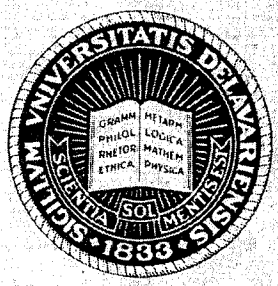


~~Teicher~~  
~~Recher~~  
~~Dunham~~  
~~Fildhaus~~  
Return to  
Brasher

A PETITION

for the Establishment  
of a Chapter  
of the

SOCIETY OF THE SIGMA XI



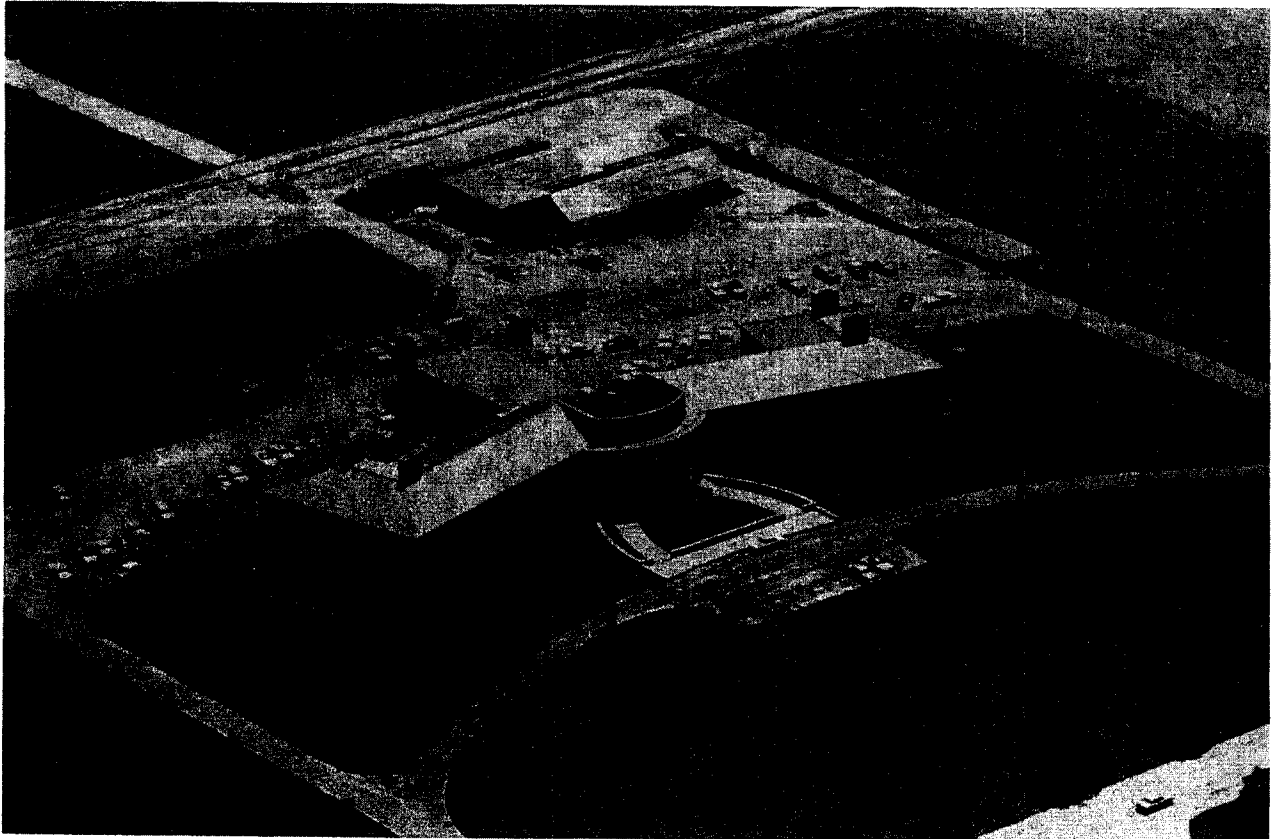
at

THE UNIVERSITY OF DELAWARE

UNIVERSITY OF DELAWARE

Newark Delaware

October, 1958



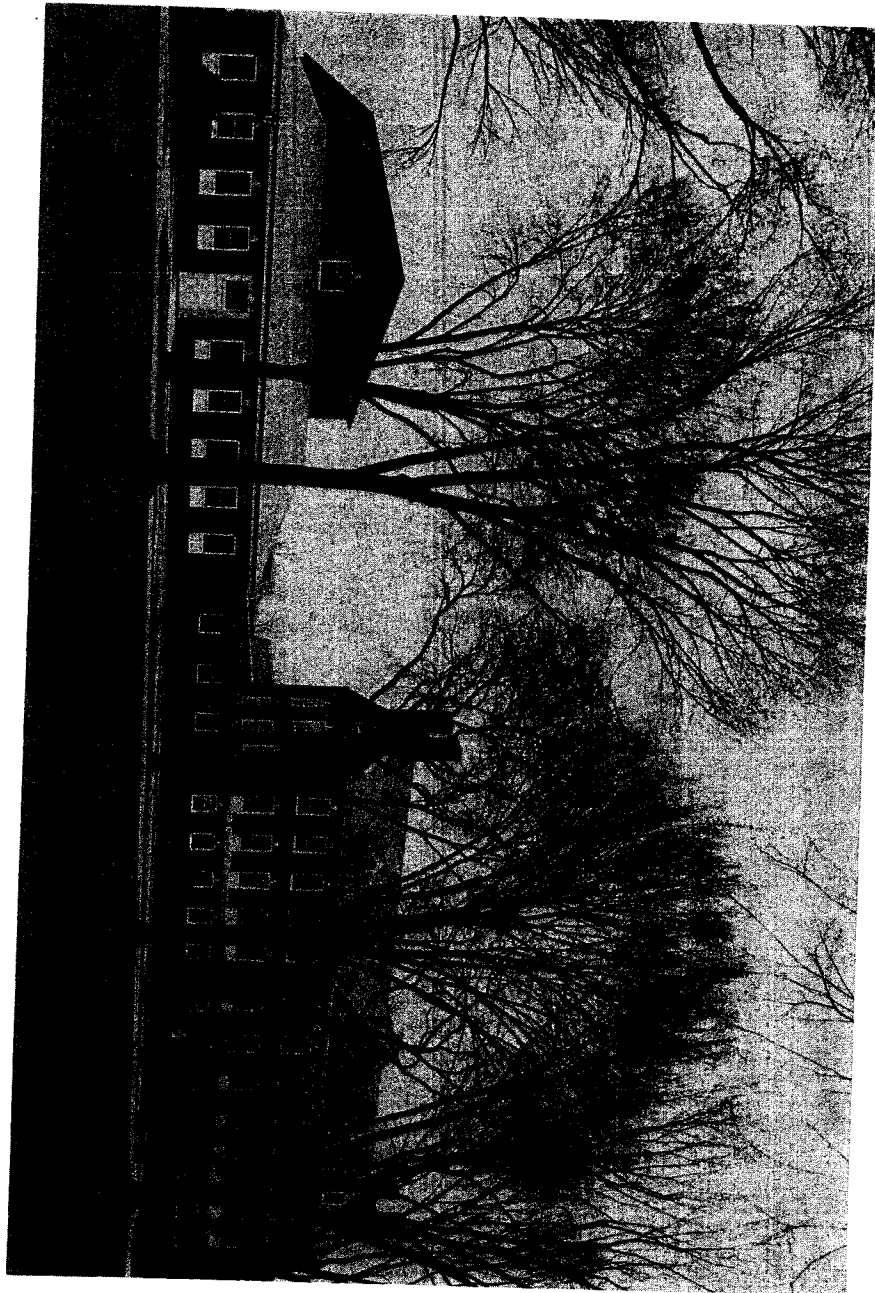
Agricultural Hall

A PETITION  
*for the Establishment  
of a Chapter  
of the*  
SOCIETY OF THE SIGMA XI



*at*  
THE UNIVERSITY OF DELAWARE

UNIVERSITY OF DELAWARE  
*Newark Delaware  
October, 1958*



Pierre S. duPont Hall (left) and Evans Hall (right)

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THE PETITION

THE UNIVERSITY OF DELAWARE  
NEWARK, DELAWARE

September, 1958

The Executive Committee  
The Society of the Sigma Xi

Gentlemen:

We, the undersigned members of the Society of the Sigma Xi now organized as a Club at the University of Delaware, hereby petition for the establishment of a chapter of the Society at the University of Delaware.

Respectfully submitted,

James Baldini  
Harold C. Beachell  
Vaughn C. Behn  
Albert A. Branca  
Arnold M. Clark  
James I. Clower  
Walter A. Connell  
Morris S. Cover  
Henry W. Crittenden  
Donald F. Crossan  
Franklin C. Daiber  
Richard F. Darsie, Jr.  
J. Fenton Daugherty  
Warren Davies  
Quaesita C. Drake  
Charles M. Dunham  
Elizabeth Dyer  
Donald J. Fieldhouse  
Vernon J. Fisher  
Jack A. Gerster  
John B. Harmon  
John W. Heuberger  
Conrad E. Hoffmann  
Frederic C. Houghton  
Robert S. Howard  
Russell A. Hyre  
Henry W. Indyk  
Robert F. Jackson  
James C. Kakavas  
Lewis P. Kelsey

James B. Krause  
Harold Kwart  
G. Gorham Lane  
Robert M. Lauer  
Bruce C. Lutz  
Cecil C. Lynch  
Halsey M. MacPhee  
John H. McClendon  
James A. Moore  
William A. Mosher  
Edward J. Pellicciaro  
Wilfred A. Pemberton  
Robert L. Pigford  
Bruce M. Pollock  
William A. Price  
Clyde R. Richards  
Elizabeth Ronkin  
Raphael R. Ronkin  
Tom D. Runnels  
Mary A. Russell  
Russel J. Seibert  
Carl N. Shuster  
Glenn S. Skinner  
F. Loren Smith  
G. Fred Somers  
Richard N. Taylor  
Ernest F. Waller  
G. Cuthbert Webber  
Kurt Wohl  
John C. Wriston, Jr.  
Katherine E. Yaw

LIST OF MEMBERS

AND ASSOCIATE MEMBERS

of the Society of the Sigma Xi  
at the University of Delaware

1957-58

<u>Name</u>	<u>Initiated</u>
Abbott, Okra J.	University of Wisconsin
Bailey, W. Robert A.	McGill University
Baker, Thomas A.	Cornell University
Baldini, James	Purdue University
Beachell, Harold C.	New York University
Behn, Vaughn Crawford	Johns Hopkins University
Bock, Paul	Johns Hopkins University
Bolgiano, Paul L., Jr.	Johns Hopkins University
Branca, Albert A.	University of North Carolina
Braunschweiger, Chris C.	University of Wisconsin
Brennan, Paul J.	Yale University
Brooks, Sidney	Rutgers University
Cheslock, Katherine E.	University of Wisconsin
Clark, Arnold M.	University of Pennsylvania
Clark, Lyle G.	University of Michigan
Clower, James I.	Virginia Polytechnic Institute
Cobble, Milan H.	University of Michigan
Connell, Walter A.	University of Minnesota
Cotnoir, Leo J., Jr.	Purdue University
Cover, Morris S.	University of Illinois
Crittenden, Henry W.	Ohio State University
Crossan, Donald F.	University of North Carolina
Daiber, Franklin C.	Michigan State University
Darsie, Richard F., Jr.	Cornell University
Daugherty, J. Fenton	University of North Carolina
Davies, Warren	University of Wisconsin
Drake, Quaesita C.	University of Chicago
Dunham, Charles W.	Michigan State University
Dyer, Elizabeth	Yale University
Fieldhouse, Donald J.	University of Wisconsin
Fisher, Vernon J.	Michigan State University
Gerster, Jack A.	Ohio State University
Gulick, Walter L.	Princeton University
Hagerty, W. W.	University of Michigan
Harmon, John B.	University of Maryland
Hellerman, Herbert	Syracuse University
Heuberger, John W.	University of Maryland
Hoffman, Conrad E.	Western Reserve University
Houghton, Frederic C.	University of Pennsylvania
Howard, Robert S.	Northwestern University
Hyre, Russell A.	Cornell University
Indyk, Henry W.	Pennsylvania State University
Jackson, Robert F.	University of Oregon
Kakavas, James C.	Yale University
Kelsey, Lewis P.	Cornell University

<u>Name</u>	<u>Initiated</u>
Krause, James B.	Duke University
Kwart, Harold	Bryn Mawr College
Lamb, David L.	Princeton University
Lane, G. Gorham	Ohio State University
Lauer, Robert M.	University of Michigan
Lutz, Bruce C.	Johns Hopkins University
Lynch, Cecil C.	Columbia University
Lynch, Darrell L.	University of Illinois
MacPhee, Halsey M.	University of North Carolina
McClendon, John H.	University of Pennsylvania
Mellen, William J.	Cornell University
Metzner, Arthur B.	Massachusetts Institute of Technology
Milliron, H. E.	University of Minnesota
Moore, James A.	Pennsylvania State University
Mosher, William A.	Oregon State University
Pellicciaro, Edward J.	University of North Carolina
Pemberton, Wilfred A.	University of Chicago
Pigford, Robert L.	University of Illinois
Pollock, Bruce M.	University of Rochester
Price, William A.	Rutgers University
Richards, Clyde R.	Cornell University
Ronkin, Raphael R.	University of California
Runnels, Tom D.	West Virginia University
Russell, Mary A.	University of Pennsylvania
Seibert, Russel J.	Washington University
Shuster, Carl N.	Rutgers University
Simpson, J. H.	Rutgers University
Skinner, Glenn S.	University of Illinois
Smth, F. Loren	Oberlin College
Somers, G. Fred	Cornell University
Taylor, Richard N.	University of Virginia
Van Name, Frederick W., Jr.	Yale University
Waller, Ernest F.	University of Vermont
Ward, Richard F.	Bryn Mawr College
Webber, G. Cuthbert	University of Chicago
Wohl, Kurt	Princeton University
Wriston, John C., Jr.	Columbia University
Yaw, Katherine E.	University of Michigan

Associate Members

Leonard, Roy S.	University of Connecticut
Ronkin, Elizabeth	University of California
Thompson, William A., Jr.	University of North Carolina
Wiseman, Harry A. B.	Pennsylvania State University

LETTERS OF ENDORSEMENT

COPY

UNIVERSITY OF DELAWARE  
Newark, Delaware

Office of the President

2 December 1957

The Executive Committee  
Society of Sigma Xi  
New Haven, Connecticut

Gentlemen:

As President of the University of Delaware, I enthusiastically support the application of our Sigma Xi Club for the establishment of a Sigma Xi Chapter here.

The Officers and Trustees of this University are cognizant of the vital role science and basic research play in higher education. We do everything within our means to encourage it. Further, among the land-grant institutions the University of Delaware has a respected tradition of research in both the applied and the pure sciences.

By reason of its highly technological and scientific environment, this University has developed strong programs of instruction and research in the physical and engineering sciences, especially chemistry, biological sciences, chemical engineering, and physics.

For our size, the current dollar volume of sponsored research is high. It requires the part-time efforts of one third of our faculty and 70 graduate research assistants and associates from twenty departments and divisions. Over half of the faculty publications for 1956-57 were in the scientific fields. Our School of Engineering in recent years has emphasized the basic sciences and to that end has secured a staff and planned a new building now nearing completion.

These characteristics of the University of Delaware indicate that its objectives in the basic sciences coincide with those of the Society of Sigma Xi. The establishment of a Sigma Xi Chapter here will further stimulate and enhance scientific study.

Sincerely yours,

/s/ John A. Perkins

John A. Perkins

COPY

UNIVERSITY OF DELAWARE  
Newark, Delaware

Office of the Provost

December 3, 1957

Executive Committee  
The Society of Sigma Xi

Gentlemen:

As Dean of the Graduate School, for some years I have observed the consistent and exhilarating progress of the University of Delaware in scientific achievement and its effect upon graduate study. Honestly and enthusiastically, do I write in support of the petition of our Sigma Xi Club.

During the last decade the faculty at Delaware has been greatly strengthened; this is certainly true in the sciences. The volume and quality of research has grown steadily. This growth can be gauged by the increase in research sponsored by outside agencies, such as government, industry, and foundations. In the past few years an upper limit has had to be placed upon the extent of sponsored research. These projects have been basic and have led to important applications in areas such as synthetic rubber, combustion, and new fuels.

Recent changes, wrought at the University of Delaware as a whole, may be clearly observed by noting one School, the School of Engineering. Ten years ago the faculty attitude of the majority in this school was that of the professional engineer. Although there was some excellent research work done in those days and a few capable men were speaking for a more scientific base upon which to base its educational efforts, they were, unfortunately, in the minority. Now the School is being rebuilt upon modern science as its instructional base and with research as an expected undertaking of its staff. The great majority of its staff has supported and brought to pass this important change. Basic and applied research is being carried on, not in one, but in all departments of the School.

Visiting scientists and evaluators tell us that at Delaware the facilities for scientific research and for the teaching of graduate students are excellent. The standards for conferring master's and doctor's degrees are high. Many of our graduates occupy positions of considerable importance by reason of demonstrated competence.

I believe you will find the University of Delaware to be an institution in whose hands a chapter of Sigma Xi can be safely and confidently entrusted.

Sincerely yours,

/s/ C. J. Rees

C. J. Rees, Provost and Dean  
School of Graduate Studies

C O P Y

UNIVERSITY OF DELAWARE  
Newark, Delaware

SCHOOL OF AGRICULTURE  
Instruction - Research - Extension  
Office of Dean and Director

November 21, 1957

The Executive Committee  
The Society of Sigma Xi

Gentlemen:

I am happy to support the petition of the members of the Society of Sigma Xi from this faculty requesting the establishment of a chapter of the Society at this University. Membership in Sigma Xi has long been one criterion of accomplishment which we have used in selecting new staff for our School.

Since the Agricultural Experiment Station is a part of the School of Agriculture, it is obvious that our staff has a long record of research accomplishments. The funds and facilities to support research in Agriculture have been greatly expanded during the past few years. About five years ago the School moved into new facilities which provided new offices, classrooms, and laboratories for all of the staff. As a consequence, laboratory facilities for research are excellent. With the exception of a few who are devoting full time to agricultural extension work, all of our staff devote half, or more, of their time to research. Graduate training is offered to the master's degree level in Agriculture and, by cooperation with the Department of Biological Sciences, study can be pursued to the Ph.D. level in the Agricultural Life Sciences.

The research program in agriculture is a vigorous, growing one. This is evidenced by the fact that during the past five years the funds for its support have increased by 72.5 percent. This program provides a balance between fundamental and applied research and is continually changing to meet new needs. For example, there are currently about 100 active research projects under way in the Agricultural Experiment Station and during the past five years there have been about the same number initiated, terminated and/or revised.

The establishment of a chapter of Sigma Xi at the University of Delaware would stimulate our research work and the training of graduate students because of the activity to be expected in a chapter program. I hope the Executive Committee will act favorably upon the petition.

Sincerely,

/s/ G. M. Worrilow

G. M. Worrilow  
Dean and Director

C O P Y

UNIVERSITY OF DELAWARE  
Newark, Delaware

School of Arts and Science  
Office of the Dean

December 2, 1957

Executive Committee  
The Society of Sigma Xi

Gentlemen:

I learn with pleasure that a group of scientists on the faculty of the University of Delaware who are members of the Society of Sigma Xi are applying to you for approval of a chapter of the Society at this institution. They have my hearty endorsement in this application, and my hope that you will be able to act favorably on their request.

The University has been steadily strengthening its offering in the Sciences over the past several years, and takes pride in the well prepared faculty, well equipped laboratories, and full course programs in these areas. Among our faculty in the School of Arts and Science are a number of distinguished research scholars and teachers. Their abilities and interests have made possible a significant program of sponsored research. During the past year research contracts totalling over half a million dollars were undertaken by fifty-four members of the University faculty. Approximately one half of the members of the science departments are at present engaged in organized research, and as new members are added, this percentage will rise.

It is my conviction that effective teaching must be underpinned by continuing and significant research. In the climate of opinion on the University of Delaware campus, this position is widely accepted. I feel that the present situation justifies a chapter of Sigma Xi, and that having a chapter here will in turn stimulate and encourage the concern for research which is particularly needful for educational health and national welfare at this time.

Sincerely,

/s/ Bruce Dearing

Bruce Dearing  
Dean

COPY

UNIVERSITY OF DELAWARE  
Newark, Delaware

School of Engineering  
Office of the Dean

November 29, 1957

The Executive Committee  
The Society of the Sigma Xi

Dear Sirs:

I am happy to support the application of the Sigma Xi Club of the University of Delaware for establishment of a formal chapter at this institution.

Research is a most important part of our program. In Chemical Engineering we have had a well rounded research program for nearly twenty years. With our new staff and facilities, the research activities in other areas of engineering science are growing rapidly. We now have research, both sponsored and unsponsored, active in all departments of the School of Engineering. All prospective faculty members are carefully interviewed to determine that they are interested in our research programs. We regard such research activities essential to assure continued growth of our faculty and improvement of our courses and programs.

The presence of a Sigma Xi Chapter on this campus would provide a means of encouragement and recognition to successful students engaged in research activities.

Sincerely,

/s/ W. W. Hagerty

W. W. Hagerty  
Dean

COPY

UNIVERSITY OF DELAWARE  
Newark, Delaware

School of Home Economics

December 12, 1957

The Executive Committee  
Society of Sigma Xi

Gentlemen:

This institution has long been dedicated to strengthening its research program, and with the inauguration of research in nutrition in 1954, each of the academic schools of the University is engaged in research activities.

Faculty members and research workers who are members of Sigma Xi have been meeting informally for several years, and this group has been quite active in terms of bringing outstanding scientists to the campus each year.

The establishment of a chapter of Sigma Xi on this campus would enable the group to give due recognition to able graduate students conducting research. Also, in my opinion, Sigma Xi would serve to stimulate interest in research as a continuing effort among both undergraduate and graduate students.

It is a pleasure to endorse the application of our local Sigma Xi Club, and I trust that the activities of this group will justify favorable action by your committee.

Respectfully yours,

/s/ Irma Ayers

Irma Ayers  
Dean



## HISTORICAL SKETCH OF THE UNIVERSITY

The University of Delaware had its inception in a little institution of colonial days founded in 1743 near New London, Pennsylvania, by a Presbyterian clergyman, the Reverend Francis Alison. The academy was made the official educational institution of the Synod of Philadelphia on May 25, 1744. When the Reverend Alexander McDowell succeeded Dr. Alison as principal in 1752, he removed the school to his manse located in the north-western corner of Cecil County, Maryland, near Lewisville, Pennsylvania. It was removed then to Newark, Delaware, by Mr. McDowell in 1765 and chartered by Thomas and Richard Penn on November 10, 1769. Instruction in the academy was interrupted by the Revolutionary War in the period between 1777 and 1780 and again by financial difficulties between 1796 and 1799. From this time until 1834 it continued as one of the outstanding academies of its day.

When the degree-granting institution known as Newark College was opened on May 8, 1834, under a charter granted by the General Assembly of Delaware on February 5, 1833, Newark Academy was merged with it as its preparatory department. The name of the institution was changed to Delaware College by an Act of the General Assembly on February 7, 1843. As a result of a succession of financial misfortunes, the collegiate department of the institution was closed from 1857 to 1870, although the academic department continued to function throughout these years. Instruction in the collegiate department of the institution was resumed on September 14, 1870, and work below the collegiate grade was discontinued.

The College had meanwhile been designated by an Act of the General Assembly of March 14, 1867, as beneficiary under the Act of Congress, approved on July 2, 1862, and known as the Morrill Act, which apportioned to each of the several states large areas of public lands to form the bases of endowments for colleges which must include in their curricula courses in agriculture, the mechanic arts, and military tactics. The College remained under combined private and State ownership until March 19, 1913, when by an Act of the General Assembly it came into the sole possession of the State.

The Women's College, a college for women affiliated with Delaware College, was established by an Act of the Delaware Legislature on March 31, 1913, and was opened to students on September 15, 1914. On March 28, 1921, by an Act of the Legislature, Delaware College and the Women's College were united under the name of the University of Delaware. Separate classes were still held for men and women, however.

On September 16, 1944, the Board of Trustees adopted a new administrative structure for the University, according to which the two existing Colleges were completely merged into the University organization.

## GENERAL INFORMATION

	Current Year (1957-58)	Five Years Ago	Ten Years Ago
<b>a. Students and Faculty</b>			
Undergraduates	2307	1722	1817
Graduate Students	911	645	446
Professors (full)	67	52	34
Professors (Assoc., Asst.)	122	100	58
Instructors	44	50	58
Special Lecturers, etc.	10	10	6
<b>b. Degrees Granted</b>			
	<u>Last Year</u>	<u>Five Years Ago</u>	
Undergraduate Degrees Total	414	367	
Graduate Degrees			
Masters	132	113	
Doctors	21	25	
Total	153	138	
<b>c. Finances</b>			
Approximate book value of plant and equipment		\$16,268,000.00	
Approximate annual income			
1. Education and General			
a. From Endowment		468,000.00	
b. From Fees		1,090,000.00	
c. From State Government		2,840,000.00	
d. From Federal Government		479,000.00	
e. Sales and Services of Educational Departments and Other Sources		446,000.00	
2. Contract Research		237,000.00	
3. Auxiliary Enterprises		1,093,800.00	
4. Student Aid Income		12,000.00	
Total		\$6,665,800.00	
<b>d. List of major departments</b>			
For the B. A. degree:			
Art			
Biological Sciences			
Chemistry			

Dramatic Arts and Speech  
Economics and Business Administration  
Education  
English  
History  
Mathematics and Astronomy  
Modern Languages and Literatures  
Music  
Philosophy  
Physics  
Psychology  
Sociology, Anthropology, and Geography

For the B. S. degree:

Agriculture Economics  
Agronomy  
Animal and Poultry Industry  
Biological Sciences  
Chemistry  
Economics and Business Administration  
Education  
Entomology  
Home Economics  
Horticulture  
Medical Technology  
Nursing  
Physics  
Plant Pathology

For the B. Ch. Eng. degree: Chemical Engineering

For the B. C. Eng. degree: Civil Engineering

For the B. E. Eng. degree: Electrical Engineering

For the B. M. Eng. degree: Mechanical Engineering

For the M. A. and M. S. degrees:

Agricultural Economics  
Agronomy  
American Studies  
Animal Industry  
Biological Sciences  
Chemistry  
Dramatic Arts and Speech  
Economics  
Education  
English  
Entomology  
History  
Home Economics  
Horticulture  
Mathematics and Astronomy  
Philosophy  
Physics  
Plant Pathology  
Political Science  
Poultry Industry  
Psychology  
Sociology

Statistics

For the M. B. A. degree (Master of Business Administration):  
Economics and Business Administration

For the M. Ed. degree (Master of Education):  
Education

For the M. Ch. Eng. degree: Chemical Engineering

For the M. C. Eng. degree: Civil Engineering

For the M. E. Eng. degree: Electrical Engineering

For the M. M. Eng. degree: Mechanical Engineering

For the Ph. D. degree:  
Biological Sciences (and Agriculture)  
Chemical Engineering  
Chemistry

e. Departments of instruction

Agricultural Economics  
Agronomy  
Ancient Languages and Literatures  
Animal and Poultry Industry  
Art  
Biological Sciences  
Chemical Engineering  
Chemistry  
Civil Engineering  
Dramatic Arts and Speech  
Economics and Business Administration  
Education  
Electrical Engineering  
English  
Entomology  
Geology  
History  
Home Economics  
Horticulture  
Mathematics and Astronomy  
Mechanical Engineering  
Military Science and Tactics  
Modern Languages and Literatures  
Music  
Philosophy  
Physical Education  
Physics  
Plant Pathology  
Political Science  
Psychology  
Sociology, Anthropology and Geography

THE FACULTY OF THE UNIVERSITY OF DELAWARE

1957-58

OFFICERS OF ADMINISTRATION

- John Alanson Perkins, A.B., M.A., and Ph.D. (Michigan), President
- Carl John Rees, M.A. (Chicago), Ph.D. (Pennsylvania), A.B. and Sc.D. (Franklin and Marshall), Provost and Dean of the School of Graduate Studies.
- Irma Ayers, B.S. (West Virginia), M.S. (Pennsylvania State), Ed.D. (Columbia), Dean of the School of Home Economics.
- James I. Clower, B.S.M.E. (Pennsylvania State), M.E. (West Virginia), Asst. Dean of the School of Engineering.
- Bessie B. Collins, B.S. and M.S. (Pennsylvania), Dean of Women.
- John M. Dawson, A.B. (Tulane), B.S. (Louisiana State), Ph.D. (Chicago), Director of Libraries.
- G. Bruce Dearing, A.B. (Allegheny), M.A. (Iowa State), Ph.D. (Iowa), Dean of the School of Arts & Science.
- William George Fletcher, A.B. (McMaster), M.A. (Toronto), Ph.D. (Johns Hopkins), Director of Admissions and Records.
- Gordon Clay Godbey, A.B. and M.A. (Kentucky), Ed.D. (Harvard), Director of University Extension.
- William Walsh Hagerty, Ph.D. (Michigan), Dean of the School of Engineering.
- John Evans Hocutt, B.S. (William & Mary), M.S. (Ohio State), Dean of Students.
- James Christos Kakavas, B.S. and M.S. (Massachusetts), Ph.D. (Yale), Associate Dean of the School of Graduate Studies.
- David M. Nelson, B.S. and M.S. (Michigan), Director of the Division of Physical Education and Athletics.
- Bruce J. Partridge, A. B. (Oberlin), LL.B. and J.D. (Blackstone Law), Business Administrator.
- William O. Penrose, A.B. and M.A. (Arkansas), Ed.M. and Ed.D. (Harvard), Dean of the School of Education and Director of the Summer School.
- G. Fred Somers, B.S. (Utah State), A.B. and B.S. (Oxford), Ph.D. (Cornell), Associate Dean of the School of Agriculture and Associate Director of the Agricultural Experiment Station.
- Daniel W. Wood, A.B., M.A. (Delaware), Administrative Assistant to the President.
- George M. Worrilow, B.S. (Maryland), D.Ag. (Maryland), Dean of the School of Agriculture and Director of the Agricultural Experiment Station and Agricultural and Home Economics Extension.

OFFICERS OF INSTRUCTION

PROFESSORS

- Augustus Henry Able, III, A.B., M.A., and Ph.D. (Pennsylvania), Professor of English.
- Ned Bliss Allen, A.B. (Dartmouth), A.B. (Oxford), Ph.D. (Michigan), Professor of English.
- Irma Ayers, B.S. (West Virginia), M.S. (Pennsylvania State), Ed.D. (Columbia), Professor of Home Economics and Dean of the School of Home Economics.
- Harriet Thorpe Baily, M.A. (Columbia), Professor of Art, Emeritus.
- Thomas Alexander Baker, Ph.D. (Cornell), Professor of Animal Husbandry.
- Robert Otis Bausman, Ph.D. (Cornell), Professor of Agricultural Economics, Emeritus.
- Harold C. Beachell, A.B. and M.A. (Queens), A.A. (Regina), Ph.D. (New York University), Professor of Chemistry.
- Jack N. Behrman, B.S. (Davidson), M.S. (North Carolina), M.A. and Ph.D. (Princeton), Professor of Economics.
- Eugene P. Brasher, B.S. (Missouri), M.S. (Pennsylvania State), Professor of Horticulture.
- Dale F. Bray, B.S. and M.S. (Michigan State), Ph.D. (Rutgers), Professor of Entomology.
- Paul J. Brennan, D.Eng. (Yale), Professor of Civil Engineering.
- Edwin Colby Byam, A.B. (Boston), Ph.D. (Johns Hopkins), Professor of Modern Languages and Literature, Emeritus.
- Arnold M. Clark, A.B. (Pennsylvania State), M.A. and Ph.D. (Pennsylvania), Professor of Biological Sciences.
- Lyle G. Clark, Ph.D. (Michigan), Professor of Mechanical Engineering.
- James I. Clower, B.S. M.E. (Pennsylvania State), M.E. (West Virginia), Professor of Mechanical Engineering.
- J. Fenton Daugherty, A.B. (Dickinson), M.A. and Ph.D. (North Carolina), Professor of Physics.
- Cyrus Lawrence Day, M.A. (Columbia), A.B. and Ph.D. (Harvard), Professor of English.
- G. Bruce Dearing, A.B. (Allegheny), M.A. (Iowa State), Ph.D. (Iowa), Professor of English.
- Louis Reinhold Detjen, M.S. (North Carolina State), Professor of Horticulture, Emeritus.
- Quaesita Cromwell Drake, A.B. and M.A. (Vassar), Ph.D. (Chicago), Professor of Chemistry, Emeritus.

Arthur Ray Dunlap, A.B. (Acadia), M.A. (Harvard), Ph.D. (Yale), Professor of English.

Albert H. Dunn, III, B.S. (Amherst), M.S. and D.C.S. (Harvard), Professor of Business Administration.

Elizabeth Dyer, A.B. and M.A. (Mt. Holyoke), Ph.D. (Yale), Professor of Chemistry.

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William George Fletcher, A.B. (McMaster), M.A. (Toronto), Ph.D. (Johns Hopkins), Professor of Ancient Languages and Literatures.

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## SCIENTIFIC EQUIPMENT AND LIBRARY RESOURCES

### A. Equipment:

#### Agricultural Biochemistry and Food Technology

Warburg manometric apparatus  
Vacuum oven with vacuum pump  
Muffle furnace with controller  
Brabender drying oven  
Centrifuge, refrigerated, with high speed attachment  
and other accessories  
Kjeldahl nitrogen apparatus  
Polarigraph - strip chart recorder  
Friden calculator  
Deep freezer - 24 cubic foot  
Water bath - Cenco - DeKhotinsky  
Water bath cooler  
Analytical balance, Mettler  
Beckman DU spectrophotometer, Quartz optics, UV  
attachment and reflectance attachment  
Wiley mill with motor  
Geiger counter and scaler  
Platinum crucibles, dishes, etc., for ash analyses

#### Agronomy

Autoclave  
Analytical balance  
Spectrophotometer, Beckman, Model B  
Centrifuge  
Two electric non-sparking ovens  
Calculator  
One compound microscope  
Van Slyke apparatus  
Automatic fraction cutter  
Barnstead water still  
Large dryer for plant material  
Seed cleaning equipment  
Plot sized threshing machine

#### Animal and Poultry Industry

Refrigerated ultra centrifuge (Spinco)  
Autotechnicon  
2 Incubators for virus propagation in eggs  
Subzero mechanical freezer cabinet  
Dry ice cabinet  
1 Chest type 15 cu. ft. freezer  
Semi-automatic Christian-Becker balance  
Electrophotometer  
Beckman Zeromatic pH meter  
Bomb calorimeter  
3 Binocular microscopes  
1 Monocular microscope  
1 Stereomicroscope  
1 Constant temperature water bath  
1 Autoclave  
1 Electric oven  
1 International centrifuge

#### Animal and Poultry Industry (cont.)

8 Starting batteries for chicks (400 chick capacity)  
17 Growing batteries for chicks (200 compartments - 10  
chicks each to 10 weeks of age)  
3 Metabolism crates for calves  
6 Metabolism crates for sheep  
4 Constant temperature and constant humidity rooms for poultry  
(12' x 12' each)

#### Biological Sciences

Laboratories well equipped with standard equipment and materials  
for both teaching and research; also available for research are:

Paraffin oven  
Radiation facilities at Delaware Hospital  
(Wilmington)  
Microbalances  
Ordinary, polarized and phase microscopes  
Microtomes  
Histologic freeze-dry equipment  
Warburg respirometer  
Ultracentrifuge  
Spectrophotometer  
Autoclaves  
Incubators  
Photomicrographic camera  
Oscilloscope  
Recording potentiometers  
Microchemical centrifuge

#### Chemistry

Standard equipment for regular undergraduate laboratories and for  
graduate research laboratories; special equipment for research  
includes:

Baird spectrophotometer (infrared)  
Perkin-Elmer spectrophotometer (infrared and visible)  
Beckman, DU, infrared and visible range spectrophotometers  
Light scattering equipment  
Hilger Raman spectrometer  
Near infrared (short range) spectrophotometer  
Automatic recording pH meter  
Sargent: XXI Polarograph (recording)  
Heterodyne beat apparatus for dipole moments  
Complete conductivity equipment for high precision  
Complete optical benches for special work with gases (as  
boron hydrides)  
Ozonizers for special research  
The latest type hydrogenation equipment  
U. V. and visible range spark and arc emission spectrometer  
(Lane-Wells)  
X-ray (G.E.) cabinet type, equipment for crystal powder work  
(both regular and back reflection cameras)  
Complete photographic equipment for any necessary research  
procedures

## Engineering

**Chemical Engineering:** The Chemical Engineering Department has facilities for research in unit operations, thermodynamics, and chemical kinetics. Among the unusual facilities is a large semi-works distillation unit used for research in distillation column efficiencies, and several pieces of apparatus for studying chemical structure and fluid flow patterns in gas flames. The department maintains its own machine shop used for construction of research equipment.

**Civil Engineering:** The Civil Engineering Department has laboratory facilities for study of static and dynamic vibrations for soil, concrete, external stress analysis, fatigue, fluid mechanics, photogrammetry, and the chemical and biological analysis of water. Major equipment includes a tow tank 120 feet long, 8 feet wide and 5 feet deep. The single largest piece of equipment is a universal testing machine of one million pounds capacity. Rooms at controlled temperature include an elevated temperature room, and walk-in rooms at 40°F. below and 20°C. above.

**Electrical Engineering:** The Electrical Engineering Department has facilities for the study of ultra-high frequency, radioengineering, industrial electronics, solid-state phenomena, and servo-mechanisms. An analog computer and a measurements and standards laboratory are also available. Nuclear instrumentation is provided.

**Mechanical Engineering:** Mechanical Engineering Department has facilities in fuels and lubrication laboratory, air conditioning and refrigeration, and instrument development. Major equipment is available for solar energy studies.

## Entomology

Major equipment includes:

- Microscopes and accessories
- Insect storage cabinets containing 90,000 pinned specimens, 40,000 liquid specimens, and 5,000 slide specimens
- Specialized spraying apparatus
- Temperature-humidity chambers
- Unitized laboratory facilities

## Horticulture

Major equipment includes:

- Multiple point temperature recorder
- Two walk-in refrigerators
- Pump and irrigation equipment
- Autoclave
- Cameras and projection equipment
- Greenhouse - headhouse and two ranges
- Grading and packing equipment for fruits and vegetables
- Farm equipment necessary for field plant research

## Physics

Major items of research equipment:

- Varian Model 4300A High-Resolution Nuclear Magnetic

## Physics (cont.)

- Resonance Spectrometer with 6-inch magnet and associated apparatus

- 4240 gauss permanent magnet and associated apparatus for observing nuclear quadrupole resonances

- Stark cells (K-band and X-band) with 100 kc, 1000-volt modulator for observing Stark effect on gases, plus associated equipment

- Absorption cell (K-band) and associated equipment for observing widths of microwave spectral lines and thus determining collision diameters and quadrupole moments of gases

- High-frequency (G-band) absorption cell and associated equipment for observing microwave spectral lines in 60-90 mc region

- Well-equipped machine shop and full-time machinist

## Plant Pathology

- Dry-air sterilizer
- Aloe controlled-temperature water bath
- pH meters
- Precision Scientific controlled temperature chambers
- Philco stock-culture refrigerators
- Spencer microtome
- Research microscopes
- Autoclave
- Dissecting microscopes
- Photomicrographic camera equipment
- Precision microbalances

## Psychology

Research equipment includes:

Good assortment of the classical apparatus in experimental psychology. Some of the more unusual items are Tachistoscopes (Whipple and Dodge), Esterline-Angus Operations Recorder, E-A Galvanometer, kymographs, chronometers, voice keys, Western Electric tape-punching and -reading programming equipment, MacBeth Illuminometer, Kaeler Polygraph, and electronic stimulus timer; two dark rooms for visual research; a small-animal colony and surgery equipped with microscopes, ECS stimulator, Skinner boxes, mazes, and discrimination apparatus; a carpentry shop with good selection of power and hand tools for apparatus repair and adjustment; and seven calculating and adding machines add to the research facilities in general experimental areas. A wide variety of clinical and testing instruments, and test-construction equipment is available; two rooms with one-way observation facilities extend clinical and group-dynamic research capacities. Along more specialized lines, the department also has an 8-channel Grass Electroencephalograph, with EKG and EMG filter networks, with an (Ace) shielded room for its use. A quite

## Psychology (cont.)

unusual facility is the noise room for psychoacoustic research. This room, acoustically isolated, contains equipment for generating noise of specified spectrum at levels up to 120 db SPL. The Psychoacoustic equipment also includes oscillators, oscilloscopes, sound level meters, noise analyzer, amplifiers, earphones, and tape recorders, including a 2-channel Magnecorder. The acquisition of a wave analyzer, and of research quality audiometric equipment is planned for the near future.

## B. Library Resources

Memorial Library, erected by the citizens of Delaware in 1924 as a State War Memorial and enlarged in 1939, dominates the campus scene by reason of its position across the central green midway between the northern and southern extremes of the main campus. In the center of the entrance rotunda is preserved the State's Book of Remembrance, a record of the names of the State's dead of World War I, surrounded by the flags of the State and Nation, of our Allies, and of the military unit existing in the University in World War II.

The library contains about 235,000 volumes including a large collection of documents which it receives as an official depository for publications of the United States Government. The Library subscribes to 900 periodicals.

Special collections include the Delaware Collection of local reference; the Esther Schwartz Collection of books on the American decorative arts; the William Hazlitt Collection of printed writings of that English author, some items of which are not available elsewhere; the Christopher Ward Collection, consisting of the reference library of Christopher Ward (maps and about 3,000 books), together with the late Mr. Ward's own publications; a Letter and Diary Collection, about 5,000 volumes, all in the English language and all day-dated.

Special technical collections are maintained by the Department of Chemistry, with 4,983 volumes, and the School of Agriculture, with 10,027 volumes.

## RESEARCH ACTIVITIES AND FACILITIES

### 1. Research Activities

#### (a) Number of investigators now at work on problems

Faculty	76 (including Agricultural Experiment Station)
Graduate Students	163
Undergraduates	20

#### (b) Number of papers presenting original investigations published each year for the preceding 6 year period

<u>Year</u>	<u>Number</u>
1953	61
1954	74
1955	71
1956	64
1957	50
1958	77

### 2. Research Facilities

#### (a) Approximate percentage of time specifically provided or free for research: All ranks 25 to 30 per cent

#### (b) Annual Expenditures for Research

Approximately \$600,000.00 (exclusive of Agricultural Experiment Station, which likewise expended approximately \$600,000.00 for research).

#### (c) Neighboring Research Institutions:

The University of Delaware is situated 12 miles south of Wilmington, Delaware, approximately 45 miles from Baltimore, Maryland, and 38 miles from Philadelphia, Pennsylvania. It would prove difficult to include all the research in such a region. A few of these institutions are:

#### Educational:

Johns Hopkins University, Baltimore  
University of Pennsylvania, Philadelphia  
Temple University, Philadelphia  
Drexel Institute of Technology, Philadelphia  
Swarthmore College, Swarthmore, Pennsylvania

#### Governmental:

Army Chemical Center, Edgewood, Maryland  
Aberdeen Proving Grounds, Aberdeen, Maryland  
Marine Biological Laboratory, Lewes, Delaware  
Eastern Utilization Branch Laboratory, U.S.D.A.,  
Philadelphia, Pennsylvania

Commercial:

E. I. duPont deNemours Company, Wilmington, Delaware  
 Hercules Powder Company, Wilmington, Delaware  
 Atlas Powder Company, Wilmington, Delaware  
 Biochemical Research Foundation, Newark, Delaware  
 Houdray Process Corporation, Marcus Hook, Pennsylvania  
 General Chemical Company, Marcus Hook, Pennsylvania  
 Franklin Institute, Philadelphia, Pennsylvania  
 Sun Oil Company, Marcus Hook, Pennsylvania  
 Sinclair Oil Company, Marcus Hook, Pennsylvania  
 Tidewater Oil Company, Delaware City, Delaware

(d) The University has no fixed system for sabbatical leaves. Each leave is considered on its own merits.

(e) Research is encouraged by the following means:

- (1) For evaluation of new staff prospects and for promotion to the next higher academic rank the ability of the individual to develop significant research in his field is of prime importance.
- (2) Attendance at professional meetings is encouraged, especially in the event that the individual is to present a paper in his field. Suitable reimbursement is offered.
- (3) Honoraria from college funds are provided for visiting speakers on scientific research topics.
- (4) Summer Grants-in-Aide are available to faculty requesting them. Leaves of absence to members of the staff who have won traveling lectureships, research fellowships for work abroad or otherwise away from the University, are granted with commendations to recipients.
- (5) College facilities are made available for meetings of several local and regional scientific societies throughout the year.

FUNDS FOR SPONSORED RESEARCH

SPONSOR	FUNDS FOR SPONSORED RESEARCH				
	1953-54	1954-55	1955-56	1956-57	1957-58
Experiment Station Division, U. S. Department of Agriculture	\$138,619.54	\$164,184.50	\$188,707.17	\$215,524.00	\$261,567.00
Other Federal Agencies	282,530.66	269,499.90	280,066.05	164,331.04	199,705.38
State of Delaware	263,559.00	257,659.00	265,951.42	322,616.30	349,161.27
Foundations	96,538.95	82,765.67	157,597.67	161,650.39	228,468.74
Industry	158,603.00	115,714.50	46,808.88	41,351.48	53,632.37
University	128,338.15	131,675.08	212,305.52	235,773.29	227,695.12
TOTAL SPONSORED RESEARCH	\$1,068,189.30	\$1,021,498.65	\$1,151,436.71	\$1,141,246.50	\$1,320,229.88

## PROBLEMS UNDER INVESTIGATION

### Department of Agricultural Biochemistry and Food Technology

Chemistry of pectins and other polysaccharides in ripening fruits  
Chemical changes which occur during the marketing of poultry and mushrooms  
Protein metabolism in rats and humans  
Chemistry of non-cellulosic constituents of plant cell walls

### Department of Agricultural Economics

Economics of irrigation  
Marketing of poultry  
Economics of forage programs in Delaware  
Consumer acceptance of mushrooms

### Department of Agronomy and Agricultural Engineering

Variety and breeding trials of agronomic crops  
Soybean fertilization and cultural practices  
Weed control in soybeans  
Corn irrigation  
Chemistry of soil organic matter  
The role of microbial gums in soils  
Green manuring practices  
Effect of irrigation and fertilization on root growth of forage species  
Factors influencing production and marketing of hay  
Investigation of soil profiles  
Identification of grass species  
Poultry housing  
Harvesting vegetable crops

### Department of Animal and Poultry Industry

Evaluation of forages, pastures, and lima bean silage as cattle feed  
Study of thyroid activity in chickens  
Growth factors in broilers  
Antibiotics and energy supplements for laying hens  
Processing of broilers  
Ketosis in cattle  
Improvement of dairy herd  
Iodine levels in cattle  
Chronic respiratory disease and synovitis in chickens  
Evaluation of protozoacides

### Department of Biology

Age and growth analysis of the trout (Cynoscion regalis)  
Spawning of the sea trout (Cynoscion regalis)  
Histology of the reproductive system of female elasmobranchs  
Racial analysis of the sea trout (Cynoscion regalis)  
Life history study of the eagle ray (Myliobatis fremovilli)  
Life history study of the northern sting ray (Dasyatis centroura)  
Development of the horned passalus beetle, Popilius disjunctus Illiger  
Serology and morphometry of Limulidae  
Bivalve shell structure  
Survival and growth of Callinectes in low salinity waters  
Survey of Delaware oyster beds  
Effects of ionizing radiations and radio-mimetic chemicals on corn seedlings.

### Department of Biology (cont.)

Energetics of ciliary activity  
Respiration of Chlamydomonas  
Mechanisms of radiation damage  
Oxygen poisoning effects on development  
Ecology, distribution and behavior of intertidal insects and associated fauna of the Atlantic and Gulf Coasts  
Revision of the Bryozoa of the Woods Hole Region  
Study of the physiological and biochemical mechanisms at the rest period in seeds  
Transduction of K antigen in Escherichia coli

### Department of Chemical Engineering

Application of digital and analog computers in the resolution of research problems  
Gaseous combustion kinetics  
Distillation column performance  
Mechanics of non-Newtonian fluids  
Catalytic reaction rate phenomena  
Shell and tube heat exchanger design  
Automatic control devices and transient performance of chemical process equipment

### Department of Chemistry

Phase studies of ternary systems  
Thermodynamic investigations of certain reversible cells with electrodes of silver, silver salts or the saturated aliphatic acids of six to 14 carbon atoms  
Polarographic kinetic studies of hydrazones, etc. of the hexose and pentose sugars  
Investigations of new heterocyclic systems and their reactions  
Structure determination of natural products  
Reaction mechanism studies  
Structure of addition products obtained from unsymmetrical olefins  
Benzilic acid rearrangement during addition to bicyclic olefins  
Reactivity of sulfur and oxygen analogs  
Molecular rearrangements  
Mechanism of oxidation reactions  
Aliphatic hydrocarbons and terpenes  
Thermal degradation of monomeric and polymeric urethans  
Kinetics of reactions of isocyanates with alcohols and with thiols  
Synthesis of polyurethans  
Synthesis of anticonvulsants, especially thiomorpholinediones  
Oxazolidines and pyrrolidinetriones  
Reactions of cyanohydroxycinnamates  
Syntheses in the barbituric acid series  
Mechanism of action of sarcosine oxidase  
Biosynthesis of felinine  
Adaptive enzyme formation  
Interrelationships of vitamin B<sub>6</sub> and essential fatty acids  
The oxidation of 1,3 - thiazane - 4 - carboxylic acid by D-amino acid oxidase  
Syntheses in the purine and pyrimidine series  
Polar interactions of proteins and polysaccharides  
Entropies of dilution of strong electrolytes

Department of Civil Engineering

Prestressed concrete highway slabs  
Expansive properties of concrete materials  
Impact and blast effects of welded structural steel connections  
Rainfall and run-off relationships  
Water resources problems  
Particle sedimentation  
Vibration in soil masses  
Triaxial stresses in concrete

Department of Electrical Engineering

Radio astronomy  
Properties of insulating materials

Department of Entomology

Mosquito flight-range studies  
Toxicity of insecticides to mosquitoes and muskrats  
Control of insects attacking fruits, vegetable, and forests  
Distribution and abundance of economic insects  
Biology and control of clover mite  
Effect of impounding water on mosquito production  
Taxonomy of Phillipine mosquitoes

Fels Group Dynamics Center

Studies of conditions affecting the acquisition of imitation and  
aposition response  
Studies of decision making under conditions of uncertainty

Department of Geology

Lithostratigraphy and biostratigraphy of the nonmarine  
Cretaceous sediments of northern Delaware  
Mineralogy and micropaleontology of the Tertiary and Cretaceous  
sediments in a testhole drilled at the Dover Air Force Base  
Engineering soil survey of Delaware  
Geology and water resources of Sussex County

Department of Horticulture

Problems of asparagus culture  
Weed control in vegetables  
Agricultural climatology and irrigation problems  
Fruit dwarfing stocks, soil management and variety tests.  
Breeding and variety trials of vegetables  
Yield and chipping quality of potatoes  
Growth regulators  
Greenhouse soil fertility  
Nutrition in hollies

Department of Mathematics

Transient behavior of a packed absorption column  
Poker playing by computer  
Cuttings of topological spaces  
Cuttings of topological spaces applied to fixed point theorems  
The problem of negative estimates of variance components  
The generalized intercept problem

Department of Mathematics (cont.)

A study of Fick's equation  
A study of the compatibility of systems of ordinary differential  
equations  
To determine the solution of the Cauchy problem for the non-  
homogeneous wave equation in n-space variables  
A study of the characteristic geometric properties of Banach spaces  
Homology structure of loop-spaces over groups

Department of Mechanical Engineering

Solar energy  
Bending and stability of thin elastic laminated plates  
Stability of flow of viscous incompressible fluids.  
Heat transfer and energy dissipation of viscous  
incompressible fluids.

Department of Physics

Collision diameters and quadruple moments from the broadening  
of the ammonia inversion spectrum by various foreign gases

Department of Plant Pathology

Control of phytopathogenic soil organisms (bacteria, fungi, nematodes)  
Study of apple fruit rots  
Pepper and lima bean diseases  
Vegetable diseases and irrigation  
Ornamental diseases and their control  
New fungicides

Department of Psychology

Some relationships among vocabulary, practice and intelligibility  
Speech intelligibility in parallel communication nets  
Psycho-physical judgment behavior and personality test patterns  
Anticipatory and instrumental response congruence as reinforcement:  
a theoretical synthesis  
The construction and evaluation of a screening program for ministerial  
students  
A validation study of a selection program for systems operators  
Human Development (text-book in progress)  
The inter-relationship of psycho-motor tests at three development levels  
Relationship of learning curves to psycho-motor intelligence  
The relationship of abstract thinking to religious conformity  
The incidence and nature of mental retardation and its effect on the  
pool of available manpower

**PUBLICATIONS OF THE MEMBERS OF THE SCIENCE DEPARTMENTS  
UNIVERSITY OF DELAWARE  
1953-1958, INCLUSIVE**

DEPARTMENT OF AGRICULTURAL BIOCHEMISTRY AND FOOD TECHNOLOGY

Hughes, Donald H.

- 1957 The cause of the discoloration of fresh market mushrooms. Amer. Mushroom Inst. News 3(4): 1-6.
- 1957 Test plan for vacuum cooling experiments. Ibid 3(8): 3 (with R. L. Carey).
- 1957 Results of vacuum cooling experiments. Ibid 3(10): 4-5 (with R. L. Carey).
- 1957 A progress report on discoloration research. Proc. 2nd Ann. Mushroom Short Course, Penn State Univ. (in press).
- 1958 Washing and packaging equipment. Amer. Mushroom Inst. News 4(1): 6-7.
- 1958 Some chemical properties of mushrooms and how they affect your marketing. Ibid 4(1): 9-13.
- 1958 Principles of washing fresh market mushrooms. Ibid 4(3): 2.
- 1958 Chemical properties of mushrooms. Mushroom Growers Assoc. Bull., England (in press).
- 1958 A chromatographic identification of the amino acids and carbohydrates in the cultivated mushroom, Agaricus campestris L. ex Fries. (with G. F. Somers and D. L. Lynch) (in press).
- 1958 Principles and practices of washing fresh market mushrooms. Proc. 3rd Ann. Mushroom Short Course, Penn State Univ. (in press).
- 1958 Amino acids and carbohydrates in mushrooms - a progress report Ibid (with G. F. Somers) (in press).

McClendon, J. H.

- 1953 The intracellular localization of enzymes in tobacco leaves. II. Cytochrome oxidase, catalase, and polyphenol oxidase. Amer. Jour. Botany 40: 260-266.
- 1954 The physical environment of chloroplasts as related to their morphology and activity in vitro. Plant Physiol. 29:448-458.
- 1955 Simple large scale ultrafiltration using osmotically forced dialysis. Plant Physiol. 30:485 (with G. F. Somers).
- 1956 Identification of protopectinase. Plant Physiol. 31: Suppl. XLIII (with G. F. Somers).
- 1958 Chemistry of arylboric acids VIII. The relationship between physicochemical properties and activity in plants. Acta

McClendon, J. H. - 1958 (cont.)

Chem. Scand. (With K. Torssell and G. F. Somers) (in press)

Somers, G. Fred

- 1949 Laboratory Experiments in Biological Chemistry, 2nd ed. Academic Press (with Summer, J. B.).
- 1953 Chemistry and Methods of Enzymes, 3rd ed. Academic Press (with J. B. Summer).
- 1955 Simple large scale ultrafiltration using osmotically forced dialysis. Plant Physiol. 30 (5):485 (with J. H. McClendon).
- 1956 Identification of protopectinase. Plant Physiol. 31 Suppl., XLIII, (with J. H. McClendon).
- 1957 Influence of shading upon changes in the ascorbic acid content of turnip greens as compared with changes in fresh weight, dry weight and nitrogen fraction. J. Nutrition 62: 39-60 (with W. C. Kelly).
- 1958 A chromatographic identification of the amino acids and carbohydrates in the cultivated mushroom, Agaricus campestris L. ex Fries. (with D. H. Hughes and D. L. Lynch). (in press).
- 1958 Chemistry of arylboric acids VIII. The relationship between physicochemical properties and activity in plants. Acta Chem. Scand. (with K. Torssell and J. H. McClendon). (in press).
- 1958 Amino acids and carbohydrates in mushrooms- a progress report. Proc. 3rd Ann. Mushroom Short Course, Penn State Univ. (with D. H. Hughes) (in press).

Woodmansee, C. W.

- 1954 Calcium pectinates, their preparation and uses. Adv. in Chemistry Series No. 11, pp. 3-9. (with G. L. Baker).
- 1954 The preparation of calcium pectinates and the effect of the degree of esterification on their gel properties. Del. Agr. Expt. Sta. Bull. 305, 27 pp. (with G. L. Baker).
- 1958 Coating sub-scalded broiler parts in order to afford protection against dehydration and skin darkening in fresh storage. Poultry Sci. (with O. J. Abbott) (in press).

DEPARTMENT OF AGRICULTURAL ECONOMICS

McDaniel, W. E.

- 1953 Changes in the dairy farming picture, their effect on farmers' earnings at various price levels. Minnesota Agr. Exp. Sta. Bul., No. 416, 20 pp. (with G. A. Pond).
- 1953 Influence of organization and production practices on income of Delaware vegetable farms. Del. Agr. Exp. Sta. Bul. No. 296, 27 pp.



McDaniel, W. E. - 1953 (cont.)

- 1953 Increasing net returns in producing tomatoes in Delaware. Del. Agr. Exp. Sta. A. E. Pamphlet No. 7, 8 pp. (with C. Wesley Webb).
- 1954 Milk handling--can or bulk tank? Del. Agr. Exp. Sta. Cir. No. 29, May (with T. A. Baker and B. L. Bondurant).
- 1955 Facts and figures about the broiler industry. Delaware Poultry Improvement Assn., Delaware Poultry Handbook, 10th ED., pp. 40-42.
- 1955 Delaware's competitive position in the production of tomatoes for processing. Del. Agr. Exp. Sta. Bul. Tech. No. 313, 34 pp.
- 1956 Profitability of alternative forage programs on Delaware dairy farms. Del. Agr. Exp. Sta. Pamphlet No. 14, 35 pp. (with William H. West).
- 1957 Annual gross cash farm income, farm production and amount sold by counties and commodities and annual net farm income in Delaware. Del. Agr. Exp. Sta. A. E. Pamphlet No. 17, 22 pp.
- 1958 Cost of irrigation in Delaware 1957, preliminary data. Dept. of Agr. Econ., Mimeo. 5 pp. (with H. M. Evans and W. T. McAllister).

Smith, R. C.

- 1953 Analysis of Chicago live poultry market, 1943 and 1949. Agr. Econ. Publ. No. 2937, 40 pp. Univ. of Ill. (with R. L. Lacy).
- 1953 Factors affecting consumer purchases of frying chickens. Del. Agr. Exp. Sta. Bul. 293, 33 pp.
- 1953 Consumer preferences for Delmarva broilers. Delaware Poultry Handbook, Delaware Poultry Improvement Assoc., p. 26.
- 1954 Factors affecting consumer purchases of frying chickens. Doctoral Dissertation, Univ. of Ill., 155 pp.
- 1954 Why the difference between farm, wholesale and retail prices for fryers? Delaware Poultry Handbook, Delaware Poultry Improvement Assoc., pp. 34, 36.
- 1955 What age and weight to market broilers? Del. Agr. Ext. Bul. No. 66, 6 pp.
- 1955 What age and weight to market broilers? Poultry Comment 12 (2):3 E. I. duPont deNemours and Co., Inc., June.
- 1955 Kind of litter and breast blisters on broilers. Poul. Sci., 35(3):593-595.
- 1956 Quality and farm price of Delaware broilers. Del. Agr. Exp. Sta. Bul. No. 317, 15 pp.
- 1956 Kind of litter and breast blisters on broilers. Delaware Poultry Handbook, Delaware Poultry Improvement Assoc. pp.24,26.

Smith, R. C. - 1957 (cont.)

- 1957 Quality and farm price of Delaware broilers. Delaware Poultry Handbook, Delaware Poultry Improvement Assoc. pp. 112-114.
- 1958 Factors affecting the bruising of broilers. Del. Agr. Exp. Sta. Bul. (Tech.) 323, 11 pp. (with W. K. Kaiser).
- 1958 Factors affecting the bruising of broilers. Delaware Poultry Handbook, Delaware Poultry Improvement Assoc., pp. 14, 18.

DEPARTMENT OF AGRONOMY AND AGRICULTURAL ENGINEERING

Cotnoir, Leo J., Jr.

- 1953 Soil fertility levels of grassland in some dairy sections of the Northeast. Agron. Jour. 45: 371-376 (with R. R. Robinson)
- 1956 Adsorption of carbohydrates and related compounds on clay minerals. Proc. Soil Sci. Soc. Amer. 20: 6-9 (with D. L. Lynch and L. M. Wright)
- 1956 The influence of clay minerals on the breakdown of certain organic substrates. Proc. Soil Sci. Soc. Amer. 20: 367-370 (with D. L. Lynch)
- 1957 The determination of polyuronides in soils with carbazole. Proc. Soil Sci. Soc. Amer. 21: 160-162 (with D. L. Lynch and E. E. Hearns)
- 1957 Some factors affecting the adsorption of cellulose compounds, pectins and hemicellulose compounds on clay minerals. Soil Sci. 84: 113-126 (with D. L. Lynch, L. M. Wright and E. E. Hearns)
- 1958 Breakdown of cellulose dextrin and gelatin in the presence of attapulgite. Nature (in press) (with D. L. Lynch and L. M. Wright)
- 1958 Nature's own soil conditioners. What's New in Soils and Crops 10: (with D. L. Lynch and J. K. Barczewski) (in press)

Indyk, H. W.

- 1957 Pre-emergence weed control in soybeans. Weeds 5 (4): 362-370.
- 1958 Chemical control of brush on drainage ditch banks. Proc. 12th Annual Meeting, Northeastern Weed Control Conference, pp. 246-256.

Lynch, D. L.

- 1953 Zinc status of some Illinois soils as estimated by an *Aspergillus niger* method. Soil Sci. Soc. Amer. Proc. 17: 111-114 (with T. C. Tucker, L. T. Kurtz)
- 1954 Inheritance of a non-nodulating character in the soybean. Agron. Jour. 46: 28-29 (with L. F. Williams)

Lynch, D. L. (cont.)

- 1956 Adsorption of carbohydrates and related compounds on clay minerals. Soil Sci. Soc. Amer. Proc. 20: 6-9 (with L. M. Wright and L. J. Cotnoir, Jr.)
- 1956 The influence of clay minerals on the breakdown of certain organic substrates. Soil Sci. Soc. Amer. Proc. 20: 367-370 (with L. J. Cotnoir, Jr.)
- 1957 The determination of polyuronides in soils with carbazole. Soil Sci. Soc. Amer. Proc. 21: 160-162 (with E. E. Hearn and L. J. Cotnoir, Jr.)
- 1957 Qualitative and quantitative chromatographic analyses of the carbohydrate constituents of the acid-insoluble fraction of soil organic matter. Soil Sci. 84: 405-411 (with H. O. Olney and L. J. Wright)
- 1957 Some factors affecting the adsorption of cellulose compounds, pectins and hemicellulose compounds on clay minerals. Soil Sci. 84: 113-126 (with L. M. Wright, E. E. Hearn, and L. J. Cotnoir, Jr.)
- 1957 A chromatographic analysis of the exudate of Xanthomonos vesicatoria. Phytopathology 47: 690 (with D. F. Crossan)
- 1958 Breakdown of cellulose dextrin and gelatin in the presence of attapulgite. Nature (with L. M. Wright and L. J. Cotnoir, Jr.) (in press)
- 1958 Some sugars and related carbohydrates found in Delaware soils. J. Sci. of Food and Agric. 1: 56-60 (with L. M. Wright and H. O. Olney)
- 1958 Nature's own soil conditioners. What's New in Soils & Crops 10: (with J. K. Barczewski and L. J. Cotnoir, Jr.) (in press)
- 1958 A qualitative comparison of the amino acid and sugar content of acid hydrolysates from the mycelium of several anthracnose fungi. Phytopathology 48: 55-57.
- 1958 The resistance of protein-lignin complexes, lignins and humic acid to microbial attack. Nature (with C. C. Lynch) (in press)
- 1958 A chromatographic identification of the amino acids and carbohydrates in the cultivated mushroom, Agaricus campestris L. ex Fries. (with G. F. Somers and D. H. Hughes) (in press)

Phillips, C. E.

- 1956 Weeds of the Northeast -- Aids to their identification by basal-leaf characteristics. Del. Agr. Exp. Sta. Field Manual No. 1.

Springer, F. B., Jr.

- 1954 Pre-emergence chemical weed control in soybeans. Univ. Del. M. S. Thesis.

Abbott, Okra J.

- 1954 Disappearance of the growth response of chicks to dietary antibiotics in old environment. Poul. Sci. 33: 1141.
- 1954 Effects of dietary arsenilic acid on chicks. Poul. Sci. 33: 1245-1253.
- 1955 Arsenic deposition in tissues of chickens fed arsenilic acid. Poul. Sci. 34: 1175.
- 1958 Coating sub-scaled broiler parts in order to afford protection against dehydration and skin darkening in fresh storage. Poul. Sci. (in press). (with C. W. Woodmansee).

Baker, T. A.

- 1926 Transmission of butter-fat percentage. Del. Agr. Exp. Sta. Bul. No. 145, 15 pp.
- 1953 Thirty years of herd improvement at the University of Delaware. Del. Agr. Exp. Sta. Bul. No. 306, 10 pp. (with A. E. Tomhave).
- 1956 Effect of varying levels of hay and silage consumption on total digestible nutrient intake. Dairy Sci. 39: 11. (with D. F. Owens and C. R. Richards).

Benton, William J.

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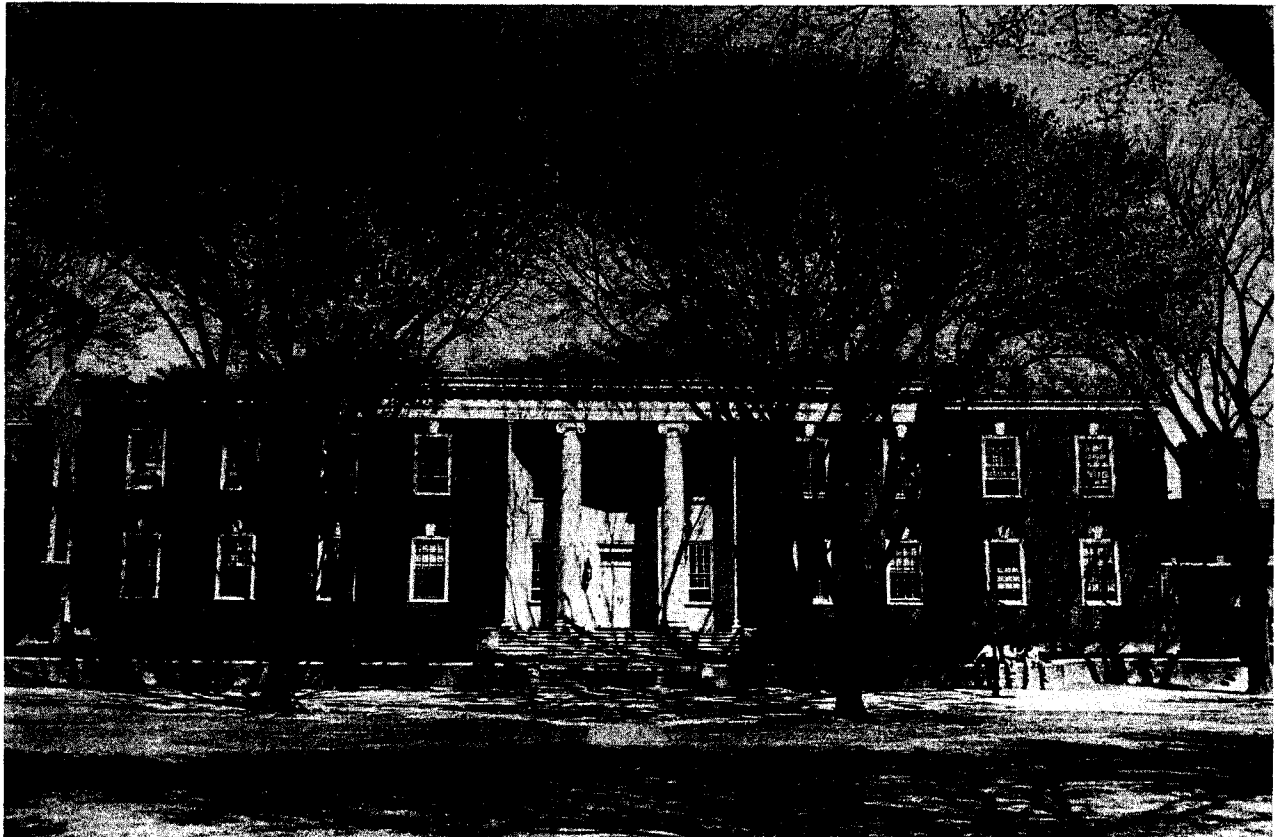
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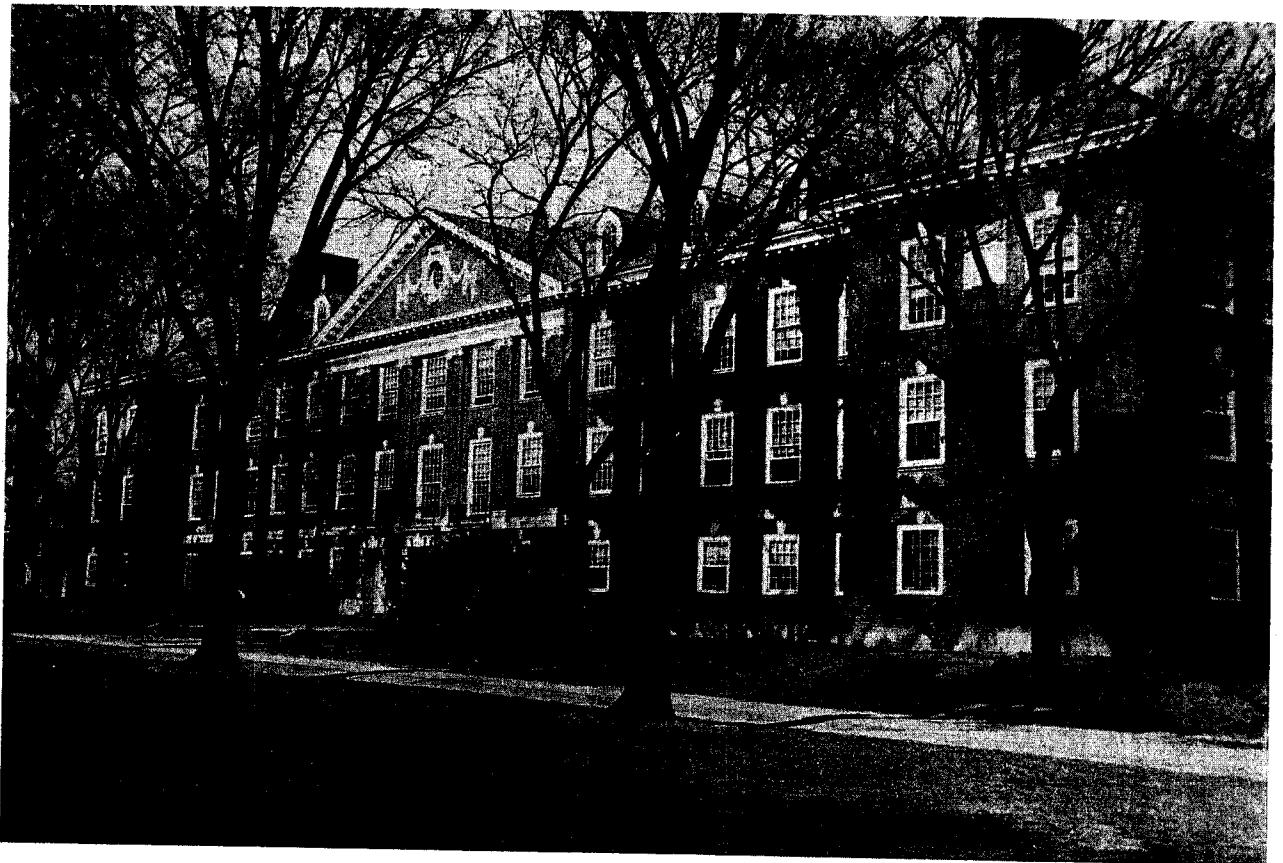
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