



1983

Biochemistry

W. E. Cornatzer
University of North Dakota

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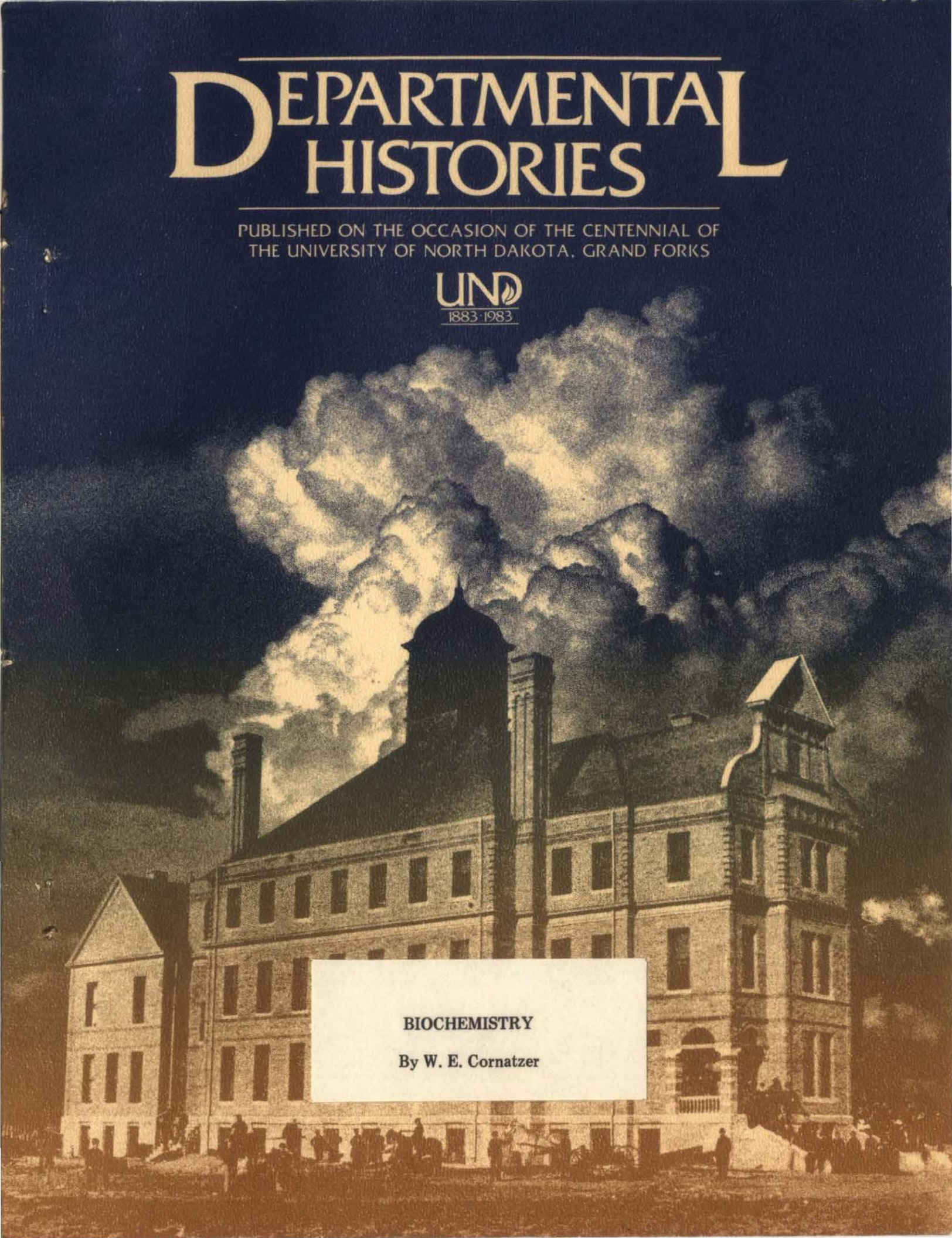
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DEPARTMENTAL HISTORIES

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THE UNIVERSITY OF NORTH DAKOTA, GRAND FORKS

UND
1883-1983



BIOCHEMISTRY

By W. E. Cornatzer

HISTORY OF BIOCHEMISTRY DEPARTMENT

1951-1982

BY

W. E. CORNATZER, PH.D., M.D.
PROFESSOR AND CHAIRMAN, DIRECTOR
IRELAND RESEARCH LABORATORY
CHESTER FRITZ DISTINGUISHED PROFESSOR

BIOCHEMISTRY DEPARTMENT

The Biochemistry Department was organized July 1, 1951. In the spring of 1951 the Accreditation Committee of the American Association of Medical Schools recommended that the Basic Science staff had to be expanded and that a Department of Biochemistry be established in the Medical School. Up to that time Physiological Chemistry was taught in the Chemistry Department. Wilbur F. Potter, Ph.D., M.D., Dean of School of Medicine and President John C. West, appointed W. E. Cornatzer, Ph.D., M.D. to be Professor and Chairman of the new department. Dr. Cornatzer obtained his Ph.D. in Biochemistry in 1944 and completed two years of Medicine from the University of North Carolina in 1946. He became Assistant Professor, Bowman Gray School of Medicine, 1946 to 1951 and completed his M.D. in June, 1951.

The objectives and goals of the Department of Biochemistry have been to create a center of excellence in Biochemistry and to excel in teaching, research and services.

The Department of Biochemistry was to be organized for the teaching of medical and graduate students and research. A laboratory for Clinical Chemistry was established to do analyses on bloods and urines for hospitals in the State. The Department's teaching facilities and research area were shared in the Physiology-Pharmacology Department. Plans were made for the expansion or doubling of the Basic Science Building. State funds were provided for teaching laboratory equipment, instrumentation, and the hiring of a second staff member, Dr. John P. Davidson, October 1, 1951. Dr. Davidson was a graduate of the University of Michigan, Biochemistry Department. A laboratory manual was written, chemicals and equipment ordered and a teaching laboratory for Medical Biochemistry was set up in the Physiology Department in time for the first class in September of 41 medical students. As part of the Clinical Chemistry Laboratory, the first flame photometer for sodium and potassium analyses in the State was placed in the new St. Michael's Hospital.

The Medical School received full accreditation in the fall of 1951. A Master's degree program was approved by the Graduate School and the first graduate student, Duane Gallo, enrolled. Duane Gallo had taken some graduate courses in the fall of 1951 in the Chemistry Department. He became a full-time graduate student on February 1, 1952, and was awarded a Research Fellowship with a \$2,000 stipend for 12 months. October 1, 1951, a \$27,400 grant was given by the North Dakota Cancer Society to study Metabolism in Experimental Cancer and provide permanent equipment for research and a radioactive isotope laboratory for the Department. These funds provided the first Geiger Counter in the State to do radioactive iodine uptake in patients in the Deaconess Hospital. On October 25, 1951, a \$17,450 grant from the U.S. Public Health to study the "Effect of Drugs and Hormones on the Phospholipide Turnover in Animals and Man" for two years and December 1, 1951, a grant from the U.S. Atomic Energy for \$22,572 to study "The Effects of Radiation on Functional Capacity of Tissue" were awarded to Dr. W. E. Cornatzer.

On June 16, 1952, Dr. Cornatzer was asked to contribute to a symposium at Johns Hopkins University, Vol. II, "Role of Phosphorus Metabolism in Plants and Animals", edited by W. D. McElroy and Bently Glass, Johns Hopkins Press.

In July 1952, Dr. Cornatzer was awarded a Travel Grant of \$740 to attend the Second International Congress of Biochemistry in Paris, France, July 21-27. He was one of eight young biochemists, out of 100 applicants, to receive the award given by the American Association of Biological Chemists.

The September 1952-53 Medical School Catalog listed the following Biochemistry courses:

Medical Biochemistry 333 - 7 credits; Food Chemistry 334 - 6 credits; Advanced Biochemistry 501-502 - 6 credits; Radioactive Tracers in Biochemistry 503 - 3 credits; Research in Biochemistry 510-511 - 2-6 credits; Seminar in Biochemistry 521-522 - 1 credit.

In the fall of 1952, Orlyn Engelstad became the first Graduate Teaching Assistant. In 1953 the Department of Biochemistry moved into the new Medical Science addition with 6,000 square feet of floor space for offices, research laboratories, a teaching laboratory with a walk-in coldroom. State funds were made available for the addition of a third staff member and three graduate students were enrolled. Fred Snyder, a graduate student, obtained the first three year Pre-doctorate Fellowship from the National Institutes of Health in 1955. The first U.S. Office of Education National Defense Education Act Fellowship was awarded to two graduate students, Virginia Zewe and Eric Glende for three years in 1960. Subsequently, four were awarded in 1962 and 1963. These funds provided, in addition, salary money for instructors, Dr. Carol L. Dahl, Dr. Mary Harsch and Dr. Akira Mochizuki. Dr. Mochizuki spent full-time in research working with Dr. Ya-Pin Lee. The first fellowship for medical students to do research in the summer months was awarded to the Department in 1954 for Ross D. Halliday by the National Institutes of Health.

The first National Science Foundation grant for undergraduate participation in research was awarded to the Department in 1959 to George Sarosi and Reed Keller. The first National Science Foundation Research Participation High School Teaching Training Fellowship was awarded in 1961 for 3 teachers, one each to Drs. Jacobs, Dr. Cornatzer, and Mrs. Luper. The National Institutes of Health awarded to the Department the first fellowship in 1959 for First-Year Medical Students to do research and obtain a Master's degree. David Rinn was awarded this fellowship. The National Institutes of Health awarded to the Department a Training Grant for graduate students working on their doctoral degree in 1962. These funds provided research fellowships for 8 students for 8 years.

On February 20, 1953, Guy and Bertha Ireland gave to the Department \$11,200 for scientific equipment for research. An instrument room in the new Medical Science Building which was under construction was designated the "Guy and Bertha Ireland Laboratory for Cancer Research". The laboratory was completed and dedicated on May 7, 1956, with a lecture entitled "Biochemistry of Energy Transfer" by Dr. Fritz Lipmann, Nobel Prize Laureate in Medicine and Physiology. In May 1957 Mrs. Bertha Ireland gave \$75,000 to the Ireland Research Laboratories. In November, the Department of Health, Education and Welfare gave \$75,000 for the construction of a first floor of 5,000 square feet of floor space for the Ireland Research Laboratory. Fifty thousand dollars from Medical Center State funds provided for the footings and other designs so that additional floors to the laboratory could be added later. The first floor provided two offices for additional staff, common centrifuge laboratory, and

radioisotope laboratory, walk-in coldroom and seven other research laboratories. The building was dedicated in February 1959 with a lecture by Dr. James Frederick Danielli, Kings College, London. Dr. Danielli is noted for his lipid bi-layer of membranes.

The Medical School Catalog in September, 1956, shows that Duane Gallo and Fred Snyder were Research Assistants. In September 1956 an undergraduate biochemistry course was first initiated. The course in 1982 has 70 undergraduates enrolled with a separate Biochemistry Laboratory course with 25 students enrolled. In Spring of 1956 Dr. Herbert J. Fromm taught the graduate course 508 Enzyme Chemistry.

In 1961 Dr. Cornatzer obtained from the Hill Foundation funds for first Hill Research Professorships of \$150,000 for salary for 11 years. Dr. Robert C. Nordlie, University of Wisconsin, Enzyme Institutes, accepted this appointment January 1, 1962. In September 1963 Dr. Nordlie received a grant from National Institutes of Health of \$13,404/year to study "Liver Pyrophosphatase-Phosphotransferase Activities". This was the beginning of his study of the enzyme glucose-6-phosphatase which regulates blood sugar. In 1963 Dr. Herbert J. Fromm received a National Institutes of Health Career Development Award. The Career Development Award made State funds available for the addition of the fifth staff member to the Department, Dr. Jerald L. Connelly. In September 1, 1963, he transferred his National Institutes of Health research grant of \$20,600 from University of West Virginia Medical School.

In 1962 Dr. Cornatzer obtained from the Hill Foundation in St. Paul, Minnesota, \$150,000 salary funds for a 10-year period for the establishment of a Second Hill Research Professor. Ya-Pin Lee, M.D., Ph.D., University of Wisconsin, Enzyme Institute accepted this position June 1, 1963. Dr. Lee transferred from the University of Wisconsin a \$12,370 grant from National Institutes of Health to study "Hormones on Carbohydrate Metabolism". In 1961, \$402,000 was awarded to Dr. W. E. Cornatzer from the National Cancer Institute for the construction of a three-floor addition to the Ireland Research Laboratory of 15,000 square feet of floor space in an open laboratory arrangement. Each floor has 10 research laboratory rooms with a central bench with five chemical hoods. The research work is to be carried out in enzymology, membrane permeability and lipid chemistry, ultra-structure of the cells, cancer viruses, drug metabolism, tissue culture, histochemistry and circulation of body fluids. Medical center funds provided \$30,000 for construction of the fourth floor and \$60,000 from a grant to Dr. Robert G. Fischer from National Cancer Institutes to provide a Viral Laboratory.

The goals of the Ireland Research Laboratory were to investigate the basic molecular biology of the cell during growth and development. The laboratory was completed in 1963 with dedication lectures given May 2 by Nobel Prize Laureates, Dr. W. Stanley and Dr. Arthur Kornberg. Mrs. Bertha Ireland endowed the Ireland Laboratory, July 24, 1963, with \$15,000 of securities. The income from these funds has provided guest lecturers (\$1350/year). In 1977 Dr. Cornatzer obtained the Robert Massee endowed Nutrition Lectureship of \$10,000 of Standard Oil securities. These funds provide \$850/year for an annual lecture in nutrition for the Medical School.

In July, 1967, Dr. Paul D. Ray joined the Department of Biochemistry as a staff member. He transferred from the University of Wisconsin, the American

Heart Established Investigatorship, a salary grant of \$86,000 for 6 years with additional funds for his research use. He also was awarded in 1967 from the National Institutes of Health a \$40,483 grant to study "Hormones on Carbohydrate Metabolism".

In 1967, Dr. Jerald L. Connelly, received a Career Development Award for 5 years from the National Institutes of Health. This provided his salary and freed State funds to hire an additional staff member, Dr. John E. Dyson. In 1968 Dr. Dyson received an equipment grant of \$3,036 from Research Corporation, Chicago and \$25,000 from the National Science Foundation to study "Chemical and Physical Properties of 6-Phosphogluconate Dehydrogenase".

On April 2, 1964, Dr. W. E. Cornatzer testified before the U.S. Senate Committee on Appropriations on "Expanded Program of Research in Food and Nutrition". In July 1962 Dr. Cornatzer was asked to be a member of the Human Nutrition and Consumer Use Research Advisory Committee, U.S. Department of Agriculture. In April, 1976, funds were made available by the U.S. Department of Agriculture for planning a Human Nutrition Laboratory to be built at the University of North Dakota from a bill introduced by Senator Milton Young. April 9, 1969, bids were let for the construction of this \$633,000 facility with a staff of 40 that will include 10 scientists with a \$500,000 per year operating budget. The original building had 20,640 square feet of floor space and in 1976 an additional 6,720 square feet of floor space was added. In September 15-17, 1970, the Human Nutrition Research Laboratory was dedicated with a Symposium of 17 scientists as speakers. This laboratory was the first major scientific center dedicated solely to the study of trace elements. Harold H. Sandstead, M.D., was appointed Director of the Laboratory. The Proceedings of the Symposium were published, as a book, Newer Trace Elements in Nutrition, edited by Dr. Walter Mertz and Dr. W. E. Cornatzer, 1971, Mercel Dekker, Inc., New York, pp. 438. The staff in the Human Nutrition Laboratory have appointments in the Biochemistry Department. Currently, the laboratory is being tripled in size. The total laboratory space available for research with the new addition is 75,685 square feet of floor space. In 1982, the laboratory has a 1 million dollar per year budget as a Cooperative Agreement with the University of North Dakota.

The National Institutes of Health Training Grant of 1962 and the beginning of the U.S. Office of Education National Defense Education Act Fellowship, along with Research Grant Fellowships, resulted in 30 full-time graduate students enrolled in 1967. Twenty graduate students or more were enrolled full-time each with a fellowship between 1963-1969. The staff has supervised between 1951-1982, sixty-four Master's degree theses and fifty-six Ph.D. dissertations. The names of Master's degree students and Ph.D. degree students, titles of theses and dissertations, staff advisory with year of graduation are given in Tables. In addition, the staff of the Department has trained twenty-one Post-doctorate students between the years of 1957-1982.

The staff has published 293 full-length publications from 1951-1982. This includes 26 contributions to books. The number of publications of each staff member is given in a table.

As recognition for research and creative work the Department of Biochemistry was awarded the "McDermott Award for Excellence in Research and Creative Work" on Founder's Day, February 1968. This was the first award given by

the University. The Department received this award again (\$1,500), for excellence in research and creative work at Founder's Day in 1981. Two of the staff were awarded Chester Fritz Distinguished Professorships, Dr. W. E. Cornatzer, 1973 and Dr. Robert C. Nordlie, 1974. The Society of Sigma Xi has awarded the following staff "Individual Excellence in Scientific Research", 1969 Dr. Robert C. Nordlie; 1970 Dr. W. E. Cornatzer; 1973 Dr. Ya-Pin Lee; and 1982 Dr. Francis A. Jacobs. The staff has served on numerous national scientific committees and have received many scientific awards (see listing under each staff member's name).

The total research grant funds for professorships and fellowships, awarded to staff for 1951 to 1982 is \$6,657,605. These monies have provided the funds for equipment, animals, supplies, and research fellowships for graduate and post-doctorate fellows. Not included in this is the funds for the construction of the Human Nutrition Laboratory.

The Professorship funds provided the salary money for Dr. Robert C. Nordlie, Hill Foundation Research Professor 11 years, Dr. Ya-Pin Lee, Hill Foundation Research Professor 10 years; Dr. Herbert J. Fromm, Career Development Award 4 years; Dr. Jerald L. Connelly, Career Development Award 6 years; and Dr. Paul D. Ray, American Heart Established Investigator 6 years. Clinical Chemistry funds provided part of the salary of Miltza Luper for 20 years.

A table is given showing the amounts of research funds awarded to the individual staff members.

The Biochemistry Training Grant funds (1962-1969), the Ireland Lecture Endowment, Robert Masee Endowed Nutrition Lectureship and Industry funds have provided 108 scientists to visit and lecture in the Biochemistry Department. There have been 9 Nobel Prize winners in this Biochemistry lecture series 1961-1982. The detailed list of these lectures is given.

Bibliography references of the staff in the Department of Biochemistry can be found in:

- Who's Who in America
- Who's Who in American Education
- Who's Who in the Midwest
- World Who's Who in Science from Antiquity to the Present
- Who's Who in the World
- American Men and Women of Science
- American Men of Medicine
- Chemical Who's Who
- Leaders in American Science
- Who's Who in North Dakota

Detailed information about the Department, research grant awards, and staff can be found in the bound volumes of Annual Reports sent to the Dean of the Medical School and President of the University.

BIOCHEMISTRY DEPARTMENT STAFF
1951 to 1982

| <u>Names</u> | <u>Highest Rank</u> | <u>Date of Appointment</u> |
|------------------------------|---|---|
| W. E. Cornatzer, Ph.D., M.D. | Professor and Chairman, Director, Ireland Research Laboratory (1962) Chester Fritz Distinguished Professor (1973) | July 1, 1951 |
| John Philip Davidson, Ph.D. | Assistant Professor | Oct. 1, 1951 to June 30, 1954 (resigned) |
| Francis A. Jacobs, Ph.D. | Professor | July 14, 1954 |
| Herbert J. Fromm, Ph.D. | Professor, Career Development Award (1963-66) | July 1, 1954 to June 30, 1966 (resigned) |
| Miltza Luper, M.S. | Assistant Professor | July 1, 1959 to June 30, 1980 (retired) |
| Robert C. Nordlie, Ph.D. | Professor Hill Research Professor (1962-1973) Chester Fritz Distinguished Professor (1974) | January 1, 1962 |
| Carol Lynn Dahl, M.S. | Instructor | Sept. 1, 1960 to June 15, 1962 (resigned) |
| Robert F. McGregor, Ph.D. | Instructor | May 1, 1961 to June 1, 1963 (resigned) |
| Mary Harsch, Ph.D. | Instructor | Aug. 23, 1962 to Aug. 23, 1963 (resigned) |
| Ya-Pin Lee, M.D., Ph.D. | Professor Hill Research Professor (1963-1973) | June 1, 1963 to Aug. 8, 1978 (deceased) |
| Jerald L. Connelly, Ph.D. | Professor Career Development Award (1967-1972) | June 1, 1963 to April 15, 1977 (resigned) |
| Paul D. Ray, Ph.D. | Professor American Heart Established Investigatorship (1967-1972) | July 15, 1967 |
| John E. Dyson, Ph.D. | Assistant Professor | July 1, 1968 to June 30, 1974 (resigned) |
| David O. Lambeth, Ph.D. | Associate Professor | July 1, 1977 |
| Harvey R. Knull, Ph.D. | Associate Professor | Sept. 15, 1980 |

TOTAL RESEARCH GRANTS, PROFESSORSHIPS AND FELLOWSHIPS
AWARDED TO STAFF 1951-1982

| | <u>Fellowships</u> | <u>Professorships</u> | <u>Research Grants</u> | <u>Total</u> |
|---|--------------------|-----------------------|------------------------|--------------|
| Dr. W. E. Cornatzer | \$ 922,208 | | \$1,805,951 | \$2,728,159 |
| Dr. Francis A. Jacobs | 29,979 | | 422,560 | 452,539 |
| Dr. Robert C. Nordlie | 53,066 | \$150,000 | 1,453,923 | 1,656,989 |
| Dr. Ya-Pin Lee (deceased, 1978) | | 150,000 | 377,849 | 527,849 |
| Dr. Jerald L. Connelly (resigned, 1977) | 24,050 | 213,925 | 195,260 | 433,235 |
| Dr. Paul D. Ray | | 92,000 | 378,893 | 470,893 |
| Dr. David O. Lambeth | | | 129,117 | 129,117 |
| Dr. Harvey R. Knull | | | 1,532 | 1,532 |
| Dr. Herbert J. Fromm (resigned, 1966) | 8,787 | 49,886 | 147,521 | 206,194 |
| Dr. John E. Dyson (resigned, 1974) | | | 51,098 | 51,098 |
| TOTALS: | \$1,038,090 | \$655,811 | \$4,963,704 | \$6,657,605 |

PUBLICATIONS OF STAFF - 1982

| | <u>Full-length Publications</u> | <u>Abstracts</u> | <u>Total</u> |
|---------------------------------------|-------------------------------------|------------------|--------------|
| Dr. W. E. Cornatzer | 137 | 85 | 222 |
| Dr. Robert C. Nordlie | 76 | 79 | 155 |
| Dr. Paul D. Ray | 24 | 25 | 49 |
| Dr. Francis A. Jacobs | 17 | 47 | 64 |
| Dr. David O. Lambeth | 12 | 7 | 19 |
| Dr. Harvey Knull | 28 | 22 | 50 |
| Dr. Ya-Pin Lee (deceased, 1978) | 30 | 10 | 40 |
| Dr. Jerald Connelly (resigned, 1977) | 17 | 18 | 35 |
| Dr. John E. Dyson (resigned, 1974) | 9 | 11 | 20 |
| Dr. Herbert J. Fromm (resigned, 1966) | 34 | 7 | 41 |
| Dr. John P. Davison (resigned, 1954) | <u>4</u> | <u>5</u> | <u>9</u> |
| | 388 | 316 | 704 |

CONTRIBUTIONS TO BOOKS BY STAFF - 1982

| | |
|------------------------|----------|
| Dr. W. E. Cornatzer | 6 |
| Dr. Robert C. Nordlie | 13 |
| Dr. Paul D. Ray | 3 |
| Dr. Herbert J. Fromm | 2 |
| Dr. Jerald L. Connelly | 1 |
| Dr. Francis A. Jacobs | <u>1</u> |
| | 26 |

BIOCHEMISTRY STAFF SCIENTIFIC AWARDS AND MEMBERSHIPS OF NATIONAL COMMITTEES

Dr. W. E. CORNATZER, MEMBERSHIPS OF NATIONAL COMMITTEES

1. American Chemical Society, Cooperative Examination Biochemistry, Examination Committee (1959).
2. Member of Board of Directors of American Board of Clinical Chemistry (1960-66).
3. National Board of Medical Examiners, Biochemistry Test Committee (1962-66).
4. Scientific Exhibit Committee for American Society of Biological Chemists (1959-1972).
5. Member of Human Nutrition and Consumer Use Research Advisory Committee, U.S. Department of Agriculture (1965-1968).
6. Council Member of American Association of Advancement of Science (1967-1969).
7. Panel Member for National Academy of Science, Predoctoral Graduate Fellowships (1967, 1968, 1969).
8. Member of National Science Foundation Evaluation Panel, National Science Foundation Grants (1960-61, 1968-69).
9. Chairman, Review Panel, Undergraduate Research Participation, National Science Foundation (1959-60).
10. Member of Organizing Committee on "Aging" for President Richard Nixon, White House Conference on Food, Nutrition and Health, December 2-4, 1969.
11. Member of Grant Review and site visit for Medical Research Council of Canada, University of Manitoba, 1970 and 1974.
12. Association of American Medical Colleges, Biochemistry Placement Test Committee (1970).
13. A member of the Board of Editors, Journal of Clinical Chemistry, 1971-1975, 1975-1980.
14. A member of the Board of Editors, Journal of Nutrition, 1975-1979.
15. Member of Review Panel, Human Nutrition Competitive Grants, U.S. Dept. of Agriculture, 1978, 1979, 1980.

DR. W. E. CORNATZER, NATIONAL SCIENTIFIC AWARDS AND HONORS

1. American Medical Association, Frank Billing, Award for Original Investigations. A silver medal for an exhibition on "The Role of Lipotropic Agents in Liver Disease", Atlantic City, 1951.
2. National Science Travel Award to the Second International Congress of Biochemistry, Paris, France, 1952.
3. American Association for Cancer Research Travel Award to the Seventh International Cancer Congress, London, England, July 6-12, 1958.
4. International Union of Physiological Science Travel Award to First International Congress of Pharmacology, Stockholm, August, 1961.
5. National Science Travel Award to the Seventh International Congress of Biochemistry, Tokyo, Japan, August 1967.
6. Picture Award 1976. Student American Medical Association.
7. American Institute of Nutrition Travel Award to Eighth International Congress of Nutrition, Prague, August, 1969.

8. Sigma Xi, University of North Dakota Outstanding Scientific Research Award, February 27, 1970.
9. Distinguished Service Award, Faculty of the University of North Carolina, School of Medicine, May, 1970.
10. American Institute of Nutrition Travel Award to Ninth International Congress of Nutrition, Mexico City, September, 1972.
11. Golden Apple Award Outstanding Professor, 1975, Student American Medical Association.
12. Distinguished Alumni Award, Bowman Gray Medical School, 1976.

DR. ROBERT C. NORDLIE, MEMBERSHIP OF NATIONAL COMMITTEES

1. Member of Examination Committee, Division of Biological Chemistry, American Chemical Society.
2. Chairman, Hudson Award Committee, American Chemical Society.
3. Member Midwestern Regional Research Advisory Committee, American Heart Association (1978-1982).
4. Member Editorial Board of the International Journal, *Biochimica et Biophysica Acta*, (1972 to present date), Managing Editor, Summer 1980.
5. Member of Biochemistry Study Section, Division of Research Grants, National Institutes of Health (1975-1979).
6. Member of National Institutes of Health Site Visit at Dept. of Biochemistry and Molecular Biology, University of CA, Irvine (1978); Dept. of Biochemistry, University of Chicago (Oct. 1979); Department of Pediatrics, Case Western Reserve University, Cleveland (1977); Dept. of Biochemistry, Case-Western Reserve and Dept. of Pediatrics, Univ. of Oregon (1978); Bronx N.Y. V.A. Hospital, Alcohol Unit (1981).
7. Member of National Research Council Post-doctoral Fellowship Review Panel, 1980.

DR. ROBERT C. NORDLIE, NATIONAL SCIENTIFIC AWARDS AND HONORS

1. Post-doctoral Fellow, National Cancer Institute, NIH (with Prof. Henry A. Lardy at Institute for Enzyme Research, University of Wisconsin), January 1960-Dec. 1961).
2. Recipient of Travel Grants from the American Society of Biological Chemists for the 7th, 8th and 9th International Congress of Biochemistry (Tokyo, 1967), (Lucerne, 1970), (Stockholm, 1973).
3. Sigma Xi, University of North Dakota Outstanding Scientific Research Award, February, 1969.
4. Golden Apple Award Outstanding Professor, 1968, Student American Medical Association.
5. Visiting Professor, San Marcos University, Lima, Peru, Jan.-Feb., 1982.

DR. PAUL D. RAY, MEMBERSHIP OF NATIONAL COMMITTEES

1. Member of the Arthritis, Metabolism and Digestive Diseases Study Section, National Institutes of Health (1967-1972).
2. Member of Great Plains Regional Review and Advisory Committee, American Heart Association 1974-1978; Chairman, 1977.

3. Member of American Heart Association, N.D. Affiliate Research Policy and Funding Working Group.

DR. PAUL D. RAY, NATIONAL SCIENTIFIC AWARDS AND HONORS

1. Post-doctoral Fellow of the American Cancer Society (1962-65).
2. Established Investigatorship of the American Heart Association (1967-1972).

DR. FRANCIS A. JACOBS, MEMBERSHIP OF NATIONAL COMMITTEES

1. Member of Panel to review grants for National Science Foundation, October 1962, 1976 and 1977.
2. Member of Panel for the National Science Foundation for Research Participation Program of High School and College Programs, 1964 and 1969.

DR. FRANCIS A. JACOBS, NATIONAL AWARDS AND HONORS

1. Post-doctoral Fellow of National Cancer Institutes, Bethesda, Maryland, 1949-1950.
2. National Cancer Institutes Travel Funds to attend Golden Research Conference, New London, NH, 1950.
3. New England Nuclear Corporation funds to attend Eleventh Symposium on Advances in Tracer Methodology, Boston, Massachusetts, Oct. 1966.
4. Travel Award from Western Hemisphere Nutritional Congress II, San Juan, Puerto Rico, 1968.
5. Travel Award from American Chemical Society to attend Regional Officer's Meeting, Zion, IL, Nov. 1970.
6. Travel Award to attend Western Hemisphere Nutrition Congress III, Bal Harbour, Florida, Aug. 30, 1971.
7. American Institutes of Nutrition Travel Award to attend the IX International Congress of Nutrition, Mexico City, Mexico, Sept. 3, 1972.
8. Travel Award, University Faculty Research Committee, International Symposium on Metabolic Effects of Alcohol, Milan, Italy, April 26, 1979.
9. Travel Award, University of North Dakota School of Medicine VA Fund, International Symposium on Biological Aspects of Metals and Metal Related Diseases, Toronto, Canada, October, 1981.
10. Sigma Xi, University of North Dakota Outstanding Scientific Research Award, February, 1982.

MEMBERSHIP IN THE AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS AND AMERICAN INSTITUTE OF NUTRITION REPRESENTS NATIONAL RECOGNITION OF ACCOMPLISHMENTS IN RESEARCH. THE FOLLOWING ARE DEPARTMENT MEMBERS AND YEAR ELECTED INTO MEMBERSHIP:

| <u>Staff</u> | <u>American Society Biological Chemists</u> | <u>American Institute of Nutrition</u> |
|------------------------------------|---|--|
| | Year | Year |
| Dr. W. E. Cornatzer | 1950 | 1960 |
| Dr. Robert C. Nordlie | 1963 | 1972 |
| Dr. F. A. Jacobs | 1961 | 1966 |
| Dr. Ya-Pin Lee (deceased) | 1963 | |
| Dr. Paul D. Ray | 1973 | |
| Dr. David O. Lambeth | 1979 | |
| Dr. Harvey Knull | 1982 | |
| Dr. Herbert J. Fromm (1954-1966) | 1959 | |
| Dr. Jerald L. Connelly (1963-1977) | 1969 | |

SECRETARIES, DEPARTMENT OF BIOCHEMISTRY (1951-1982)

| | |
|----------------------------|--------------|
| Barbara Nyhus | 1951 - 1956 |
| Jean Morton Beach | 1956 - 1965 |
| Marcia Skyberg Holeczy | 1964 - 1967 |
| Marlys Carlson Kennedy | 1965 to date |
| Sandra Sveningson Kirkland | 1968 - 1972 |
| Marla Carl Paulson | 1973 - 1975 |
| Diane Fay Peterka | 1973 - 1976 |
| Kathleen Ann Phelps | 1974 to date |
| Marlys M. Patterson | 1976 to date |
| Terry Lynn Rufo | 1979 - 1980 |
| Mary C. Asleson | 1979 to date |

M.S. DEGREES AWARDED FROM THE DEPARTMENT OF BIOCHEMISTRY
1951-1982

1. Duane G. Gallo (1952) Ph.D.*
2. Orlyn D. Engelstad (1953) M.D.
3. Fred L. Snyder (1955) Ph.D.
4. Miltza Luper (1956)
5. Robert C. Nordlie (1957) Ph.D.
6. Eli Kaplan (1957) Ph.D.
7. Lyle J. Coen (1958)
8. Sister Rita George (1958)
9. David A. Rinn (1959) M.D.
10. J. Michael Poston (1960) Ph.D.
11. Raymond C. Flaa (1960) M.D.
12. John H. Reiter (1960) Ph.D.
13. Will A. Sandstrom (1961) Ph.D.
14. Adolf H. Walser (1961) M.D.
15. Eric A. Glende (1962) Ph.D.
16. Virginia Z. Holten (1962) Ph.D.
17. William G. Tarnasky (1962) M.D.
18. Shuang-Shine Tsao (1962) Ph.D.
19. John N. Youngs (1962) M.D.
20. Kwane Buahene (1962) M.D.
21. Dale G. Makey (1963)
22. Frederick E. Varricchio (1964) Ph.D.
23. William J. Arion (1964) Ph.D.
24. Arlene H. Lang (1964)
25. Paul M. Bowden (1965)
26. Joe A. Bowden (1965) Ph.D.
27. Curtis H. Hallstrom (1965) Ph.D.
28. Dean J. Danner (1965) Ph.D.
29. Wayne B. Anderson (1965) Ph.D.
30. Joseph R. Sowokinos (1965) Ph.D.
31. James E. Miller (1965) Ph.D.
32. Lee-Jing Chen (1965) Ph.D.
33. Heng Chun Li (1965) Ph.D.
34. Thomas L. Hanson (1965)
35. James F. Soodsma (1965)
36. Jerald A. Bietz (1966)
37. Ming-hwei Wang (1966)
38. Michael L. McDaniel (1966) Ph.D.
39. Howard Haa-tu Hsu (1966) Ph.D.
40. James D. Johnson (1967) Ph.D.
41. Elwood E. Largis (1967) Ph.D.
42. Roy E. Snoke (1967) Ph.D.
43. Judy L. Evans (1967)
44. James R. Gilsdorf (1968) M.D.
45. Chung-Yuan Liu (1968) Ph.D.
46. Richard J. Paur (1968) Ph.D.
47. Tsun Wen Wang (1969) Ph.D.
48. Darrel J. Rytter (1969)
49. Mary F. Miller (1969)
50. Su-Mei Huang (1969)
51. Kathleen A. Ebert (1970)
52. Elizabeth B. Proctor (1971)
53. Richard Rottschafer (1971) M.D.
54. Robert A. Brunsvold (1972) M.D.
55. Patrick C. Choy (1972) Ph.D.
56. Ronald W. Bryan (1973) M.D.
57. Craig B. Fabel (1973) M.D.
58. John M. Haun (1973)
59. Thomas W. Winter (1975) M.D.
60. Thomas E. Thoreson (1975)
61. Wing Cheun Lau (1975) Ph.D.
62. Carol R. Overvold (1975)
63. Eric O. Uthus (1976) Ph.D.
64. James R. Maxwell (1976) Ph.D.
65. Fair A. Meeks (1976) M.D.
66. Harvey Hwang (1977) M.D.

*The degree after each name has subsequently been awarded.

GRADUATE DEGREES AWARDED FROM
THE DEPARTMENT OF BIOCHEMISTRY
1951-1982
Ph.D. Degrees

1. Duane G. Gallo (1955)
2. George Miroff (1957)
3. Fred L. Snyder (1958)
4. Robert C. Nordlie (1960)
5. Jerome E. Bakke (1960)
6. Dennis R. Nelson (1964)
7. Virginia Zewe Holten (1965)
8. Darold D. Holten (1965)
9. Eric A. Glende (1966)
10. William J. Arion (1966)
11. Shaung-Shine Tsao (1966)
12. Curtis H. Hallstrom (1967)
13. James E. Miller (1968)
14. Dean J. Danner (1967)
15. James F. Soodsma (1968)
16. Wayne B. Anderson (1968)
17. Joe A. Bowden (1968)
18. David G. Lygre (1968)
19. Thomas L. Hanson (1968) M.D. (1979)*
20. Joe R. Sowokinos (1969)
21. Jerry J. Baldwin (1969) M.D. (1972)*
22. Howard Haai-ta Hsu (1970)
23. Roy E. Snoke (1970)
24. Philip T. Johnson (1970)
25. Elwood E. Largis (1970)
26. Duane R. Myron (1970)
27. Douglas C. Johnson (1970) M.D. (1975)*
28. Richard N. Horne (1970)
29. J. Michael Poston (1970)
30. Gary W. Evans (1970)
31. Jonathan E. Craine (1971)
32. Wayne A. Johnson (1971)
33. Gene C. Ness (1971)
34. Ronald E. D'Orazio (1971)
35. John C. Crandall (1972)
36. Wesley H. Hanson (1972)
37. Frederick L. Alvares (1972)
38. David N. Skurdal (1973) M.D. (1977)*
39. Hans M. Gunderson (1974)
40. Kraig E. Lorenzen (1974) M.D. (1978)*
41. Patrick C. C. Choy (1975)
42. Charles A. Huibregtse (1976)
43. Francis K. M. Choy (1976)
44. William T. Johnson (1976)
45. Wilson D. Grant (1977)
46. Wing Cheun Lau (1978)
47. Sharon Jane Greeley (1979)
48. Roger Allan Jorgenson (1979)
49. Ching-hong Chen (1979)
50. Dennis Robert Hoffman (1979)
51. Gerald A. Rufo (1980)
52. Mark A. Yorek (1981)
53. Darrell W. Swank (1981)
54. Katherine A. Sukalski (1981)
55. Eric O. Uthus (1982)
56. Phillip Lee Stepanik (1982)

*The M.D. degree has subsequently been awarded.

ADVISOR FOR STUDENTS, TITLE OF MASTER'S THESIS AND YEAR OF GRADUATION
FOR M.S. DEGREES AWARDED FROM THE DEPARTMENT OF BIOCHEMISTRY (1952-1982)

| <u>Advisor</u> | <u>Student</u> | <u>Year</u> | <u>Title of Thesis</u> |
|----------------|----------------------------|-------------|--|
| Cornatzer | 1. Duane Gordon Gallo | 1952 | "Phospholipid and Nucleoprotein Metabolism in Experimental Cancer" |
| Cornatzer | 2. Orlyn Delvern Engelstad | 1953 | "Effect of Whole Body X-Irradiation on Liver Function" |
| Cornatzer | 3. Fred Leonard Snyder | 1955 | "Lipid Phosphorylation and Lipotropism" |
| Jacobs | 4. Miltza Luper | 1956 | "Studies on Glycine Absorption from Small Intestine, In Situ" |
| Fromm | 5. Robert C. Nordlie | 1957 | "Redistribution and Incorporation of Sulfur-Containing Amino Acid During the Healing of Experimental Wounds" |
| Cornatzer | 6. Eli Kaplan | 1957 | "Electrophoretic Analyses of Rat Serum Protein in Liver Disease" |
| Jacobs | 7. Lyle C. Coen | 1958 | "Effects of Pyridoxine on Absorption from the Small Intestine of the Rat" |
| Cornatzer | 8. Sister Rita George | 1958 | "Enzyme Studies on Myocardial Infarction and Pregnancy" |
| Cornatzer | 9. David A. Rinn | 1959 | "Chromatography of Phospholipids in Induced Nephrosis" |
| Jacobs | 10. J. Michael Poston | 1960 | "Effects of the B6-Vitamin and Their Phosphates in Intestinal Absorption of L-Methionine" |
| Jacobs | 11. Raymond C. Flaa | 1960 | "Effects of the B6-Vitamin and 2,4-Dinitrophenol on Intestinal Absorption of L-Tyrosine" |
| Cornatzer | 12. John H. Reiter | 1960 | "The Influence of Age on the Liver Phospholipid Metabolism of Mice" |
| Cornatzer | 13. Will A. Sandstrom | 1961 | "The Effect of Poliomyelitis Virus Type I on the Phospholipid Metabolism of the HeLaCell" |
| Cornatzer | 14. Adolph H. Walser | 1961 | "Chromatographic Separation of Liver Phospholipids During the Development of Dietary Cirrhosis in the Rat" |

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|-----------|-----|----------------------|------|---|
| Cornatzer | 15. | Eric A. Glende | 1962 | "The Role of Tranquilizers on Sulfalipid Metabolism" |
| Fromm | 16. | Virginia Zewe Holten | 1962 | "Kinetic Studies of Rabbit Muscle Lactic Acid Dehydrogenase" |
| Jacobs | 17. | William G. Tarnasky | 1962 | "Amino Acid Absorption and Uptake Studies in the Small Intestine of the Rat" |
| Cornatzer | 18. | Shuang-Shine Tsao | 1962 | "Lipid Phosphorylation in Mitochondria, Nuclei, and Microsomes of HeLa Cells with and without Polio-myelitis Virus" |
| Cornatzer | 19. | John N. Youngs | 1962 | "The Effects of Oxidative Phosphorylation Inhibitors on Rat Liver Mitochondrial Phospholipids" |
| Cornatzer | 20. | Kwame Buahene | 1962 | "Effect of Magnesium and Manganese Deficiencies on Synthesis of Heart and Liver Mitochondria Phospholipids" |
| Jacobs | 21. | Dale G. Makey | 1963 | "The Absorption and Distribution Phenylalanine in the Small Intestine of the Rat" |
| Nordlie | 22. | Frederick Varricchio | 1964 | "Hormonal and Metabolic Control of Rat Liver Mitochondrial Phosphoenolpyruvate Carboxykinase" |
| Nordlie | 23. | William J. Arion | 1964 | "Inorganic Pyrophosphatase and Pyrophosphate-Glucose Phosphotransferase Activities of Liver Microsomal Glucose 6-Phosphatase" |
| Jacobs | 24. | Arlene H. Lang | 1964 | "Transport of Amino Acid Mixtures in the Small Intestine of the Rat" |
| Jacobs | 25. | Paul M. Bowden | 1965 | "Effects of Ethionine Upon the Intestinal Absorption of Amino Acids" |
| Connelly | 26. | Joe A. Bowden | 1965 | "Isolation of Partial Characterization of Alpha-Ketoisocaproic Decarboxylase" |
| Connelly | 27. | Curtis H. Hallstrom | 1965 | "An Investigation of Some Factors Controlling the Time of Onset of Rat Liver Mitochondrial Swelling" |
| Connelly | 28. | Dean J. Danner | 1965 | "Studies on Rat Liver Mitochondrial Alpha-Ketoisovalerate Decarboxylase Activity" |

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|-----------|-----|---------------------|------|--|
| Jacobs | 29. | Wayne B. Anderson | 1965 | "Possible Relationship of the Transaminase Enzymes to the Intestinal Absorption" |
| Lee | 30. | Joseph R. Sowokinos | 1965 | "Phosphohydrolase in Microorganisms" |
| Cornatzer | 31. | James E. Miller | 1965 | "Composition and Rate of Synthesis of Individual Phospholipids in Sub-cellular Particles of Tissues During Pre- and Post-natal Development" |
| Lee | 32. | Lee-Jing Chen | 1965 | "Studies on NAD-Linked L-Glycerophosphate Dehydrogenase from Rat Liver" |
| Fromm | 33. | Heng-Chen Li | 1965 | "The Effect of pH on the Kinetics and Mechanisms of the Lactate Dehydrogenase Reaction" |
| Fromm | 34. | Thomas L. Hanson | 1965 | "Study of the Kinetics and Reaction Mechanism of Rat Skeletal Muscle Hexokinase" |
| Nordlie | 35. | James F. Soodsma | 1965 | "Rat Nucleotide--and Pyrophosphate--Glucose Phosphotransferase Activities Associated with Microsomal Glucose-6-Phosphatase" |
| Fromm | 36. | Jerald A. Bietz | 1966 | "Exchange Studies on the Rat Muscle Hexokinase Reaction" |
| Lee | 37. | Ming-Hwei Wang | 1966 | "Studies of 5'-Adenylic Acid Deaminase in Rat" |
| Jacobs | 38. | Michael L. McDaniel | 1966 | "An In Vitro Study of Active Intestinal Absorption of Amino Acids" |
| Lee | 39. | Howard Haai-ta Hsu | 1966 | "Some Species Differences in Response to Thyroid Hormone" |
| Cornatzer | 40. | James D. Johnson | 1967 | "Phospholipid Composition of Mitochondria and Microsomes of Liver and Kidney in Adrenalectomized, Hypophysectomized, and Alloxan Diabetic Rats" |
| Jacobs | 41. | Elwood E. Largis | 1967 | "Amino Acid Transport Via the Lymphatic System" |
| Nordlie | 42. | Roy E. Snoke | 1967 | "Comparative Studies of In Vitro Effects of Surface-Active Agents on the Response of Inorganic Pyrophosphate-Glucose Phosphotransferase, Glucose-6-Phosphatase and Inorganic Pyrophosphatase to Hormonal Administration and Deprivation" |

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|-----------|-----|------------------------|------|--|
| Connelly | 43. | Judith Lee Evans | 1967 | "Studies on the Relationship of Cellular Respiratory Activities of Mitochondrial Swelling" |
| Nordlie | 44. | James R. Gilsdorf | 1968 | "Liver Microsomal Inorganic Pyrophosphatase and Inorganic Pyrophosphate-Glucose 6-Phosphotransferase: Alterations in pH: Activity Profiles in Response to Various Hormonal Conditions" |
| Lee | 45. | Chung-Yuan Liu | 1968 | "The Effects of Thyroid and/or Hydrocortisone on Free Fatty Acids, Fatty Acid Esters, Phospholipids, and Cholesterol in Blood Plasma of the Rat, Guinea Pig, and Chicken" |
| Nordlie | 46. | Richard J. Paul | 1968 | "Studies on the Effects of Glycolytic Intermediates on the Synthetic and Hydrolytic Activities of Liver Microsomal Glucose 6-Phosphatase" |
| Lee | 47. | Tsun-Wen Wang | 1969 | "Effects of Thyroid Hormone In Vivo on Ehrlich Ascites Carcinoma Cells and Tumor-Host Relationship" |
| Cornatzer | 48. | Darrel J. Rytter | 1969 | "Metabolism of the Various Lecithins in Tumors" |
| Cornatzer | 49. | Mary F. Miller | 1969 | "Effect of Ethanol Ingestion on Liver Mitochondrial and Microsomal Phosphatidyl Choline Fractions" |
| Nordlie | 50. | Su-Mei Huang | 1969 | "The Effects of Amino Acids, Inhibitors, and Substrates on the Thermal Stability of Microsomal Glucose 6-Phosphate Phosphohydrolase" |
| Ray | 51. | Kathleen A. Ebert | 1970 | "Enzymes Involved in Gluconeogenesis in Rabbit Liver" |
| Nordlie | 52. | Elizabeth B. Proctor | 1971 | "Studies on the Differential Responses of Synthetic and Hydrolytic Activities of Liver Microsomal Glucose 6-Phosphatase to Glucocorticoid Therapy and Experimental Diabetes" |
| Lee | 53. | Richard D. Rottschafer | 1971 | "Effects of Methionine on the Action of Thyroxine" |
| Ray | 54. | Robert A. Brunsvold | 1972 | "Dietary and Hormonal Regulation of Enzymes Involved in Hepatic Gluconeogenesis in Rabbits" |

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|-----------|-----|--------------------|------|--|
| Lee | 55. | Patrick C. Choy | 1972 | "Immunological Difference of NAD-linked L-glycerol-3-phosphate Dehydrogenase in Rabbit and Rat Tissues" |
| Cornatzer | 56. | Ronald W. Bryan | 1973 | "Effect of Ethanol on Phospholipid Metabolism" |
| Nordlie | 57. | John M. Haun | 1973 | "Glucose 6-Phosphate Phosphohydro-lase Activity in the Vertebrate Brain" |
| Jacobs | 58. | Craig B. Fabel | 1973 | "Effects of Ethanol on Amino Acid Absorption by the Rat Small Intestine" |
| Jacobs | 59. | Thomas W. Winter | 1975 | "Intestinal Lymph as Affected by Two Dietary Parameters: Ethanol and Zinc Deficiency" |
| Connelly | 60. | Thomas E. Thoreson | 1975 | "Effect of Nucleotide Compounds on Branched-Chain Keto Acid Dehydro-genase in Rat Liver Mitochondria" |
| Lee | 61. | Wing Cheun Lau | 1975 | "The Role of Thyroid Hormone in the Plasma Phospholipid Levels of the Guinea Pig and Rat" |
| Jacobs | 62. | Carol Overvold | 1975 | "Effects of Age and Ethanol on Intestinal Amino Acid Absorption in the Rat" |
| Cornatzer | 63. | Eric O. Uthus | 1976 | "The Effects of Diet and Alcohol on Phosphatidyl Ethanolamine Methyl-transferase and Choline Phosphotrans-ferase Activity in Liver Microsomes" |
| Ray | 64. | James R. Maxwell | 1976 | "Response of Hepatic Phosphoenol-pyruvate Carboxykinase to Fe^{2+} Activation and Quinolate Inhibition" |
| Nordlie | 65. | Fair A. Meeks | 1976 | "The Differential Effects of Alloxan-Induced Diabetes and Hydrocortisone Administration on the Synthetic and Hydrolytic Activities of Glucose-6-Phosphatase in Rat Liver Nuclei" |
| Lee | 66. | Harvey Hwang | 1977 | "Effect of Thyroid Hormone on Neutral Lipid Metabolism of the Guinea Pig" |

ADVISOR FOR STUDENTS, TITLE OF DISSERTATION AND YEAR OF GRADUATION FOR
Ph.D. DEGREES AWARDED FROM THE DEPARTMENT OF BIOCHEMISTRY, 1955-1982

| <u>Advisor</u> | <u>Student</u> | <u>Year</u> | <u>Title of Dissertation</u> |
|----------------|-------------------------|-------------|---|
| Cornatzer | 1. Duane Gordon Gallo | 1955 | "Phospholipid Metabolism in Cellular Fractions" |
| Cornatzer | 2. George Miroff | 1957 | "Phosphorus Metabolism of C3H Ascites Tumor Cells" |
| Cornatzer | 3. Fred L. Snyder | 1958 | "Sulfur Metabolism in Toxic and Nutritional Hepatic Injury" |
| Fromm | 4. Robert C. Nordlie | 1960 | "Studies on the Kinetics and Reaction Mechanism of the Ribitol Dehydrogenase Enzyme System" |
| Cornatzer | 5. Jerome E. Bakke | 1960 | "Metabolism of Brain and Liver Sulfatides" |
| Cornatzer | 6. Dennis R. Nelson | 1964 | "The Effects of Various Drugs and Hormones on Rat Liver Kidney and Heart Nuclear and Mitochondrial Phospholipids" |
| Fromm | 7. Virginia Zewe Holten | 1965 | "pH Studies of Rabbit Muscle Lactate Dehydrogenase" |
| Nordlie | 8. Darold D. Holten | 1965 | "Comparative Studies of Guinea Pig Liver Intra- and Extramitochondrial Phosphoenolpyruvate Carboxykinase" |
| Cornatzer | 9. Eric A. Glende | 1966 | "The Effects of Dietary Choline-Deficiency and Age on the Fatty Acid Composition of Rat Tissue Lipids" |
| Nordlie | 10. William J. Arion | 1966 | "A Comparative Study of the Responses of Synthetic and Hydrolytic Activities of Liver Microsomal Glucose 6-Phosphatase to Adrenalectomy, Glucocorticoid Therapy, and Fasting" |
| Cornatzer | 11. Shuang-Shine Tsao | 1966 | "Phospholipid Metabolism in Tissue Culture Cells" |
| Connelly | 12. Curtis H. Hallstrom | 1967 | "Characterization of the Role of Some Factors Regulating the Time of Onset of Rat Liver Mitochondrial Swelling" |
| Cornatzer | 13. James E. Miller | 1968 | "Effects of Induced-Fatty Liver and Age, Sex, and Species Differences on Liver Mitochondrial and Microsomal Phosphatidyl Cholines" |

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|-----------|-----|---------------------|------|---|
| Connelly | 14. | Dean J. Danner | 1968 | "The Effect of Alloxan Diabetes and Insulin Treatment In Vitro on Various Energy Requiring Processes in Rat Liver Mitochondria" |
| Nordlie | 15. | James F. Soodsma | 1968 | "Studies of the Effects of Phlorizin and Cetrimide on the Synthetic and Hydrolytic Activities of Rat Kidney Glucose 6-Phosphatase" |
| Nordlie | 16. | Wayne B. Anderson | 1968 | "The Effects of Anions on Glucose Dehydrogenase and Glucose-6-P Dehydrogenase Activities of the Yeast Enzyme" |
| Connelly | 17. | Joe A. Bowden | 1968 | "Evidence for the Common Identity of alpha-Ketoisocaproic and alpha-Keta-beta-Methylvaleric Acid Dehydrogenase of Beef Liver" |
| Nordlie | 18. | David G. Lygre | 1969 | "Phosphohydrolase and Phosphotransferase Activities of Rabbit Intestinal Glucose 6-Phosphatase" |
| Nordlie | 19. | Thomas L. Hanson | 1968 | "Effects of Lysolecithin, Long-Chain Fatty Acyl Coenzyme A Esters, Fatty Acids and Nucleotides on the Activities of Liver Microsomal Glucose 6-Phosphate" |
| Lee | 20. | Joseph R. Sowokinos | 1969 | "Studies on the Purification, Catalytic, and Physicochemical Properties, and Biosynthesis of Sugar Phosphate Phosphohydrolase in <u>Nesseria Meningitidis</u> " |
| Cornatzer | 21. | Jerry J. Baldwin | 1969 | "Rat Kidney Glycerylphosphorylcholine Diesterase" |
| Lee | 22. | Howard T. Hsu | 1970 | "Studies of the Nature of Species and Organ Specificity in Response to Thyroid Hormone" |
| Nordlie | 23. | Roy E. Snoke | 1970 | "Responses of the Synthetic and Hydrolytic Activities of Hepatic Glucose 6-Phosphatase to Lipid Modification" |
| Nordlie | 24. | Philip T. Johns | 1970 | "Studies on the Nature of Catalysis by Glucose 6-Phosphatase" |
| Jacobs | 25. | Elwood E. Largis | 1970 | "Transport of Amino Acids and Glucose into Mesenteric Lymph" |

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|-----------|-----|----------------------|------|---|
| Connelly | 26. | Duane R. Myron | 1970 | "Studies on the Morphology and Chemistry of the Swelling Process in Rat Liver Mitochondria" |
| Ray | 27. | Douglas C. Johnson | 1970 | "Hepatic Gluconeogenesis in Rabbits" |
| Nordlie | 28. | Richard N. Horne | 1970 | "Effects of Nucleotides and Inorganic Anions on Yeast and Rat Liver Glucose Dehydrogenase Activities" |
| Nordlie | 29. | J. Michael Poston | 1970 | "Studies on the Conversion of CO ₂ to Acetate by Cell-Free Extracts of <u>Clostridium Thermoaceticum</u> " |
| Cornatzer | 30. | Gary W. Evans | 1970 | "The Biological Regulation of Copper Homeostasis in the Rat" |
| Lee | 31. | Jonathan E. Craine | 1971 | "The Partial Purification and Characterization of Rabbit Liver NAD-Linked L-alpha-Glycerophosphate Dehydrogenase" |
| Nordlie | 32. | Wayne A. Johnson | 1971 | "Studies on the Mutual Influences of Substrates on Mammalian alpha-Keto Acid Metabolism" |
| Lee | 33. | Gene C. Ness | 1971 | "Specific Effects of Thyroid Hormones on Amino Acid Distribution and Metabolism" |
| Dyson | 34. | Ronald E. D'Orazio | 1971 | "I. Partial Purification of Bovine Brain Phosphofructokinase. II. Kinetic Parameters, Inhibition and Activation Studies of Isolated Sheep Liver 6-Phosphogluconate Dehydrogenase" |
| Jacobs | 35. | John Crandall | 1972 | "Effects of Ethanol on Methionine Transport by the Rat Intestine" |
| Dyson | 36. | Wesley H. Hanson | 1972 | "6-Phosphogluconate Dehydrogenase from Sheep Liver: Isolation, Amino Acid Composition, Modification of Sulfhydryl Groups with Organic Mercurials, and Protection Against Modification by Substrates and Inhibitors" |
| Nordlie | 37. | Frederick L. Alvares | 1972 | "The Relationship between Tryptophan Metabolism and the Regulation of Hepatic Gluconeogenesis in Diabetic Rats" |
| Cornatzer | 38. | David N. Skurdal | 1973 | "The Effect of Ethanol Ingestion on Liver Microsomal Phosphatidyl Choline Biosynthesis" |

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|-----------|-----|-----------------------|------|---|
| Nordlie | 39. | Hans M. Gunderson | 1974 | "Multifunctional Glucose-6-Phosphatase Phosphotransferase: Interrelationships Between Membrane Integrity and Catalytic Behavior" |
| Dyson | 40. | Kraig E. Lorenzen | 1974 | "An Investigation of the Physical and Chemical Parameters of Sheep Liver-6-Phosphogluconate Dehydrogenase" |
| Lee | 41. | Patrick C. C. Choy | 1975 | "Purification, Physicochemical and Some Catalytic Properties of NAD-linked L-glycerol-3-phosphate Dehydrogenase from Rabbit Heart" |
| Ray | 42. | Charles A. Huibregtse | 1975 | "Pathways and Regulation of Hepatic Gluconeogenesis in Rabbits" |
| Lee | 43. | Francis Y. M. Choy | 1976 | "Sugar Phosphate Phosphohydrolase of Microorganisms" |
| Nordlie | 44. | William T. Johnson | 1976 | "The Differential Effects of Cu^{2+} on Multi-functional Glucose-6-Phosphatase" |
| Connelly | 45. | Wilson D. Grant | 1977 | "Partial Purification and Characterization of alpha-ketoisocaproate Oxygenase" |
| Lee | 46. | Wing Cheun Lau | 1979 | "Effects of Fluoride, Molybdate and Tartrate on Sugar Phosphate Phosphohydrolase from <u>Escherichia coli</u> and <u>Neisseria Meningitidis</u> " |
| Sanstead | 47. | Sharon Jane Greeley | 1979 | "Marginal Zinc Nutrition in the Pregnant Rat: Effects on Certain Aspects of Metabolism" |
| Nordlie | 48. | Roger Allan Jorgenson | 1979 | "Multifunctional Glucose-6-Phosphates as Studied in the Isolated Rat Liver Cell" |
| Lee | 49. | Chin-hon Chen | 1979 | "Purification, Some Physicochemical and Catalytic Properties of Hepatic Mitochondrial L-Glycerol 3-Phosphate Dehydrogenase from Normal and Hyperthyroid Rats" |
| Cornatzer | 50. | Dennis Robert Hoffman | 1979 | "Studies on the Methylation of Phosphatidylethanolamine" |
| Ray | 51. | Gerald A. Rufo | 1980 | "Hormone Action on Carbohydrate Metabolism in Rabbit Liver" |
| Ray | 52. | Mark A. Yorek | 1981 | "The Influence of Hormones, α^- and β^- Adrenergic Effectors on Carbohydrate Metabolism in Isolated Rabbit Hepatocytes" |

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|---------|-----|-----------------------|------|--|
| Lambeth | 53. | Darrell W. Swank | 1981 | "Studies of the Azasulfonium Functionality: The Cyclization of Methionine and Other 3 ⁻ (amino) Thioethers to Form Isothiazolidinium Salts" |
| Nordlie | 54. | Katherine A. Sukalski | 1981 | "Mechanisms of Glucose Utilization in Isolated Perfused Rat Livers" |
| Nielsen | 55. | Eric O. Uthus | 1982 | "Arsenic: Analytical Procedure to Determine its Total Content in Biological Samples and Signs of its Deprivation in Rats and Chicks" |
| Nordlie | 56. | Phillip Lee Stepanik | 1982 | "Studies on Liver Glucose-6-P Phosphatase and Glucokinase" |

FULL-TIME GRADUATE
STUDENTS ENROLLED IN BIOCHEMISTRY

| <u>Year</u> | <u>Number of Students</u> (1958-1981) |
|-------------|--|
| 1981 | 11 |
| 1980 | 9 |
| 1979 | 9 |
| 1978 | 10 |
| 1977 | 11 |
| 1976 | 15 |
| 1975 | 15 |
| 1974 | 17 |
| 1973 | 14 |
| 1972 | 11 |
| 1971 | 15 |
| 1970 | 15 |
| 1969 | 23 |
| 1968 | 29 |
| 1967 | 30 |
| 1966 | 25 |
| 1965 | 26 |
| 1964 | 22 |
| 1963 | 29 |
| 1962 | 15 |
| 1961 | 10 |
| 1960 | 5 |
| 1959 | 5 |
| 1958 | 5 |

POST-DOCTORATE TRAINING--THE STAFF OF THE DEPARTMENT HAS TRAINED 21 POST-DOCTORATE STUDENTS:

LIST OF POST-DOCTORATES TRAINED IN BIOCHEMISTRY (1957-1982):

1. George Miroff, Ph.D., Univ. of North Dakota, 1957. 1957-1960, research with Dr. W. E. Cornatzer.
2. Akira Mochizuki, M.D., Shinshi University, 1950, Japan. 1963-1965, research with Dr. Ya-Pin Lee.
3. Tunekazu Takahasi, M.D., Nippon Medical School, Tokyo, Japan. 1955. 1964-1965 research with Dr. Ya-Pin Lee.
4. Simon Chin-Kong Wong, Ph.D., University of North Dakota, 1966. 1966-1967 research work with Dr. Ya-Pin Lee.
5. Peter Bally, Ph.D., Bern, Switzerland, 1967-1968 research work with Dr. Robert C. Nordlie.
6. Antonio L. Vianna, M.D., Buenos Aires, Argentina, 1969-1969 research work with Dr. Robert C. Nordlie.
7. James D. Lueck, Ph.D., University of Rochester, 1969. 1969-1971 research work with Dr. Robert C. Nordlie.
8. Thomas L. Hanson, M.S., Ph.D., University of North Dakota, 1968. 1969-1969 research work with Dr. Robert C. Nordlie.
9. William Colilla, Ph.D., Southern Illinois University, 1970. 1970-1974, research work with Dr. Robert C. Nordlie.
10. John Lee Herrman, Ph.D., Washington State University, 1970. 1970-1972 research work with Dr. Robert C. Nordlie.
11. Allura S. Reddi, Ph.D., Sri Venkateswar University, India, 1971. 1972-1973 research work with Dr. Ya-Pin Lee.
12. Frederick L. Alvares, Ph.D., University of North Dakota, 1972. 1972-1978 research work with Dr. Robert C. Nordlie.
13. David Skurdal, Ph.D., University of North Dakota, 1973. 1973-1974, research work with Dr. W. E. Cornatzer.
14. Kraig E. Lorenzen, Ph.D., University of North Dakota, 1974. 1974-1975 research work with Dr. Robert C. Nordlie.
15. Thomas Johnson, Ph.D., University of North Dakota, 1976. 1976-1977, research work with Dr. Robert C. Nordlie.
16. Roger A. Jorgenson, Ph.D., University of North Dakota, 1979. 1979 to Sept. 1980, research work with Dr. Robert C. Nordlie.

17. Dennis R. Hoffman, Ph.D., University of North Dakota. 1979 to Nov. 15, 1980, research work with Dr. W. E. Cornatzer.
18. Jasbir Singh, Ph.D., University of Otago, New Zealand, Sept. 15, 1980 to present date, research work with Dr. Robert C. Nordlie.
19. Mark A. Yorek, Ph.D., University of North Dakota, 1981. May 15-Aug. 31, 1981, research work with Dr. Paul D. Ray.
20. Darrel W. Swank, Ph.D., University of North Dakota, 1982. Jan to May 1982, research work with Dr. David O. Lambeth.
21. Katherine A. Sukalski, Ph.D., University of North Dakota, 1982. Jan. 1982 to present, research work with Dr. Robert C. Nordlie.

BIOCHEMISTRY DEPARTMENT LECTURE SERIES FOR MEDICAL STUDENTS,
GRADUATE STUDENTS, AND MEDICAL SCHOOL FACULTY. (1961-1982)

Speakers for the 1961-1962 series included: Fritz Lipmann (Rockefeller, Halvor H. Christensen (Michigan), and Sam Kirkwood (Minnesota).

Speakers for the 1962-1963 series included: Paul Boyer (Univ. of Minn.), E. P. Kennedy (Harvard), G. R. Brown (Sloan Kettering, Inst. for Cancer Res.), F. Putnam (Univ. Florida), P. B. Hagen (Univ. Manitoba), H. Lardy (Enzyme Institute, Univ. Wis.), W. Stanley (Univ. Calif.) and A. Kornberg (Stanford).

Speakers for the 1963-1964 series included: R. C. Bushland (U.S. Dept. of Agriculture), N. O. Kaplan (Brandeis Univ.), H. D. Brunner (A.E.C., Wash., D.C.), D. J. Hanahan (Univ. Wash.), D. E. Green (Inst. Enz. Res., Madison, Wis.), E. Racker (Pub. Health Res. Inst., N.Y., N.Y.), A. Cantarow (Jefferson Med. College, Phila.), J. F. Danielli, (State Univ. N.Y., Buffalo, N.Y.), S. Weinhouse (Fels Res. Inst., Temple Univ., Phila.).

Speakers for the 1964-1965 series included: Merton F. Utter (Western Reserve), Frank Huennekens (Scripps Clinic), Herbert E. Carter (Illinois), Oscar Touster (Vanderbilt) Konrad Bloch (Harvard), Camillo Artom (Bowman Gray).

Speakers for the 1965-1966 series included: Harland Wood (Western Reserve), Claude A. Ville (Harvard), Henrik Dam (Copenhagen), Edmund S. Nasset (Univ. Rochester), David M. Greenberg (Univ. Calif.).

Speakers for the 1966-1967 series included: K. Bruce Jacobson (Oak Ridge National Laboratory), Carl S. Vestling (Iowa), Albert Lehninger (Johns Hopkins), Joseph Larner (Minnesota), Halvor H. Christensen (Michigan), Robert A. Harte (Am. Soc. Biological Chemists), and LaVell Henderson (Minnesota).

Speakers for the 1967-1968 series included: Jordi Folch-Pi (Harvard), Martin Morrison (Univ. of Tennessee, Medical School), Ralph T. Holman (Hormel Institute), William D. McElroy (Johns Hopkins), Henry Lardy (Univ. of Wisconsin), Kenkichi Tomita (Japan), William E. Lands (Michigan), A. Baird Hastings (Harvard).

Speakers for the 1968-1969 series included: Abraham White (Albert Einstein College of Medicine), Ralph A. Nelson (Mayo Clinic), Bernard L. Horecker (Albert Einstein College of Medicine), Robert C. Baldrige (Temple), Frederick John Stare (Harvard), Eugene H. Cordes (Univ. of Indiana), Ernst A. Noltmann (California), Laurens Van Deenen (Netherlands), Robert W. Holley (Cornell-Salk Institute).

Speakers for the 1969-1970 series included: Robert I. Henkin (National Heart Institute), Ear. R. Stadtman (National Heart Institute), Robert E. Olson (St. Louis University), Hector F. DeLuca (University of Wisconsin), Van R. Potter (University of Wisconsin).

Speakers for the 1970-1971 series included: E. J. Underwood (Univ. of Western Australia, Nedlands), D. M. Hegsted (Harvard University), B. L. Vallee (Harvard Univ.), M. S. Scott (Cornell University), O. A. Levander

(Agricultural Res. Service, Beltsville, Maryland), J. Parizek (Czechoslovak Acad. of Sciences, Prague), W. A. Gortner (Agricultural Res. Service, Beltsville, Maryland), B. L. O'Dell, (Univ. of Missouri), Walter Mertz (Agricultural Res. Service, Beltsville, Maryland), R. J. Doisy (N.Y. State Univ., Syracuse), K. M. Hambidge (Univ. of Colorado), Leon L. Hopkins (Agricultural Res. Service), F. H. Nielsen (Agricultural Research Service), Robert A. Henkin (National Heart/ Lung Institute), W. A. Gordon (NASA, Cleveland), M. L. Taylor (Aerospace Research Lab., Wright Patterson Air-Force Base), W. W. Harrison (Univ. of Virginia).

Speakers for the 1971-1972 series included: Paul Walter (Univ. Bern), Nelson D. Goldberg (Minnesota), George V. Mann (Vanderbilt), Ronald L. Hanson (Harvard), M. C. Blanchaer (Manitoba), Charles H. Best (Toronto).

Speakers for the 1973-1974 series included: David Law (Univ. of New Mexico Med. Sch.), Hamish Munro (Mass. Inst. Technology).

Speakers for the 1974-1975 series included: Grace A. Goldsmith (Tulane), Christian deDuve (Rockefeller Univ.).

Speakers for the 1975-1976 series included: Mark D. Hegsted (Harvard).

Speakers for the 1976-1977 series included: Dennis P. Burkitt (St. Thomas Hospital Med. Sch., London), Eric J. Underwood (Univ. of Western Australia), Henry Lardy (Univ. of Wisconsin).

Speakers for the 1978 series included: Merton F. Utter (Case Western Reserve as a Wellcome Visiting Professor for 3 days (\$1773 grant), Gilbert A. Leveille (Michigan State Univ.), Darold D. Holten (Univ. of California), Wayne B. Anderson (National Cancer Institute).

Speakers for the 1979 series included: Philip P. Cohen (Univ. of Wisconsin)--AOA four day visiting professor), Alfred E. Harper (Univ. of Wisconsin), Andrew V. Schally (Veterans Administration, New Orleans).

Speakers for the 1980 series included: Julius Axelrod (National Institute of Mental Health), Boyd L. O'Dell (Univ. of Missouri), Ken Tomita (Univ. of Kyoto, Japan).

Speakers for the 1981 series included: John Lenard, Douglas Miller (Rutgers Med. Sch.), Julius Adler (Univ. of Wisconsin), Bengt E. Gustafsson (Karolinska Institute) Stockholm, E. Thackery Pritchard (Univ. of Manitoba), Victor Herbert (State Univ. of N.Y. Downstate Medical Center), Fred Snyder (Oak Ridge Associated Universities).

Speakers for the 1982 series include: J. R. Prohaska (Univ. of Minnesota Med. Sch.), Patrick C. Choy (Univ. of Manitoba), Jim Buckner (Metabolism and Radiation Research Laboratory).

HUMAN NUTRITION RESEARCH CENTER, U.S. DEPARTMENT OF AGRICULTURE
(1982)

HAROLD H. SANDSTEAD, M.D., Research Professor of Biochemistry, Director,
Human Nutrition Laboratory.

LESLIE KLEVAY, M.D., D.S. in Hygiene, Research Instructor, Biochemistry,
Research Medical Officer.

FORREST H. NIELSEN, Ph.D., Research Instructor, Biochemistry, Research
Chemist.

GARY EVANS, Ph.D., Research Instructor, Biochemistry, Research Chemist.

WILLIAM T. JOHNSON, Ph.D., Post-doctorate Research Associate, Biochemistry.

WING CHEUN LAU, Ph.D., Post-doctorate Research Associate, Biochemistry.

PUBLICATION OF FULL-LENGTH MANUSCRIPTS, NOT INCLUDING ABSTRACTS OR WORK IN PROGRESS, FROM THE DEPARTMENT OF BIOCHEMISTRY, GUY AND BERTHA IRELAND RESEARCH LABORATORY, UNIVERSITY OF NORTH DAKOTA SCHOOL OF MEDICINE, 1951-1982:

1. "Phospholipid Metabolism in Human Liver Disease", W. E. Cornatzer, Symposium of Phosphorus Metabolism", Vol. 2, 243-245, edited by W. E. McElroy and Bentley Glass, Johns Hopkins Press (1952).
2. "Biological Effects of Radiation and the Factors which Influence Recovery", W. E. Cornatzer, *Journal-Lancet* 2, 403-409 (1952).
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CLINICAL CHEMISTRY LABORATORY

Dr. W. E. Cornatzer set up a Clinical Chemistry Laboratory in the area of service for hospitals, clinics and physicians. Dr. Cornatzer became a licensed Clinical Chemist in 1952 and served on the National Board of Certification of Clinical Chemists in the U.S. (1960-1966). This laboratory did clinical chemistry analyses on urines and bloods. Special chemistry analyses were set up so that blood and urine samples would not have to be sent out of state; this reduced the turn around time necessary to report the laboratory data. This laboratory was the first in the state to determine serum sodium and potassium by flame photometry, serum electrophoresis, serum protein immunoelectrophoresis, serum lipoproteins, serum triglycerides, SGOT and SGPT, serum triglycerides, serum isoenzymes, urine 17-ketosteroids, serum protein bound iodine, radio-immunoassay for hormones, serum magnesium, urinary estrogens and many others. The Clinical Chemistry Laboratory did 5,000 to 7,000 tests annually. The income from these laboratory tests provided funds to the Department of Biochemistry for chemicals, equipment, travel, postage, salaries and other unexpected expenditures for over 25 years.

Miltza Luper, a registered medical technologist, who has a Master's degree in Biochemistry, supervised this laboratory (1959-1980). She set up and tested new procedures for clinical chemistry as they appeared in the literature. The laboratory was accredited and licensed both by the federal government and State of North Dakota (1967-1980). The Federal Government passed a law of licensure of clinical chemistry laboratories in 1967. The following is a list of medical technologists who worked in this laboratory:

MEDICAL TECHNOLOGISTS IN CLINICAL CHEMISTRY 1953-1982:

| | |
|------------------------|----------------------------------|
| Carol Simonson Goven | 1953-1954 |
| Myra Janke Rada | 1956-1960 |
| Marilyn Bates Merbach | 1957-1958 |
| Carol Arter Brown | 1958-1960 |
| Marcia Rhodes Anderson | 1959-1960, 1968-1969 |
| C. Wendell Pope | 1958-1960 |
| Jo Lobb Ebentier | 1959-1960 |
| Virginia Garrett | 1960-1964 |
| Marilyn Elofson | 1960-1962 |
| Ruth Kylo | 1960-1963 |
| Marilyn E. Thibeault | 1962-1966 |
| Carole Gregoire | 1963-1966, 1971-1975, 1981, 1982 |
| Mrs. Charles Bassom | 1965-1966 |
| Karen Oren | 1965-1968 |
| Meredith Dubuque | 1966-1968 |
| Sharon Oien | 1966-1967 |
| Charlotte Flemming | 1966-1968 |
| Mitzi Dahle | 1968-1970 |
| Mary Schneider | 1969-1972 |
| Nicolette Nelson | 1967-1972 |
| Jane Ahlin | 1970-1972 |
| Jean C. Bitney | 1971-1972 |
| Joy Currie | 1970-1971 |
| Debbie McPherson | 1971-1974 |

| | |
|-----------------------|-----------|
| Lila Chakrobarty | 1972-1974 |
| Marilyn Mathsen | 1972-1974 |
| Linda Anne Rubin | 1974-1975 |
| Karen Hansen | 1975-1977 |
| Linda Fay Green | 1975-1977 |
| Jean A. Miller | 1972-1977 |
| Christine Briedlander | 1977-1978 |
| Edith Green | 1977-1980 |
| Julie Kvitne | 1977-1980 |
| Krista L. Botsford | 1979-1979 |
| Carol Gaudry | 1981-1981 |
| Lori Sollom | 1980-1982 |

A LIST OF RESEARCH TECHNICIANS WHO HAVE WORKED IN THE DEPARTMENT OF BIOCHEMISTRY:

RESEARCH TECHNICIANS:*

| | |
|------------------------|-----------------|
| Eileen Simonson Nelson | 1952-1953 |
| Beverley Teter | 1963-1965 |
| Elaine June Bowden | 1964-1966 |
| Lin Lin Lee | 1964-1966 |
| Martin Glynn | 1967-1970 |
| Judy Haning | 1978 to present |
| Beth Ann Hoffman | 1979 |
| Vicky Hodson | 1970-1981 |

LABORATORY WORKERS:

| | |
|--------------|-----------------|
| Osa Davis | 1961 to present |
| George Davis | 1965 to present |

*There are numerous students and others who worked as research technicians from 1951-1982, however, employment records in the Department are not available.