretary	1971-1977	6
Doll, Julie	Secretary	1979-1985	6
Doten, Melissa	Office Assistant	1981-1982	1
Dunn, Mary	Office Assistant	1982-2006	24
Dutson, Patricia Jo	Typist Production/Tech	1986-1988	2
Elsesser. Rebecca j.	Clerk	1978-1979	1
Ernsberger, Laurine	Executive Secretary	1970-1974	4
Farr, Helen	Clerk Typist	1984-1986	2

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Office Staff 1961-2011	Title of Position	Year	Years served
Fenn, Carol	Clerk Typist	1982-1984	2
Fillwock, Theresa	Clerk Typist	1978-1980	2
Fillwock, Theresa	Office Assistant	1980-1983	3
Fillwock, Theresa	Office Supervisor	1983-1986	3
Fitzpatrick, Donna	Receptionist	1972-1973	1
Flory, Lena M.	Sr. Dept Secretary	1962-1967	5
Fronek, Jill J.	Clerk Steno	1962-1963	1
Gallagher, Katrina M.	Secretary	2006-	
Gant, Savannah M.	Undergraduate Sec	1973-1974	1
Geiger, Helen	Administrative Assistant	2002-	
Gilmore, Patricia	Bookkeeper	1966-1969	3
Glass, Mary	Clerk Typist	1979-1980	1
Glossenger, Patricia	Clerk Typist	1963-1965	2
Glossenger, Patricia	Bookkeeper	1965-1970	5
Graham, Kathy	Receptionist	1970-1971	1
Graves, Pamela	Clerk Typist	1980-1982	2
Hartwig, Linda	Secretary	1969-1972	3
Haigt, Judy K.	Clerk Typist	1977-1978	1
Halgren, Rob	Academic Specialist	2003-2005	2
Hansen, Edwina M.	Secretary	1976-1977	1
Hearit, Linda L.	Clerk Typist	1968-1969	1
Hinman, Deanna	Clerk	1977-1978	1

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Office Staff 1961-2011	Title of Position	Year	Years served
Howell, Adam	Secretary	2000-2001	1
Jagger, Patricia A.	Secretary	1970-1972	2
Jones, Linda	Clerk Typist	1982-1984	2
Joseph, Sandra L.	Clerk Typist	1962-1963	1
Kagey, Marilyn	Clerk Typist	1967-1968	1
Kanouse, Melinda	Accounting Clerk	1987-1988	1
Kanouse, Melinda	Office Assistant	1988-1992	4
Kochenderfer, M.	Secretary	2002-2004	2
Kochenderfer, M.	System Assistant	2005-	
Kraus, Theresa	Office Supervisor	1986-1988	2
Lambright, Cara	Clerk/Receptionist	2001-2002	1
Lami-Schimizzi, Olga	Clerk Receptionist	1996-1997	1
Lami-Schimizzi, O.	Accounting Clerk	2003-2006	3
Lang, Linda	Typist	1986-1987	5
Lang, Linda	Typist Production/Tech	1987-1989	2
Lang, Linda	Typist Technical	1989-1994	5
Lang, Linda	Grad Admissions Secretary	1994-1996	2
Laprad, Carolyn M.	Clerk Stenographer	1961-1963	2
Lawrence, Jessica (Hudson)	Secretary	2005-	
Leavitt, Susan	Administrative Assistant	1979-1989	10
Leavitt, Susan	Office Assistant	1989-1996	7
Levi, Joan E.	Clerk Typist	1961-1963	2

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Office Staff 1961-2011	Title of Position	Year	Years served
Lewis, Nancy	Clerk Typist	1966-1967	1
Lutzke, Vonnie	Accountant Clerk	1978-1979	1
Mathews, A. L.	Administrative Assistant	1969-1976	7
McCutchson, Carol	Typist Technical	1991-2001	10
McCutchson, Carol	System Assistant	2001-2005	4
McMillan, Marcia F.	Secretary	1972-1973	1
McPharlin, Tim	Labor Aide	2000-2001	1
McPharlin, Victoria	Secretary	1980-1986	7
McPharlin, Victoria	Office Supervisor	1986-2002	15
Morris, Mary A.	Sr. Department Secretary	1967-1970	3
Nichols, Charlene	Accounting Clerk	1986-1987	1
Oberg, Carol M.	Accountant	1996-1999	3
Oesterle, Julie	Office Assistant	1992-2001	9
Oesterle, Julie	Office Supervisor	2001-2005	4
Onaga, Chris	Clerk Typist	1980-1982	2
Pearson, Marjorie M.	Clerk Typist	1978-1979	1
Pember, Sara E.	Administrative Assistant	1977-1978	1
Prokopp, Patricia P.	Secretary	1974-1976	2
Rayburn, Stephen R.	Administrative Associate	1982-1986	4
Rayburn, Stephen R.	Administrator	1986-1998	12
Reed, Lesley	Secretary	2002-2004	2
Reed, Lesley	Office Assistant	2004-	

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Office Staff 1961-2011	Title of Position	Year	Years served
Richards, Janice G.	Secretary	1974-1976	2
Roslund, Jennifer	Secretary	2001-2002	1
Ruggles, Jerri	Office Supervisor	1988-1989	1
Ruonavaara, Alanna D.	Clerk	1976-1977	1
Ruwart, Karen S.	Clerk Typist	1978-1979	1
Sachtleben, Sara P.	Office Supervisor	1974-1977	3
Sargent, Darby A	Clerk Typist	1964-1965	1
Schafer, Cara	Office Assistant	2002-2009	7
Schmuhl, Carl	Office Assistant	1999-2001	2
Secord, Laurie	Office Assistant	2007-	
Seeger, Loreen	Clerk	1979-1980	1
Seltz, Joann M.	Clerk Typist	1969-1970	1
Shaw, Miyoshi E O	Secretary	1996-1997	1
Sheely, Cherie	Clerk Typist	1977-1978	1
Shoal, Jane A.	Payroll Clerk	1969-1970	1
Shoal, Jane A.	Bookkeeper	1970-1973	3
Sherman, Virginia	Clerk Stenographer	1962-1965	3
Simon, Debra L.	Clerk Receptionist	1978-1979	1
Smith, Carol	Administrative Associate	1990-2001	11
Sorenson, Karen	Secretary	1973-1974	1
Springstead, Sandy L.	Clerk Stenographer	1968-1969	1
Strudwick, Diana	Payroll Clerk	1972-1973	1

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Office Staff 1961-2011	Title of Position	Year	Years served
Tanis, Robert	Specialist	1976-1980	4
Trumble, Nancy	Secretary	1997-2001	4
Ungren, Patricia	Accountant	2000-	
Uselton, Sue	Clerk Typist	1980-1982	2
Vanderjagt, Carol S.	Administrative Assistant	2001-	
Vignola, Patricia	Stenographer	1965-1970	5
Vignola, Patricia	Secretary	1970-1974	4
Villarreal, Mary E	Secretary	2006-	
Volmer, Teresa	Clerk Typist	1984-1990	6
Vollmer, Teresa	Typist Technical	1990-2004	14
Vollmer, Teresa	Office Supervisor	2004-	
Wakerley, Cherly	Secretary	1973-1974	1
Wakerley, Cherly	Undergraduate Sec	1974-1977	3
Wood, Janine	Typist Production/Tech	1987-1992	5
Wyman, Jolene	Clerk Typist	1979-1980	1
Yang, William	Department Manager	2009-	

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Appendix 7.3

Memories of the Office Staff

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Professor Richard Luecke and Teresa Vollmer in the Undergraduate Programs office,1980

Theresa Fillwock Kraus, 1983

Professor Charles Sweeley at some event in 1982

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1983

Betty Brazier, 1982

Betty Brazier in 1983

Professor Loran Bieber relaxing in Room 208 in 1983

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Theresa Fillwock Kraus iand Rosemarie Casale setting up an event in Room 298 in 1985

Mary Dunn over the years that she served the Department

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1985

Mary Dunn at her accounting desk in 1985.

Rosemarie Casale at her desk in 1985.

Vickie McPharlin at her desk in 1985.

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1985

Professor Clarence Suelter using the type-writer in the office in 1985.

Unknown staff assistant in 1985. The person on the right in the back is Cathy Custer.

Joyce Robinson at her desk in the Biochemistry Storeroom in 1985.

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(l to r) Theresa Fillwock Kraus, Betty Brazier, and Susan Leavitt probably preparing for an event in Room 208.

1985

(l to r) Bob Gee, Theresa Fillwock Kraus, Unknown, Jack Holland, Unknown, Vickie McPharlin, and Dan Castle.

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1987

Susan Leavitt

Betty Brazier

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1987

(l to r, back row standing) Janine Wood, Mary Dunn, Linda Lang, Melinda (Mindy) Kanouse, Teresa Vollmer, Vickie McPharlin, Julie Detwiler. Front row: Rosemarie Casale, Betty Brazier, and Susan Leavitt.

Melinda (Mindy) Kanouse

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1988

Mary Dunn

Rosemarie Casale

Susan Leavitt

Cathy Custer

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1988

(l to r) Betty Brazier, Mary Dunn, Susan Leavitt, Linda Lang, Janine Wood, and Melinda (Mindy) Kanouse.

Jeff Lounds relaxing in Room 208 during some function.

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(l to r) Brian Smith-White, Mike Denison, and William Wells during an event remembering Mike Denison who left the Department in 1994.

(l to r) Carol Vanderjagt, TaHa TaHa, Clarence Suelter and Steve Treizenberg.

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Holiday Party 1998

Santa Claus-unknown

(l to r) Pat Voss and Shelagh Ferguson-Miller

Doug Gage and Cheryl Sisk

Claire Vielle

(l to r) Trine Celius and Janine Clemons

Carol and Len Vanderjagt

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Vickie McPharlin's retirement party in 2002. On the left, Vickie with retirement cake. On the right, (l to r) Betty Brazier, Vickie McPharlin, Pat McPharlin, Dave McConnell, and Estelle McGroarty.

(l to r) Vickie McPharlin, Bill Smith, and Julie Oesterle.

Vickie McPharlin remembering the past 22 years.

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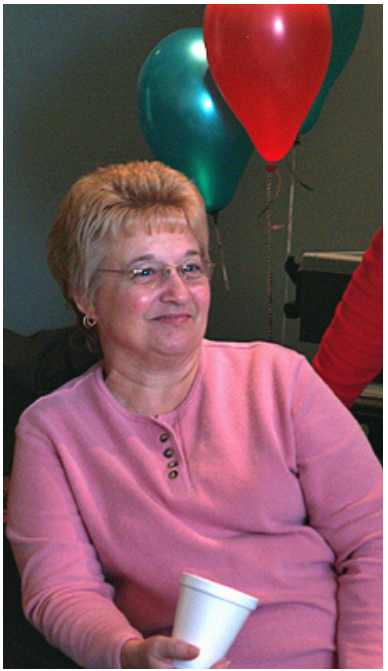
Lesley Reed

2004

Mary Dunn



(l to r) John LaPres, unknown, and Ron Norris.

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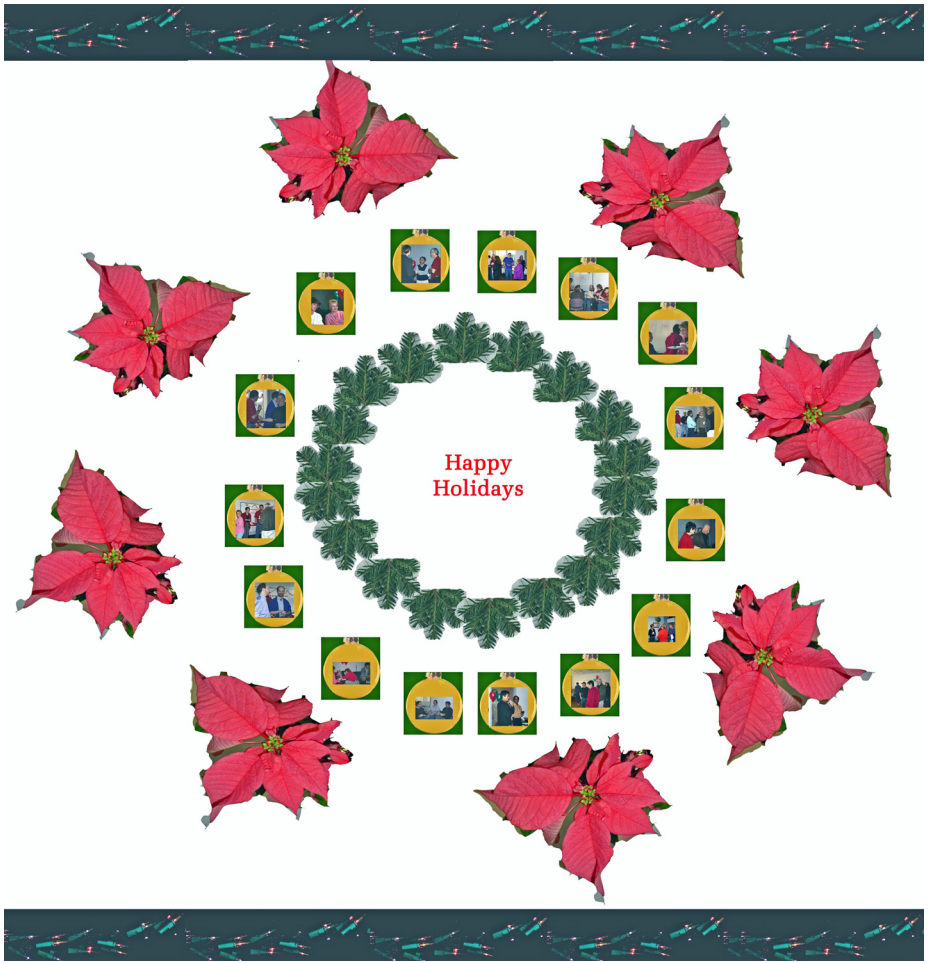

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