

HISTORY

COLLEGE OF MEDICINE

1959-1968

CHAPTER - 16

DEPARTMENT OF PHYSIOLOGICAL CHEMISTRY

D. G. CORNWELL, PH. D.

	Page
I. Introduction	1
II. Teaching Programs and Other Academic Affairs	2
a. Teaching Programs	2
b. Graduate Degrees Conferred	5
c. Faculty Honors and Awards	7
d. Institute of Nutrition and Food Technology	8
e. Training Grant with Pathology	9
f. Visitation Committee	9
III. Research Activities	10
IV. Biographies	14

I. INTRODUCTION

The Department of Physiological Chemistry was organized in 1921 with Dr. Clayton S. Smith the founding chairman. Dr. Smith continued as chairman until he reached the mandatory retirement age in 1957. He was succeeded as chairman by Dr. J. B. Brown. Dr. Brown had joined the department in 1924. He relinquished the chairmanship in 1964 when he reached the mandatory retirement age. Dr. David G. Cornwell was appointed acting chairman in 1964 and chairman in 1965. He has continued in this position until the present time. The early history of the department has been covered in two previous volumes which describe the department as it developed under the chairmanship of Clayton S. Smith. The period covered by this history coincides with the chairmanship of J. B. Brown and more recently his successor, David G. Cornwell.

Dr. Clayton S. Smith, former chairman and professor emeritus, died in the summer of 1967. Dr. Smith maintained an active interest in the department and the College of Medicine throughout his retirement years. He was active as a consultant in toxicology until shortly before his death.

The Department of Physiological Chemistry was organized initially as the Department of Physiological Chemistry and Pharmacology. A new Department of Pharmacology was established in 1963. The facilities and the equipment in the parent department were divided at that time. It is interesting that the annual salary budget in the 1957-1958 fiscal year for the combined departments (\$73,800) had increased three-fold (\$216,380) for the Department of Physiological Chemistry in the 1968-1969 fiscal year. In 1958 the combined departments included seven full-time and five adjunct faculty members. The Department of Physiological Chemistry had increased to twelve full-time and fourteen adjunct faculty members by 1968.

II. TEACHING PROGRAMS AND OTHER ACADEMIC AFFAIRS

a. Teaching Programs

Budget and personnel are highly visible and easily quantified aspects of a department's history. The major developments in Physiological Chemistry have been in the evolutionary development of teaching programs and the organization of strong research groups. The history of these developments is a small part of a larger history which describes the renaissance of medical education at Ohio State.

The Department of Physiological Chemistry is one of two departments in the university responsible for graduate and professional education in biochemistry. Biochemistry is a fundamental academic discipline and this discipline is necessary for education in the health sciences. This department is charged with the responsibility for the professional education of students in the College of Medicine, the College of Dentistry, and the School of Allied Medical Professions. The College of Biological Sciences was organized in 1966 and the Department of Agricultural Biochemistry was transferred from the College of Agriculture to the College of Biological Sciences at that time. The College of Biological Sciences is charged with undergraduate instruction in biochemistry in other areas of the university and shares with the College of Medicine the responsibility for graduate instruction in biochemistry. The two colleges have pioneered in a new type of instructional program and now offer for the first time in any discipline on this university campus a truly integrated graduate course which is the joint responsibility of two departments in different colleges.

The Department of Physiological Chemistry is engaged in many new teaching programs. The medical course has been revised each year and a new tutorial program has been developed and is now offered as an optional approach

to biochemistry in the first year of medical school. The department has worked cooperatively with the Office of Research in Medical Education and the computer group in the College of Medicine in the development of computer assisted instruction programs. The course in dental nutrition has been programmed by Helen L. Wikoff and placed on the computer for individual student evaluation, clarification, and review. This course in dental nutrition was originally developed by J. B. Brown and was at that time the first course in dental nutrition offered in America. The computer program is the first program in dental nutrition that has been completed in America. Selected areas in medical biochemistry have been programmed by Dr. Wikoff and placed on the computer. The department is now engaged in a critical evaluation of tutorial programs and computer assisted instruction. There has been an extraordinary shift of emphasis from lecture to other teaching procedures in the last ten years and if the future can be predicted from the past it appears that the conventional lecture system will be largely abandoned by this department in the next few years.

Undergraduate instruction has not been neglected during the last ten years. The College of Medicine received a major grant in 1961 for the development of a program in medical dietetics. Physiological Chemistry was asked to develop an undergraduate course suitable for students in medical dietetics and a course was developed for this purpose by Arthur W. Devor. This course has evolved into a two-quarter sequence which includes both organic chemistry and biochemistry. Dr. Devor has integrated the principles of organic chemistry with their application in the field of biochemistry. The course has been expanded to include all students in the School of Allied Medical Professions, particularly students in medical dietetics and students in medical technology, who require instruction in biochemistry.

Undergraduate majors in Physiological Chemistry were offered for a number of years. These programs were abolished at the time when the College of Biological Sciences was organized. The responsibility for undergraduate instruction by Physiological Chemistry is now limited to students in the School of Allied Medical Professions. This decrease in the teaching responsibilities of the department has allowed the department to utilize teaching laboratories for faculty offices and research laboratories. Rooms 105 and 107 in Hamilton Hall were withdrawn as teaching laboratories and remodeled into an office-research complex.

A curriculum committee was organized in the department in 1965. This committee which has been chaired by Richard H. Nuenke is charged with the evaluation and review of courses offered by the department. The committee has been particularly concerned with evaluation by students and a graduate student has served as a full voting member of the committee. In 1967, Dr. Nuenke was selected as the Laboratory Director for the new Basic Science Building of the college.

A graduate committee was organized in 1965. Keith E. Richardson has chaired this committee since the time of its organization. The graduate committee is charged with the admission of graduate students, the selection of their preceptors, and the organization and administration of their certifying examinations. The oral part of the qualifying examination has been changed from a general examination to the presentation and defense of a proposition selected by the student with the approval of the graduate committee. Foreign language requirements were changed in 1968 and the department now requires a reading knowledge of only one foreign language for the doctoral degree.

b. Graduate Degrees Conferred

Table 1 lists the graduate degrees conferred over the decade.

Table 1

GRADUATE DEGREES IN PHYSIOLOGICAL CHEMISTRY 1959-1968

Year	M.S.	Preceptor	Ph.D.	Preceptor
1958-	Marion H. Mixson	(C. S. Smith)	George Homer	(C. S. Smith)
1959	Alvin W. Washington	(" " ")		
1959-	Paul L. Gaertner	(W. J. Frajola)	Wm. J. Campbell	(W. J. Frajola)
1960	Garland A. Johnson	(R. H. McCluer)	John T. Dickman	(J. B. Brown)
	George L. Ozga	(H. L. Wikoff)	Carl E. Moyer	(H. L. Wikoff)
	John N. Swift	(J. B. Brown)	Koritala Sambisavarao	(J. B. Brown)
1960-	Kenneth Guyer	(D. G. Cornwell)	Lloyd A. Horrocks	(D. G. Cornwell)
1961	Genevieve Incefy	(W. J. Frajola)		
1961-	Charles F. Fox	(W. J. Frajola)	Gertrude M. Orth	(D. G. Cornwell)
1962	Purnendu Datta	(W. J. Frajola)	Paul L. Gaertner	(W. J. Frajola)
	Douglas A. Wolfe	(D. G. Cornwell)		
	Clinton A. Nereberg	(R. Fischer)		
1962-	David W. Deamer	(D. G. Cornwell)	Kenneth E. Guyer	(D. G. Cornwell)
1963	Robert N. DiSimone*	(F. A. Kruger)	Garland A. Johnson	(D. G. Cornwell)
	Byron Kohn*	(W. J. Frajola)		
	Rita M. O'Brien	(A. W. Devor)		
	Robert G. Sandberg	(R. H. McCluer)		
	Russell G. Taylor	(W. J. Frajola)		
	John W. Traubert*	(F. A. Kruger)		
	Joseph Weiss	(R. M. Johnson)		
	Thomas E. Williams*	(F. A. Kruger)		

* Medical students double registered

Continued on next page

Year	M.S.	Preceptor	Ph.D.	Preceptor
1963-	Bruce A. Butcher	(A. W. Devor)	Genevieve Incefy	(W. J. Frajola)
1964	Dorothy Ann Duerr	(D. G. Cornwell)	Eddy Miedema	(K. E. Richardson)
	Sharon Cottrill Parker	(K. E. Richardson)	Roman Rutkowski	(W. J. Frajola)
			Douglas A. Wolfe	(D. G. Cornwell)
1964-	Adi D. Bharucha	(G. L. Endahl)	Purnendu Datta	(W. J. Frajola)
1965	Edith Leighty	(G. T. Passananti)	David W. Deamer	(D. G. Cornwell)
	Paul H. Schreibman*	(F. A. Kruger)	Kadambar S. Holla	(D. G. Cornwell)
	Badruddin Siddiqui	(A. W. Devor)	William Morrison	(W. J. Frajola)
			Russell J. Taylor	(K. E. Richardson)
1965-	Adel El-Habet	(G. L. Endahl)	A. Birk Adams	(A. W. Devor)
1966	Michael Guarnieri	(R. M. Johnson)	Ronald J. Penick	(R. H. McCluer)
	J. Stark Thompson	(K. E. Richardson)	Lorraine E. Trojan	(R. M. Johnson)
	Victor W. Winkler	(A. W. Devor)	Frances Griffin	(R. Fisher)
			Joseph Weiss	(R. M. Johnson)
1966-	Robert J. Crus	(R. H. McCluer)	Ruth Altschuld	(F. A. Kruger)
1967	Donald F. Calbreath	(R. H. Nuenke)	Edith Leighty	(F. A. Kruger)
	Marilyn Ruth Fenton	(K. E. Richardson)	Carl H. Miller	(W. J. Frajola)
	David A. Knowlton			
	Walter Shaw			
1967-	Carroll R. Dobbs	(H. Sprecher)	Michael Guarnieri	(R. M. Johnson)
1968	Robert M. Dunton	(A. J. Merola)	J. Stark Thompson	(K. E. Richardson)
	Gerald M. Penn*	(F. A. Kruger)	Sandor L. Vandor	(K. E. Richardson)
			P. Venkatarao	(D. G. Cornwell)
1968-			Donald F. Calbreath	(K. E. Richardson)
1969			Miriam H. Meisler	(R. H. McCluer)
			S. Ramachandran	(D. G. Cornwell)

TOTAL 41 M.S.

34 Ph.D.

c. Faculty Honors and Awards

J. B. Brown served as a member of the Oilseeds Advisory Committee of the Department of Agriculture (1959-1963), and of the Fat Committee of the Agricultural Board as well as of the Council on Food and Nutrition of the National Research Council. He has been a consultant in fats and oils for the Eastern Regional Laboratory of the U.S.D.A. Dr. Brown was a member of the University Permanent Planning Committee. He received the citation of merit from the medical alumni in 1962 and the University's Distinguished Service Award in 1964. Dr. Brown received emeritus membership in the American Chemical Society, the American Society of Biological Chemists, the American Institute of Nutrition, and the American Oil Chemists' Society in 1964. He was elected a fellow of the American Institute of Nutrition in the same year.

David Cornwell was selected one of the Ten Outstanding Young Men of the Year in Columbus by the Columbus Junior Chamber of Commerce in 1961. He served as a member of the Editorial Board of the Journal of Lipid Research from 1961 to 1965. He has been a member of the Nutrition Study Section of the National Institutes of Health since 1966. Dr. Cornwell was elected to membership in the American Society of Biological Chemists in 1962 and the American Institute of Nutrition in 1966.

Walter J. Frajola was treasurer of the Electron Microscopy Society of America from 1959-1962 and president of this society from 1963 to 1965. He was treasurer of the organizing committee of the Fifth International Congress for Electron Microscopy in 1961. Dr. Frajola was elected a member of the American Society of Biological Chemists in 1959 and a fellow of the Ohio Academy of Science in 1963.

A number of the members of the Faculty have been elected members of the American Society of Biological Chemists: Gerald Brierley 1964, Robert McCluer 1966, Keith Richardson 1967, and John Rieske 1968.

Dr. Gerald P. Brierley was an established investigator of the American Heart Association from 1964-1969.

Dr. Howard Sprecher received a research study leave to work in the laboratory of Dr. Wilhelm Stoffel, University of Cologne, Cologne, Germany, in 1968.

d. Institute of Nutrition and Food Technology

Dr. Brown was appointed Director of the Institute of Nutrition and Food Technology in 1950 and continued as Director until 1963 when he was appointed director emeritus. The Department of Physiological Chemistry furnished the office for the Director of the Institute and his secretary for this period. The Institute served as the focal point for nutrition and food technology research at this institution. Biennial conferences in nutrition were organized by members of the Institute. A monthly newsletter was edited by Dr. Brown and Miss Mae Starbuck until 1966. This newsletter summarized new ideas and important research in nutrition. The nutrition research conducted at the university was described here and information about courses, lectures, and symposia was made available to the university community interested in nutrition and food technology. The news bulletin had quite a large circulation. Copies were requested by many universities and research institutes throughout the country and nutrition personnel throughout the state. In the middle 1950's Dr. Brown organized a research laboratory in the Institute of Nutrition. He brought Dr. Ralph M. Johnson to the university as the first director of this laboratory and also as associate professor in the Department of Physiological Chemistry. Dr. Johnson succeeded to the

directorship of the Institute in 1963.

e. Training Grant with Pathology

A training grant in clinical chemistry was approved and funded in 1968. This training grant is a joint venture of the Departments of Pathology and Physiological Chemistry. The successful application for this grant was prepared by Hanns-Dieter Gruemer who continues as the administrator of the program.

f. Visitation Committee

In 1967 the department requested that the Dean appoint an ad hoc committee of distinguished biochemists to review the teaching and research programs of the department and the relationship of the department to the university. This committee consisted of Professor Phillip Cohen, the University of Wisconsin, Professor Halvor Christensen, the University of Michigan, and Professor Albert Lehninger, Johns Hopkins University, who served as chairman. The committee spent two days at Ohio State and then submitted their evaluation to the Dean. The department anticipates that periodical reviews will be requested in the future.

III. RESEARCH ACTIVITIES

The Department of Physiological Chemistry has organized its research programs around five areas of biochemistry:

1. Cellular Organization
2. Enzyme and Biological Control Mechanisms
3. Bioenergetics
4. Neurochemistry
5. Clinical Chemistry

Cellular Organization represents the continuation and expansion in the lipid chemistry group that was organized and developed at this university by J. B. Brown. Among the present members of the group, David Cornwell is interested in membranes and membrane model systems, surface chemistry, the chemistry of lipids, gas liquid chromatography, and the metabolism of fat soluble vitamins, and atherosclerosis. Howard Sprecher has developed a program in fatty acid biosynthesis and the organic synthesis and characterization of lipids. H.A.I. Newman is interested in atherosclerosis and directs a laboratory which provides serum lipid analyses for epidemiological studies.

Enzymology and biological control mechanisms represent the core area for a department of biochemistry. This group includes Keith E. Richardson, James O. Alben, Fred A. Kruger, F. Fern Och, and Richard Matthews. Dr. Richardson is interested in intermediary metabolism, endogenous oxalic acid toxicity, the metabolism of ethanolamine and inborn errors of metabolism. Dr. Kruger, the Laboratory Director for the Clinical Research Center, has studied the mechanism of the action of insulin and the synthesis of hypoglycemic agents, and the role of lipids in metabolic mechanisms. Dr. Alben has developed a program in the mechanism of metal enzyme catalysis, physical inorganic biochemistry, kinetics of multiple substrate systems, spectroscopy and transition metals. Dr. Och is working on enzyme chemistry. Dr. Matthews,

a biophysicist, is interested in protein chemistry and enzyme kinetics.

Bioenergetics is represented by four faculty members, Gerald P. Brierley, John S. Rieske, A. John Merola and Clinton D. Stoner. Dr. Brierley organized this program in 1964. He has developed an active group which is studying the mechanisms of ion transport and their relation to structure in mitochondria. Dr. Rieske has developed a program in the structure and mechanism of action of respiratory enzymes, biological oxidations, and photosynthesis. Dr. Merola is interested in the metabolism and mechanism of the action of drugs, microsomal oxidation and microbial biochemistry. Dr. Stoner is studying energy metabolism particularly in the failing heart.

The neurochemistry group includes several adjunct faculty members from Psychiatry and Neurology as well as a new professor, Lloyd A. Horrocks, in the core faculty. Robert H. McCluer, an adjunct faculty member from Psychiatry, is interested in the chemistry and function of gangliosides, ribonucleic acid in plant tissue, blood group substances, and information storage and retrieval. Dr. McCluer has been a part-time member of the department for the last ten years. He will be transferred to the core faculty in the future. J. Norman Allen, Chief of the Division of Neurology in the Department of Medicine, is an adjunct member of the department interested in the distribution and function of acid hydrolytic enzymes in brain, quantitative histochemistry and chemical neuropathology. Dr. Horrocks is interested in lipid metabolism in brain and the structure and function of myelin.

The clinical chemistry group has received a major impetus from the funding of a training grant in this area. This group consists of Arthur W.

Devor, Hanns-Dieter Gruemer, Gerald L. Endahl, Somasundaram Addanki, Edward J. Eyring and Dallas E. Boggs. These adjunct members of the faculty are all associated with clinical departments. Dr. Devor is interested in the analytical chemistry of carbohydrates and the mucopolysaccharides, proteins, carbohydrates and lipids in urine. Dr. Gruemer is interested in amino acids and protein related to mental retardation and phenylketonuria and other inborn errors of metabolism. Dr. Endahl is interested in steroid hormone metabolism, hormone stimulation and the mechanism of gastric acid secretion and the biochemistry of bone. Dr. Addanki has developed a program in ion transport, acid base control mechanisms, metabolic and endocrine disorders of the cell and sub-cellular particles and radioisotopes in biochemical and clinical research. Dr. Eyring is interested in the physical chemical properties of bone and cartilage, experimental arthritis, mucoprotein structure, and anti-inflammatory drug metabolism. Dr. Boggs is interested in inborn errors of metabolism and amino acid metabolism.

Research funds for the department have been supplied largely through grants from the National Institutes of Health, the American Heart Association, the Central Ohio Heart Association, the Comly Fund of the College of Medicine and the Development Fund of the university. Research support has been variable. However there has been a distinct trend toward increased research support during the past ten years. This trend is evident in Table 2.

TABLE 2

RESEARCH FUNDS EXPENDED 1958-1968

<u>Year</u>	<u>Amount</u>
1958-1959	\$72,843
1959-1960	36,168
1960-1961	55,824
1961-1962	35,030
1962-1963	76,364
1963-1964	138,032
1964-1965	185,630
1965-1966	186,293
1966-1967	159,907
1967-1968	168,631
TOTAL	<u>\$1,114,722</u>

Increased research support has resulted in an increased number of publications from the department. The publications of the core faculty and the adjunct faculty are summarized in Table 3.

TABLE 3

PUBLICATIONS IN BIOCHEMISTRY

<u>Year</u>	<u>Core Faculty</u>	<u>Adjunct Faculty</u>	<u>Total</u>
1958	13	0	13
1959	8	4	12
1960	6	8	14
1961	11	6	17
1962	10	9	19
1963	6	15	21
1964	17	6	23
1965	18	20	38
1966	22	14	36
1967	34	18	52
1968	27	7	34
TOTAL 1958-1968	172	107	279

Publications are one criterion of research productivity. The research program of the department is also reflected through Graduate Degrees (Table 1) and Research Support (Table 2).

IV. BIOGRAPHIES

ADDANKI, SOMASUNDARAM

see Pediatrics

B.V.Sc., U. of Madras 1957; M.S., O.S.U. 1962; Ph.D. 1964. Instr. 1964;
Asst. Prof. 1966 -.

ALBEN, JAMES O.

B.A., Reed Coll. 1951; M.S., U. of Oregon Med. Sch. 1957; Ph.D., 1959;
Asst. Prof., 1962; Assoc. Prof. 1967 -

ALLEN, J. NORMAN

see Division of Neurology

M.D. Harvard Med. Schl. 1949; Assoc. Prof. 1965; Prof. 1968 -

BIAGI, GIAN L.

M.D., U. of Bologna, 1960. Postdoctoral Fellow, Research Assoc., Asst. Prof.
1966-1967.

BOGGS, DALLAS E.

see Pediatrics

B.S., West Virginia U. 1954; M.N.S., Cornell U. 1955; Ph.D., 1959.
Asst. Prof. 1968 -.

BRIERLEY, GERALD P.

B.S., U. of Maryland 1953; Ph.D., 1960. Asst. Prof., 1964; Assoc. Prof. 1965;
Prof. 1969 -. Established Investigator, American Heart Assoc. 1964-1969.

BROWN, JOHN B.

B.Sc., U. of Illinois 1915; M.Sc., U. of Illinois 1917; Ph.D., 1921; Asst.
Prof. 1924; Assoc. Prof. 1930; Prof. 1941; Chr. 1957; Prof. Emer. 1964 -.

CARSON, GWENDOLYN B.

See Pharmacology

CORNWELL, DAVID G.

B.A., Coll. of Wooster 1950; M.A., O.S.U. 1952; Ph.D., Stanford U. 1955;
Asst. Prof. 1956; Assoc. Prof. 1960; Prof. 1963-; Acting Chr. 1964; Chr. 1965 -.

DEVOR, ARTHUR W.

B.S., McPherson Coll. 1935; M.S., Kansas State Coll. 1937; U. of Southern
Calif. 1947; Asst. Prof. 1952; Assoc. Prof. 1957 -.

- ENDAHL, GERALD L. see Surgery
 B.A., Augustana Coll. 1949; M.A., U. of South Dakota 1953; Ph.D., U. of Oklahoma 1959; Asst. Prof. 1960; Assoc. Prof. 1966 -.
- ENGELMAN, ELMER D. See Pharmacology
- EYRING, EDWARD J. see Surgery
 A.B., Princeton U. 1955; M.D., Harvard Med. Sch. 1959; Ph.D., U. of Calif. at San Francisco 1967; Asst. Prof. 1967 -.
- FISCHER, ROLAND see Psychiatry and Pharmacology
 M.A., Ph.D., U. of Basel 1945; Asst. Prof. 1958; Assoc. Prof. 1967.
- FRAJOLA, WALTER J.
 B.S., Hamline U. 1938; M.S., U. of Illinois 1947; Ph.D., 1950; Asst. Prof. 1950; Assoc. Prof. 1957; Assoc. Prof. 1959; Prof. 1960 -.
- GRUEMER, HANNS-DIETER see Pathology
 M.D., U. of Frankfurt 1959; Asst. Prof. 1964; Assoc. Prof. 1967 -.
- HORROCKS, LLOYD A.
 B.A., Ohio Wesleyan U., 1953; M.S., O.S.U. 1955; Ph.D. 1958; Asst. Prof. 1968 -.
- ITO, TAKERU
 B.S., Trinity U. 1954; M.S., Oklahoma State U. 1955; Ph.D., U. of California 1958. Asst. Prof. 1962-1967. Institute of Nutrition and Food Technology: Res. Assoc. 1962-1967.
- JOHNSON, RALPH M.
 B.S., Utah State Agricultural Coll. 1940; M.S., U. of Wisconsin, 1947; Ph.D., 1948; Assoc. Prof. 1959; Prof. 1960-1968. Institute of Nutrition and Food Technology: Director, 1959-1968. College of Biological Sciences: Dean 1966-1968.
- KLAPPER, MICHAEL H.
 A.B., Harvard, 1958; M.S., U. of Rochester 1959; Ph.D., U. of Calif. at Berkeley 1964; Asst. Prof. 1968 -. Dept. of Chemistry: Asst. Prof. 1966 -.
- KREISHER, J. H. see Pediatrics
 B.A., Haverford Coll. 1955; M.S., U. of Delaware, 1959; Ph.D., 1961
 Asst. Prof. 1964.

KRUGER, FRED A.

see Medicine

B.S., Rutgers U. 1942; M.S., O.S.U., 1951; Instr. 1951-1954; Asst. Prof. 1957; Assoc. Prof. 1961; Prof. 1964 -.

LEAKE, CHAUNCEY D.

see Pharmacology

MARKS, BERNARD H.

see Pharmacology

MC CLUER, ROBERT H.

see Psychiatry

B.A., Rice Institute 1949; Ph.D., Vanderbilt U. 1954; Instr. 1956; Asst. Prof. 1958; Assoc. Prof. 1964; Prof. 1968 -.

MAYER, ROBERT M.

M.S., George Washington U., 1959; Ph.D. 1963; Asst. Prof. 1968 -.
Dept. of Chemistry: Asst. Prof. 1967 -.

MAYNARD, DONALD E.

see Medicine

B.A., U. of Buffalo 1955; M.S., U. of Kentucky 1958; Ph.D., O.S.U. 1961; Asst. Prof. 1962-1965.

MEROLA, A. JOHN

B.A., U. of Texas 1953; M.S., Rutgers U. 1959; Ph.D. 1961; Asst. Prof. 1965; Assoc. Prof. 1968 -.

NEWMAN, HOWARD A. I.

see Pathology and Preventive Medicine

B.S., U. of Illinois 1951; M.S., 1956; Ph.D. 1958; Assoc. Prof. 1968 -.

NUENKE, RICHARD H.

B.S., U. of Michigan 1953; Ph.D., Vanderbilt U. 1961; Asst. Prof. 1962 -; Assoc. Prof. 1967 -. College of Medicine: Laboratory Coordinator, 1967 -.

OCH, F. FERN

B.A., O.S.U., 1954; M.S., 1956; Ph.D., 1958; Research Assoc. 1964; Instr. 1967; Asst. Prof. 1968 -.

- ORTH, GERTRUDE M. see Preventive Medicine
 B.A., Douglass Coll. (Rutgers U.) 1955; M.A., U. of Illinois, 1957; Ph.D., O.S.U., Asst. Prof., 1964-1966.
- PASSANANTI, G. T. see Surgery
 B.S., Pennsylvania State U. 1949; M.S., 1953; Ph.D., 1957; Asst. Prof. 1963-1965.
- PINTO, PATRICK V. C. see Surgery
 B.S., Bombay U. 1945; M.S., 1955; Ph.D., O.S.U. 1963. Res. Assoc. 1963-1964. Asst. Prof. 1965-1966.
- RICHARDSON, KEITH E.
 B.S., Brigham Young U. 1955; M.S., 1955; Ph.D., Purdue U., 1958; Asst. Prof. 1960; Assoc. Prof. 1963; Prof. 1967 -; Vice Chr. 1967 -.
- RIESKE, JOHN S.
 B.A., Brigham Young U. 1949; Ph.D., U. of Utah 1956; Assoc. Prof. 1966 -.
- SIEVERT, CARL F. A.
 B.S., Capital U. 1942; Ph.D., U. of Illinois 1947. Visiting Prof. 1968-1969.
- SMITH, CLAYTON S.
 B.Sc., Rutgers U. 1909; M.Sc., Rutgers U. 1912; Ph.D., Columbia U. 1913; M.D., Northwestern U. 1920; Asst. Prof. 1920; Prof. and Chr. 1921-57; Emer. Prof. 1957-1967. Deceased 1967.
- SPRECHER, HOWARD W.
 B.A., North Central Coll. 1958; Ph.D., U. of Wisconsin 1964; Asst. Prof. 1964; Assoc. Prof. 1968 -.
- STONER, CLINTON D. see Surgery
 B.S., South Dakota State U. 1957; M.S., 1960; Ph.D., U. of Illinois 1964; Asst. Prof. 1965 -.
- WIKOFF, HELEN L.
 B.A., O.S.U. 1921; M.Sc., 1922; Ph.D. 1924; Instr. 1925; Asst. Prof. 1930; Assoc. Prof. 1943; Prof. 1968 -.

INSTRUCTORS

GRIFFIN, FRANCES, B.S., M.S., Ph.D.; 1966-1967.
HOLLA, KADAMBAR S., B.S., B.S. (Tech.), M.S. (Tech.), Ph.D.; 1964-1965.
SAMBASIVARAO, KORITALA, B.S., B.S. (Tech.), M.S., Ph.D.; 1962-1963.
SETTLEMIRE, C. THOMAS, B.S., M.S., Ph.D.; 1967 -.
SHUTTLEWORTH, EDWIN C., M.D.; 1966 -.
SWISS, EDWARD D., B.Sc., Ph.D., M.D.; 1956-1959.
TOMPKINS, RONALD K., A.B., M.D.; 1966 -.