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# THE UNIVERSITY OF NORTH CAROLINA RECORD



RESEARCH IN PROGRESS  
OCTOBER, 1935—OCTOBER, 1936

GRADUATE SCHOOL SERIES No. 30

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## FOREWORD

The present issue of RESEARCH IN PROGRESS is the sixteenth volume of this publication. It contains, according to the plan of presentation followed during the last several years, the record and summary analysis of the investigations accomplished and published and those in process of completion by graduate students and faculty of the University of North Carolina during the calendar year ending October 1, 1936.

W. W. PIERSON, *Dean*

245657

## APPROPRIATIONS GRANTED FROM THE SMITH RESEARCH FUND

PROJECT NO.	APPLICANT	SUBJECT	AMOUNT
280	Weaver, William R.....	For engaging a copyist in the National Library, Madrid, to continue his study of staging devices .....	\$ 75.00
281	Smith, Hugh P.....	For travel expenses to examine materials in the Library of Congress and the University of Virginia .....	25.00
282	Thurman, Beverly R....	For paying for photostating two Old French MSS necessary for his critical edition of the <i>Sidrac</i> .....	75.00
283	Brown, Weldon A.....	For travel expenses to Ann Arbor and Chicago to continue work on the Clinton and other papers .....	50.00
284	MacNider, Wm. deB....	For travel expenses to Washington and for microphotographs of liver tissues in various stages of injury and recuperation .....	61.00
285	Meade, Robert D.....	For travel expenses in connection with biography of Judah P. Benjamin .....	50.00
286	Mendenhall, M. S.....	For travel expenses to Columbia, S. C., to complete her investigation on agricultural conditions in South Carolina, 1865-1887 .....	25.00
287	Bice, Harry V.....	For purchase and administration of tests in work on doctoral dissertation to produce an adequately Standardized Word Association Test....	100.00
288	Pierson, W. W.....	For filming the minutes of South Carolina State Grange, for use of a doctoral dissertation under his direction .....	8.90
289	Napier, Wm. B.....	For securing photostats of periodicals (1820-1830) in the Bibliothèque Nationale in Paris.....	10.00
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292	MacKinney, L. C.....	For photostats, to be made in Paris .....	100.45
293	Downs, John A.....	For assistance on travel expenses to Paris for work on dissertation .....	100.00
294	Anderson, Charles M.	For a trip to Cincinnati in connection with his dissertation .....	25.00
295	Straley, H. W.....	For assistance in field expenses during the summer .....	25.00
296	Henry, Nathaniel H....	For travel expenses to Congressional, New York Public, and Harvard Libraries, for work on dissertation .....	50.00
297	Harland, J.P.....	For the purchase of certain books needed in two research projects .....	15.00
298	Russell, J.C.....	For transportation to Harvard Library to continue certain studies with books not available here .....	50.00
299	Holmes, U. T.....	For copying a text which he is preparing for a scholarly series in France .....	55.00
300	Boggs, Ralph S.....	For aid in making records concerning Spanish Folklore in Florida—\$26.50 for materials, and \$60.00 for travel .....	86.50
301	Meade, Robert D.....	For travel to Europe for work on his study of Judah P. Benjamin .....	100.00
302	Frierson, David E.....	For photostats of introduction to Franco-Italian manuscript in Harvard University Library .....	8.10

PART I  
RESEARCH IN PROGRESS

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DEPARTMENT OF ANATOMY

W. C. GEORGE reports the following papers:

The Lymphocytes of Some Invertebrates. Presented before the 52nd meeting of the American Association of Anatomists, Durham, N. C., April 9-11, 1936.

Blastic cells usually similar to vertebrate large lymphocytes are found in many groups of the invertebrates. In the sponges hyaline nucleolate free cells are found among other cells in the mesenchyme. They originate through separation from the mesenchymal syncytium. They serve as cells of origin for other more specialized cells. The flat-worms have similar cells that serve as formative cells in regeneration for virtually all tissues of the body. The Annelids have small non-nucleolate cells with pluripotent capacities. In the Echinoderms the primitive cells of the perivisceral fluid are hyaline nucleolate cells. In their most undifferentiated condition the cytoplasm is devoid of neutral red staining granules in the cytoplasm. In the Tunicates the blastogenic cells are small, round cells with little basophilic cytoplasm surrounding a large nucleus, which in all species but one is vesicular and nucleolate. In one species there is no distinguishable nucleolus, and the nucleus is more deeply staining than in other species, due to the presence of more abundant and more regularly distributed granules. In the main these cells are derived from the mesenchyme, but it appears that they may be proliferated by the epicardium or by the atrial epithelium (Berrill). They are totipotent.

The Role of Blood Cells in Excretion in Ascidians. *Biological Bulletin*, 71: 249-254. 1936.

In many ascidians in which there are no renal vesicles the wastes of purine metabolism appear to be withdrawn from the tissue fluids by cells of the connective tissue and blood. Vesicular cells with stored excretion products have been found in the circulating blood or fixed in the connective tissue spaces of many species. The excretion granules may range in size from the limits of visibility with the highest powers of the microscope to intracellular calculi several microns in diameter. In the living cells they are sometimes, probably always, one color (usually brown) by transmitted light and another color (usually white) by reflected light. The structure of these cells and the concentration of purine bases within the vacuoles indicate that extremely thin protoplasmic membranes may act in a glandular capacity, or at least as selective excretory membranes.

The Formation of New Siphon Openings in the Tunicate, *Styela plicata*. (In press.)

Following experimental closure of the inhalent or exhalent siphons of *Styela plicata* new openings are formed below the ligature in about twenty-four hours. There is then developed around these new openings the siphon features characteristic of the species. Though the end result is very quickly and directly achieved and extremely fortunate for the well-being of the animal, no entelechy need be assumed; the formation of the new openings may be explained mechanistically. They appear to result from the stimulus of the ligature acting upon the reflex organization and peculiar structure of the animal. The newly developed specific features of the tunic around the opening probably result from the influence of organizers in the mantle acting upon the tunic cells, plus the mechanical influence of the constrictor muscles of the siphon.

#### DEPARTMENT OF BOTANY

W. C. COKER and H. R. TOTTEN are continuing their work on the Shrubs of the Southeastern States. To illustrate this work about three hundred drawings have already been prepared, mainly by MRS. CECIL JOHNSON and MRS. H. M. BURLAGE.

W. C. COKER and ALMA HOLLAND are continuing their work on the fungi. Their monograph of the *Boletaceae* of North Carolina is approaching completion. This will be illustrated by photographs, drawings, and paintings.

JOHN N. COUCH has published:

An Incompletely Known Chytrid: *Mitochytridium ramosum*. *The Journal of the Elisha Mitchell Scientific Society*, 51: 293-296, pl. 62. 1935.

PROFESSOR COUCH is continuing his studies on *Septobasidium* and the lower fungi. A monograph in which all known species of *Septobasidium* are described and illustrated will be ready for publication this fall.

J. E. ADAMS has published:

Observations on Two Species of *Arctostaphylos*. *Madrono*, II: 147-152, with 8 text figures. 1934.

DR. ADAMS has in press:

*Arctostaphylos* Adans., in Willis Linn Jepson, *A Flora of California*, Associated Students' Store, University of California, Berkeley.

He has in progress:

Taxonomic and Anatomical Studies of the Genus *Arctostaphylos*. Monograph of the genus in preparation.

Study of Histological Criteria in Species Delimitation in Certain Genera of Seed Plants.

LELAND SHANOR, graduate assistant, has published:

The Production of Mature Perithecia of *Cordyceps militaris* (Linn.) Link in Laboratory Culture. *The Journal of the Elisha Mitchell Scientific Society*, 52: 99-104, pl. 13. 1936.

The following doctoral dissertations were accepted by the Department during the year:

ANDREW G. LANG. Some Observational and Theoretical Considerations of Spermatogenesis in *Marsilea quadrifolia*, with Special Reference to the Structure of the Spermatozoid and the Evolution of the Nucleolus. (Under the direction of JOHN N. COUCH.) (Accepted for publication in *The Journal of the Elisha Mitchell Scientific Society*, 52, now in press.)

Spermatogenesis in *Marsilea* has been studied and a detailed analysis of the spermatozoid is presented. Spermatoteleosis is briefly described and the various phenomena of spermatogenesis are interpreted as to their phylogenetic significance.

Most of the spermatid cytoplasm forms a cytoplasmic cap which is lost during dehiscence. The spermatozoid body involves no cytoplasmic constituents and consists of five types of nuclear substance: Karolymph; Chromatin, as four Chromonemata; Kinoplasm, forming the membrane and the flagellar apparatus; Nucleolin, or blepharoplast substance; and Plastin, or centrosphere substance. This identification of materials is supported by evidence of two types, that concerning the spermatozoid alone and that concerning the ontogenetic and phylogenetic history of the spermatozoid constituents. The blepharoplasts are two parallel strands rather than one. The flagella arise from one of two ciliophores located within the cilia-bearing band, which extend over the entire length of the spermatozoid.

Blepharoplasts are ontogenetic and phylogenetic derivatives of centrioles, their constituent material being homologous to nucleolin of intra-nuclear nucleoli. Ontogenetically, the *Marsilea* centrioles are nucleolar derivatives. The cilia-bearing band substance is homologous with plastin of intra-nuclear nucleoli and is ontogenetically and phylogenitically derived from centrosphere substance. Centrosomes originated phylogenetically in the cytoplasm and have evolved into intra-nuclear nucleoli. The homology of the blepharoplasts embraces all groups of living organisms which produce typical flagellated bodies. The evolution of the nucleolus is discussed and it is suggested that centrosomes have experienced two distinct evolutionary trends, one of which resulted in the intra-nuclear nucleolus and the other (superimposed upon the first) in various types of blepharoplast structure.

Phylogenetic relationships between the larger plant groups have been re-interpreted on the assumption that the analysis of *Marsilea* as described

here is essentially correct and that the principle of progressive evolution and Von Baer's Law are equally correct and applicable to cellular evolution. Granted these assumptions, it would follow that non-motility is more primitive condition than that of motility and that organisms which produce no flagellated bodies in any phase of their life cycle have developed through ancestral forms which produced no flagellated bodies. On the same basis and because of the strict homology of blepharoplasts in flagellated cells, it would follow that all organisms which produce flagellated bodies have had monophyletic origin and were derived from some one non-motile ancestral organism. Alternation of generations was essentially established as a protoplasmic behavior before any existing groups above the *Myxophyceae* became distinct from each other, and sexuality evolved and became a fundamental characteristic of living organisms before there were any flagellated bodies in existence. An effort is made to indicate that the cytological criteria are perhaps the most valuable ones we have available for studies in the phylogeny of the larger groups of plants.

VERA MILLSAPS: The Structure and Development of the Seed of *Paulownia tomentosa* Steud. and *Cynoglossum amabile* Stapf and Drumm. (Under the direction of W. C. COKER.) (Published in *The Journal of the Elisha Mitchell Scientific Society*, 52: 56-57, pls. 4-6. 1936.)

Part I: The structure and development of the seed of *Paulownia tomentosa*. Floral buds begin to form in August for April flowering. Microspores are free and 1-nucleate by September, 2-nucleate by October, and remain thus until shed in the spring. There are three pollen-tube exits in the exine. The anther wall consists of an epidermis, three to four parietal layers, and one tapetal layer.

The bilocular ovary contains many small anatropous ovules each having one integument. An 8-nucleate embryo sac develops normally from a single hypodermal cell which becomes differentiated in August and remains inactive until spring. The micropylar region of the sac becomes bulbous, the chalazal region long and narrow. The antipodal cells disappear, the polar nuclei enlarge, move toward the mid-region, fuse, then move up near the egg. Double fertilization occurs seven to ten days after pollination. One layer of tapetum surrounds the narrow region of the sac.

Endosperm formation begins before the fertilized egg divides and is cellular. A large bulbous micropylar haustorium and a two-pronged chalazal haustorium develop from the two terminal endosperm cells and are surrounded by a mass of nutritive tissue.

The proembryo has a 6-celled suspensor. The mature embryo is surrounded by two to three layers of endosperm, and enclosed by a seed coat consisting of a layer of thick-walled lignified cells and an outer layer whose cells are expanded on each side in wing-like outgrowths.

Part II: The structure and development of the seed of *Cynoglossum amabile*. The anther wall consists at first of four layers which are later reduced

to two, due to the absorption of the tapetal and adjoining parietal layers. The spore mother-cells remain in contact until after the simultaneous formation of tetrads. The 3-nucleate pollen grains are 6-8  $\mu$  by 10-12  $\mu$  in size, and have two pollen-tube exits in the constricted mid-region.

The bilocular ovary contains four ovules which are anatropous in the reverse order. The single massive integument, surrounding a transitory nucellus, never develops any tapetum, but is largely absorbed by the developing embryo. Its outer surface is traversed by five to seven procambial strands which branch out from the funicular region.

Megaspore formation is variable. The upper or lower diad may or may not divide, but in either case a chalazal cell develops into an 8-nucleate embryo sac. Double fertilization occurs after the disappearance of the three antipodal cells and before the fusion of the large polar nuclei.

Endosperm formation is at first nucleate, then cellular. The nuclei tend to aggregate about the embryo, where cell formation begins, and later proceeds around the wall of the sac whose inner region remains filled with plasma fluid.

The embryo first forms a transitory 1- to 3-celled suspensor and later develops two massive cotyledons and a short radicle. There is only one layer of endosperm and a simple seed coat of a few outer layers of the integument, the innermost of which are collapsed.

The ovary wall consists of an inner, partially lignified layer, a middle region, and a strongly echinate epidermis.

The following master's theses were accepted by the Department during the year:

JOHN ROBERT RAPER. Heterothallism and Sterility in *Achlya* and Observations on the Cytology of *Achlya bisexualis*. (Under the direction of J. N. COUCH and W. C. COKER.) (Accepted for publication in *The Journal of the Elisha Mitchell Scientific Society*, 52, now in press.)

A new method of purifying water molds from bacterial contamination is described. *A. bisexualis* Coker is shown to consist of three sexually different strains, male, female, and hermaphroditic-female. Female and male strains are morphologically different. Four other sterile *Achlya* are briefly described. Attempts to induce the regular production of sexual organs on the hermaphroditic-female strain were unsuccessful. A cytological study of the resistant spores, reproductive bodies peculiar to female and hermaphroditic-female strains of *A. bisexualis*, and the sexual organs of that species is given. The development of the sexual organs in the species agrees with accounts of work on other members of the *Saprolegniaceae*.

EDNA METZ WELLS: The Structure and Development of the Seed in *Cimicifuga racemosa*. (Under the direction of W. C. COKER.)

*Cimicifuga racemosa*, because of its two integuments and larger size of the outer one, belongs to the tribe *Helleboreae* of the *Ranunculaceae*.

The entire hypodermal layer of the microsporangium is archesporial in nature. The tapetum originates from periphery of sporogenous tissue. There is extreme thickening in the endothecium of the mature anther. Three pores are developed for the extrusion of the pollen tube. The generative nucleus does not divide in the pollen grain. The megasporangium develops from a single hypodermal cell. Four megaspores are formed, the functional one being nearer the micropylar end. In contrast to the conspicuous antipodals, the egg apparatus is poorly developed. At time of fertilization the egg is unusually large and contains impoverished protoplasm. Extensive endosperm development follows gametic and secondary fertilization. Embryonic development is variable. The seed coat is derived chiefly from outer integument. No stony layer is developed.

The 2-n chromosome count is 16.

#### DEPARTMENT OF BIOCHEMISTRY

E. W. McCHESENEY has continued work along the lines indicated in last year's volume of this journal. Of principal interest has been the work on a fraction of amino acids isolated from casein hydrolysates as their barium salts, insoluble in water. Such a fraction has not been previously reported or studied. Present information indicates that this fraction contains at least four substances and possibly more. Two of them are tyrosine and glutamic acid; the other two form insoluble phosphotungstates and have been separated but not identified positively.

Under the joint direction of R. W. BOST and E. W. McCHESENEY, W. K. SWANN, JR. began a study of the problem of finding a satisfactory derivative for the identification of the amino acids. His preliminary work showed that the toluenesulfonyl derivative would be most satisfactory. This work is now being continued by PROFESSOR McCHESENEY with a view toward preparing the derivative of all the amino acids now known, in order that they may be more readily identified.

#### DEPARTMENT OF CHEMISTRY

EDWARD MACK, JR. has submitted for publication:

Remarks on Molecular Structure and Van der Waals Forces, *Journal of Physical Chemistry*, in connection with First Symposium on Physical Chemistry to be held at Princeton, December 31, January 1, 2, 1937.

(With DAVID F. HELM.) Thermal Decomposition of Gaseous Silicon Tetramethyl. *Journal of the American Chemical Society*.

PROFESSOR MACK has directed the following research:

N. L. SIMMONS. (Progress on doctoral dissertation.) Determination of Collision Areas of Some Organic Molecules from Viscosity Data.

HOWARD A. TANNER. (Doctoral dissertation.) Some Studies of Porous Metal Membranes.

Porous copper membranes may be prepared by heating thin brass sheets in a high vacuum for several hours at temperatures ranging from 400°C to 900°C. The zinc is partially or almost wholly volatilized leaving copper containing pores which are, within certain limiting conditions of preparation, of the order of magnitude of molecular diameters. Membranes can be prepared which are permeable to small molecules and not to large ones. Results are more reproducible in the case of membranes prepared at the higher temperatures. More zinc must be volatilized at the higher temperatures in order to obtain a given degree of porosity.

Membranes of various pore sizes were prepared. Some were permeable even to molecules as large as tertiary butyl chloride, some were permeable to benzene and not to the butyl chloride, some were permeable to methyl alcohol and not to benzene, and some were impermeable to alcohol while permitting smaller molecules to pass through.

Gases to which a membrane is impermeable have the property of stopping up the membrane to smaller molecules. Thus a mixture of nitrogen and benzene vapor will not pass through a membrane impermeable to benzene. The porosity of such a stopped membrane can be restored by heating in a vacuum. Heating a membrane in the presence of organic vapors causes the pore size to increase so that mixtures cannot be separated at high temperatures.

The rate of flow through a membrane is proportional to the difference in pressure on the two sides. This indicates molecular rather than viscous flow. According to the kinetic theory the rate of molecular flow is inversely proportional to the square root of the absolute temperature of the gas. This was found to hold only approximately, the deviation being in the direction of too small flow at high temperatures. This can be explained by assuming an adsorption mechanism of transpiration.

The efficiency of porous copper as a bearing metal was tested. The porous metal has a very pronounced ability to retain oil and act as a regular bearing alloy but appears to be too soft for practical work.

The rate of flow of liquids through the porous copper membranes under various pressures was measured. Water or alcohol causes a gradual decrease in the porosity of the membrane. Organic liquids can be forced through without difficulty. Molecules of similar size and shape seem to go through at the same rate under a given pressure. Cyclo-hexane and n-hexane have the same collision areas as gases but liquid n-hexane goes through a membrane more than twice as fast as cyclo-hexane. The rate of flow of a liquid was not exactly proportional to the applied pressure, the deviations being in the direction of too small a rate at the higher pressure.

FRANK K. CAMERON has published:

Ferric Sulfate in Aqueous Solutions of Other Sulfates. *Journal of Physical Chemistry*, **40**: 689. 1936.

(With E. O. HUFFMAN.) Utilization of Alunite through Fusion with Alkali Sulfides. *Industrial and Engineering Chemistry*, **28**: 420. 1936.

Whole Cotton as a Source of Oil and Alpha Cellulose. *Proceedings of the Second Dearborn Conference*, May 1936. Under the sponsorship of the Farm Chemurgic Council and Chemical Foundation, Inc. Chapter VII, page 184.

(With A. R. MACORMAC.) Comparison of the Alkali and Nitric Acid Methods for Pulping Whole Cotton. In press, *Journal of Industrial and Engineering Chemistry*. Paper presented before the American Chemical Society, September 1, 1936, Pittsburgh, Pa.

(With J. A. TAYLOR.) Utilization of Alkali through Alkali Fusions. In press, *Journal of Industrial and Engineering Chemistry*. Paper presented before the American Chemical Society, September, 1936, Pittsburgh, Pa.

Whole Cotton: Its Growth and Utilization. In press, *The Cotton Trade Journal*.

PROFESSOR CAMERON has directed the following research during 1935-1936:

A. R. MACORMAC. (Doctoral dissertation.) Utilization of the Whole Cotton Plant—Extraction of Oil and Making of Pulp.

Whole cotton, air dry, is pulverized with a hammer mill, and the comminuted product extracted with an organic fat solvent. Oils and waxes are removed by the solvent and recovered by standard methods. The oil meeting trade specifications is recoverable. The extracted residue lends itself admirably to pulping processes. The nitric acid method compared with the sodium hydroxide method gave very good results as to yield and quality.

D. T. MILNE. The Recovery of Oil from Whole Cotton with Organic Solvents.

With the "cotton seed oil" different mixtures of other substances are removed by different solvents. Partial separations have been made, by using solid absorbents such as chars and clays, and by chilling and centrifuging. The investigation is being continued.

J. A. TAYLOR. (Progress on doctoral dissertation.) Recovery of Alumina and Potassium Sulfate from Alunite.

This was effected by sintering the ground mineral with potassium sulfate, potassium carbonate, or coal, singly or in mixtures. Sintering was effected in a rotating tube furnace, lined with alundum and heated to 900° C. more or less. Leached with water, all of the aluminum and potassium was recovered from the sinter as sulfates and carbonates. The alumina is precipitated by neutralizing the aqueous solution with carbon dioxide or sulfur dioxide. From the mother liquor potassium sulfate separates practically completely on evaporation. Potassium carbonate (or sulfo-salts) may be recovered from the aqueous residue or the residue may be advantageously used in producing or extracting a new sinter.

PROFESSOR CAMERON is directing:

F. B. CULP. (Progress on doctoral dissertation.) The System  $\text{H}_2\text{O}-\text{Fe}_2(\text{SO}_4)_3-\text{CuSO}_4$ .

W. F. BARTZ. (Progress on master's thesis.) The System  $\text{H}_2\text{O}-\text{Al}_2\text{O}_3-\text{SO}_2$ .

Under a grant from the Textile Foundation, DR. CAMERON is directing an investigation of the fundamental properties of the components in mill wastes. PROFESSOR J. E. MAGOFFIN is studying the effect of temperature and soluble components on the surface and electrical properties of dispersed solids in aqueous suspensions. MR. J. A. TAYLOR is studying the effect of the surface charges on gas bubbles upon solids in aqueous suspensions. MR. W. A. PERRY is investigating adaptations of flotation methods to the removal of solids in aqueous suspensions.

J. T. DOBBINS has directed the following research:

LAURA CORBETT THOMAS. (Doctoral dissertation.) A Study of the Soda-alum System.

The system sodium sulfate, aluminum sulfate, water has been studied at 50°, 42°, and 30°C. in the presence of 10% sulfuric acid. At 50°C. the double salt  $\text{Na}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 6 \text{H}_2\text{O}$  is formed, the other solid phases being anhydrous sodium sulfate and anhydrous aluminum sulfate. At 42°C. the double salt  $\text{Na}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{H}_2\text{O}$  is formed, the other two solid phases being anhydrous sodium and aluminum sulfate. At 30°C. the double salt that exists is the same as at 42°C. and the sodium sulfate is still anhydrous but the aluminum sulfate has hydrated to 18 moles of water. A dilatometer determination shows the transition point of the double salt with 14 moles of water to the salt with 6 moles of water to lie between 42.9° and 43.4°C. Isotherms are shown for the three temperatures studied.

H. D. CROCKFORD has published during the year:

(With H. O. FARR, JR.) The Activity Coefficients of Lead Chloride in Aqueous Solutions of Barium Nitrate. *Journal of the American Chemical Society*, 58: 87. 1936.

(With J. A. ADDLESTONE, in coöperation with the Department of Chemistry of the Virginia Polytechnic Institute.) The Solubility of Lead Sulphate in Aqueous Solutions of Sulphuric Acid at High Concentrations. *Journal of Physical Chemistry*, **40**: 303. 1936.

(With P. M. NICHOLS and N. L. SIMMONS.) The Photochemical Decomposition of Carbon Disulphide. *Journal of the Elisha Mitchell Scientific Society*, **52**: 51. 1936.

H. D. CROCKFORD has directed the following research:

J. C. LOFTIN. (Progress on doctoral dissertation.) The Effect of the Addition of Non-electrolytes on the Activity Coefficients of Lead Chloride in Barium Nitrate Solutions. An Investigation Concerning the Debye-Hückel Ion Size Parameter.

P. M. NICHOLS. (Progress on doctoral dissertation.) The Effect of Temperature Change on the Activity Coefficients of Lead Chloride in Barium Nitrate Solutions. An Investigation Concerning the Debye-Hückel Ion Size Parameter.

W. G. SINK. (Progress on doctoral dissertation. In coöperation with the U. S. Naval Research Laboratory.) Heat Balance Studies on Lead-Acid Storage Cells. A Study of Plate Polarization as a Means of Determining Current Distribution During Charge and Discharge.

PROFESSOR CROCKFORD has coöperated in the following researches:

(With J. A. ADDLESTONE, in coöperation with the Department of Chemistry of the Virginia Polytechnic Institute.) The Solubility of Nickel Sulphate in Aqueous Sulphuric Acid Solutions.

(With A. G. LANG, in coöperation with the Department of Chemistry of the North Carolina State College.) A Potentiometric Study of the Hydrogen-ion Concentrations and the Oxidation-Reduction Potentials of Certain Biological Hardening and Staining Media.

PROFESSOR CROCKFORD has continued his research work with the U. S. Naval Research Laboratory, Washington, D. C. During the scholastic year a Fellowship financed by the Navy Department enabled further progress to be made on the Heat Balance Relationship Studies on Submarine Cells. The results are given in certain reports to the Bureau of Engineering of the Navy Department.

RALPH W. BOST has published during the year:

(With FRANK NICHOLSON). The Identification of Phenols with 2,4-Dinitrochlorobenzene. *Journal of the American Chemical Society*, **57**: 2368. 1935.

(With DUDLEY WILLIAMS). Reaction Products of Ethyl Alcohol and Sodium Hydroxide. *Journal of Chemical Physics*, 4: 251. 1936.

(With E. W. CONSTABLE). Sym-Trithiane. *Organic Syntheses*, XVI: 81. 1936.

PROFESSOR BOST has directed the following research:

ALLEN LEANDER ALEXANDER. (Doctoral dissertation.) Some Chemical Compounds Obtained from the Destructive Distillation of Tobacco.

A quantity of tobacco (9036 gms.) was finely crushed and electrically heated in a specially constructed iron retort. A total of 6056 gms. (67.1%) of volatile matter and 2980 gms. (32.9%) of charcoal were obtained. Below a temperature of 150°, a small amount of distillate was obtained. As the temperature increased, the volume of both the condensate and the gases increased considerably. Above 450° the distillation was complete.

The tar was repeatedly fractioned and from the fractions were isolated ammonia, certain amines, and a number of heterocyclic substances, among which were nicotine, pyridine, alpha and gamma picoline, and quinoline. The charcoal was investigated for its absorbent properties and found to be effective.

Numerous experiments were conducted in an effort to find new derivatives of nicotine. In this connection, an improved method, definitely superior to any previously reported, was developed for the preparation of nicotiny chloride chlorohydrate. An extensive study was made of the reactions of the chlorohydrate with the various amines, amino alcohols, and phenols. In the course of the study, diethylaminoethyl nicotinate, nicotinanilide, phenyl nicotinate, and nicotinphenetidide were prepared and characterized. Various methods for these preparations were investigated and described. A study of the physiological properties is under way.

DAN FORE, JR. (Doctoral dissertation.) A Study of the Reactions of Organic Disulfides with Particular Reference to Their Detection and Determination.

In preliminary work a number of new bromides, mercaptans, lead mercaptides, 2,4-dinitrothioethers, and dinitrophenyl alkyl sulfones, and disulfides of high molecular weight were prepared and characterized.

An extensive study of the action of reducing agents on disulfides was made in order to devise better methods for the identification and analysis of these substances. A qualitative method, based on the reduction of the dithionic group to the mercapto structure with zinc and acetic acid, and the subsequent preparation of the 2,4-dinitrophenyl alkyl sulfides from the zinc mercaptides by the action of 2,4-dinitrochlorobenzene has been worked out. The method was tried on all the normal aliphatic members through decyl and a number of representative aromatic disulfides with excellent results. Two new color reactions for the —SS— group have been found.

The study has demonstrated, conclusively, that disulfides are not reducible, in a quantitative sense, to mercaptans but that they may be reduced completely to hydrogen sulfide.

A method recommended for the estimation of the mercaptan content of hydrocarbon solutions has been proposed. The procedure is based on the titration of the acid liberated by the interaction of certain mercuric halide complexes with the mercaptan to form the mercaptides,  $RSHgX$ . It is equally applicable in the presence or the absence of unsaturated bodies.

**WILLIAM WALDO WILLIAMS.** (Doctoral dissertation.) A Study of the Methods of Formation and Properties of Aliphatic Sulfonic Acids.

The purpose of this investigation has been to study the two most commonly used methods of preparation of aliphatic sulfonic acids and to attempt to find a suitable reagent for the identification of this class of compounds.

An historical survey of the nomenclature, structure, methods of preparation, physical properties, chemical properties and uses of the aliphatic sulfonic acids has been presented. The percentage yield of barium butyl sulfonate prepared by the Hemilian modification of the Strecker reaction has been increased from the thirty-six percent reported by Wagner and Reid to seventy-five percent in the present work. This was accomplished by increasing the proportion of ammonium sulfite to that of n-butyl bromide from one mole of sulfite for each mole of bromide to two and one half moles of sulfite for each mole of bromide. The reaction of n-butyl mercaptan with 4 normal, 8 normal, 12 normal and 16 normal nitric acid was studied. It was found that better yields were obtained when the more concentrated nitric acid was used.

In an attempt to find a suitable reagent for the identification of aliphatic sulfonic acids, the reaction of sodium butyl sulfonate with aniline, p-toluidine, p-nitrobenzyl bromide, p-phenylphenacyl bromide and 2,4-dinitrochlorobenzene were investigated. There was no apparent reaction in any case, for the original materials were recovered unchanged.

**C. A. PIGOTT.** (Master's thesis.) Certain New Azo Dyes Derived from 2-Amino-p-Cymene.

A detailed process for the preparation and purification of 2-cymidine-5-sulfonic acid was worked out. This intermediate was diazotized and coupled with various phenols and amines to give the corresponding dyes. These dyes were subjected to various chemical and physical tests and finally applied to different fibres. The tinctorial properties of those dyes formed from alpha- and beta-naphthol are very noteworthy. In general the dyes are extremely fast to light but do not show a high degree of fastness to certain other tests.

**WILLIAM BANKS RICHARDSON.** (Master's thesis.) The Nitration of 1,5-Dihydroxy-naphthalene.

1,5-Dihydroxy-naphthalene was first acetylated to protect the hydroxy groups from oxidation. By carefully regulating the temperature and concentration of nitric acid, the 1,5-diacetoxy-naphthalene was nitrated to give: (1) a mono-nitro-diacetoxy-naphthalene and (2) a dinitro-diacetoxy-naphtha-

lene. The latter was first hydrolyzed to give the 1,5-dihydroxy-dinitro-naphthalene, which was converted into (1) a dinitro-dibenzoxy-naphthalene, and (2) a dinitro-monomethoxy-hydroxy-naphthalene. Then the latter was reduced in solution. The reduced product, upon being oxidized in solution, gave a beautiful red product resembling, but not identical to, naphopurpurine and having the probable structure of 2, 5, 6-tridroxyl, 4-naphthoquinone.

J. E. EVERETT. (Progress on doctoral dissertation.) A Study of the Formation of Thioketones.

The mechanism of the Staudinger Reaction has been studied in connection with the formation of thiobenzophenone. A theory has been proposed to explain the mechanism of this reaction, and the validity of this theory is now being tested with other thioketones. The thermal stability and thermochromism of these compounds are also being investigated.

J. K. HODGES. (Progress on doctoral dissertation.) A Study of the Formation of Aliphatic Sulfonic Acids.

Two different methods of formation of these acids are now under investigation. The first is concerned with the action of sulfuric acid of various concentrations on the alkanes having various structures. These studies are being carried out at different temperatures, with and without catalysts.

The application of the Grignard Reaction to the formation of aliphatic sulfonic acids has also been studied. Complete details of these interesting results will be given later.

FRANK NICHOLSON. (Progress on doctoral dissertation.) 2,4-Dinitrochlorobenzene as a Reagent in Organic Analysis.

2, 4-Dinitrochlorobenzene has been studied with alcohols, phenols, amines, and acids with very gratifying results. The derivatives of phenols and amines, in particular, are well defined crystalline solids possessing sharp melting points. The speed with which these reactions take place and the yields and purity of the resultant products argue well for this compound as a reagent in the above cases. Possible commercial uses of these derivatives are now under investigation.

J. H. WOOD. (Progress on doctoral dissertation.) The Action of Hydrogen Sulfide on Aromatic Aldehydes and Certain Related Compounds.

This study was undertaken to determine the factors involved in the formation of thioaldehydes. The action of hydrogen sulfide at various temperatures and with different catalysts has been studied with benzaldehyde, B-ethoxynaphthaldehyde and anthracene aldehyde-9. A number of products have been isolated and identified. The course of the reaction can be controlled by the nature of the catalyst. Sodium hydrosulfide and sodium sulfide react with benzophenone dichloride to give products entirely different and also different from those obtained with hydrogen sulfide and benzaldehyde. The nature of these products will be reported in detail later.

O. K. RICE has published during the year the following papers based on work done at Harvard and California:

(With O. A. ALLEN and H. C. CAMPBELL.) The Induction Period in Gaseous Thermal Explosions. *Journal of the American Chemical Society*, **57**: 2212. 1935.

On the Zero-Point Energy of an Activated Complex and the Reaction  $2 \text{NO} + \text{O}_2 = 2 \text{NO}_2$ . *Journal of Chemical Physics*, **4**: 53. 1936.

(With D. V. SICKMAN.) Studies on the Decomposition of Azomethane.

I. Description of the Apparatus. *Journal of Chemical Physics*, **4**: 239. 1936.

II. Pure Azomethane and Azomethane in the Presence of Helium. *Journal of Chemical Physics*, **4**: 242. 1936.

III. Effect of Various Inert Gas. *Journal of Chemical Physics*, **4**: 608. 1936.

The Thermodynamic Properties of Nitric Oxide. An Example of an Associated Liquid. *Journal of Chemical Physics*, **4**: 367. 1936.

(With G. E. GIBSON.) The Electric Moment of the  $^1\Sigma_+$  to  $\text{O}^+$  Transition in the Continuum of  $\text{Cl}_2$ . *Physical Review*, **50**: 380. 1936.

PROFESSOR RICE has collaborated with DR. R. A. OGG, JR. in a study of the factors influencing rates of reaction in solution.

He has in progress research on the internal volume and some thermodynamic properties of liquids.

He is directing research in reaction kinetics of C. V. CANNON and LEON GALLOWAY (doctoral dissertations), and W. P. INGRAM, JR. (master's thesis.)

He has in progress a book on the application of atomic and molecular theory to inorganic chemistry.

SHERMAN E. SMITH has been engaged, during the past year, in a study of the Permeability of Cellulosic Membranes to Gases and Vapors.

It has been shown that gases which penetrate "Cellophane" and other cellulosic membranes do so by a process of solution in the membrane or in the moisture contained in the membrane. Considerable evidence as to the nature of the fine structure of these films has been developed.

This work was subsidized by the duPont Cellophane Co.

JAMES E. MAGOFFIN has published:

(With PROFESSOR W. D. BANCROFT, Cornell University.) Energy Levels in Electrochemistry I. *Journal of the American Chemical Society*, 57: 2661. 1935.

The oxidation of sulfurous acid is an irreversible reaction at ordinary temperatures because, in order for reduction to take place, the system must pass through an energy level which is higher than the energy level for nascent hydrogen obtained by electrolysis. With sulfuric acid solutions, the energy hump decreases with increasing concentration, rising temperature, and activating adsorption.

PROFESSOR MAGOFFIN has had accepted for publication:

Energy Levels in Electrochemistry II, now in press, *Journal of the American Chemical Society*.

He has the following research now in progress:

Under a grant from The Textile Foundation, a study is being made of the fundamental properties of components of textile mill wastes.

HOWARD A. TANNER has also made progress on a Study of Synthetic Rubber (subsidized by Goodyear Tire and Rubber Co.).

#### DEPARTMENT OF CLASSICS

G. A. HARRER is continuing his studies in Roman Inscriptions.

J. PENROSE HARLAND has during the past summer completed a Study of the Pottery found by him at Tsoungiza, the prehistoric site at Nemea.

PROFESSOR HARLAND has also continued to assemble material for a work on the Helladic (Bronze Age) Civilization.

HENRY B. DEWING has published:

F.E.R.A. in the Sixth Century A.D. *The Classical Journal*, XXXII: 1: 27-34. October, 1936.

PROFESSOR DEWING has in preparation:

Procopius, The Buildings. This edition and translation will form the seventh and last volume of the works of Procopius which Professor Dewing has been producing for the *Loeb Classical Library*.

A. I. SUSKIN has published:

The Date of Tacitus' Proconsulship. *American Journal of Archaeology*, XL: 1: 71-72. 1936.

In this study all the various items of evidence, which are largely from Greek and Latin inscriptions, are studied to determine the year in which the historian Cornelius Tacitus was proconsular governor of the Roman province of Asia. The evidence justifies the conclusion that the year was 112-113 A. D.

The following doctoral dissertation was completed during the year under the supervision of the Department:

MARY DIGGS. Roman Literary Men in the *Noctes Atticae* of Aulus Gellius. (Under the direction of G. A. HARRER.)

The aim of this study is to set forth the interests of Aulus Gellius in the Roman literary men from Livius Andronicus to his own period. Every passage concerning a Latin author has been examined for the purpose of considering the reasons why Gellius made the citation and the light which it throws upon the attitude of Gellius and the members of his literary circle. A purpose corollary to the one mentioned above has been that of indicating the items of information about each Latin author which we owe to Aulus Gellius. A comparison is made between the authors as given in Quintilian's canon of Latin writers and those cited by Gellius.

The study of Latin words is the most frequent motive for the citations. Gellius, however, shows that he is also interested in the subject-matter of such citations. Likewise, a variety of interests appears in the studies of Gellius and his friends in the literary works of all periods. He is interested in antiquities of all kinds, in the fields of history and biography, in the philosophical thought of the authors he quotes. Literary appreciation and criticism form another phase of Gellius' work. A distinction has been made between his appreciation for the literary qualities of an author, as shown by his expressions of appraisal, and his interest in an author because this author's work furnishes material suitable for his own studies. Therefore, frequency of citation is not the criterion for judging Gellius' appreciation of a writer.

The following master's theses were completed during the year under the supervision of the Department:

MILDRED THOMAS BERNARD. The identification of the Persons Addressed in Books VI-IX of Pliny's *Letters*. (Under the direction of G. A. HARRER.)

The manuscripts of Books VI-IX of Pliny's *Letters* give only the cognomina for the headings of the letters. It has been the purpose of this thesis to identify the sixty-eight persons addressed in these four books especially by epigraphical evidence, but also by palaeographical and literary evidence. Praenomina and nomina have been determined in all but sixteen instances; inscriptions are the most accurate source for the spelling of the elements of names. Thirty-four of the addresses are known through epigraphical evidence, eight by new inscriptions. Over half of the friends of Pliny who received letters are known to have been of the Senatorial order; sixteen were Consuls. The study is a continuation of the work of Henrietta Underwood, who dealt with the same topic for the first five books of Pliny's *Letters* in 1930.

B. W. DAVIS. A Study of the Personal and Political Relationships of Cicero and Pompey, 52-48 B.C. (Under the direction of G. A. HARRER.)

This thesis is an inquiry into the personal and political relationships of Cicero and Pompey, and attempts to show how their friendship was affected by the political situation of the times. The introduction gives an account of the relationships of the two men prior to 52 B. C. The body of the thesis itself concentrates upon the relationships in the last few years of Pompey's life, 52-48 B. C. An examination of Cicero's *Letters* reveals his criticism of Pompey and the fact that Cicero intended to follow Pompey and to remain with him, largely as a matter of personal gratitude. Although Cicero criticized Pompey for aiming at absolute power, it can perhaps be stated that he never really believed that criticism of Pompey. The main conclusion reached is that Pompey never intended, and did not try, to set himself up as an autocratic ruler.

JEWEL GODWIN. Cultural Interests of Pliny the Younger. (Under the direction of GEORGE HOWE and G. A. HARRER.)

The evidence for this study is found very largely in Pliny's *Letters*, of which a great number are concerned with cultural interests. Chief of these is the interest in literature. In this field Pliny was actively engaged as writer and also as critic for the benefit of friends. The types of literature of most concern were poetry and oratory. Pliny is found also to have had real interest in art and in the education of the young.

The following studies have been undertaken by candidates for advanced degrees:

A. I. SUSKIN. The Arrangement of Material in Livy, Books 31-45. (For the doctor's degree.)

EVELYN WAY. Seneca's Influence on Later Historians. (For the doctor's degree.)

J. B. FISHER. Asconius Pedianus: The Scholia on Cicero's Pro Milone. (For the master's degree.)

IDA LOUISE HUNTER. Panegyricus Constantino Augusto Dictus by Nazarius. (For the master's degree.)

T. M. SIMKINS, JR. Gratiarum Actio de Consulatu Suo Iuliano Imperatori by Claudius Mamertinus. (For the master's degree.)

VIRGINIA B. SIMKINS. Panegyricus Theodosio Augusto Dictus by Latinus Pacatus Drepanius. (For the master's degree.)

#### DEPARTMENT OF ECONOMICS AND COMMERCE

E. E. PEACOCK is directing the following research:

R. C. COX. (Progress on master's thesis.) A Standard Cost System for an Ice Cream Plant.

ERICH W. ZIMMERMANN has published:

Resources. (Chapter VII in *Economic Principles and Problems*, edited by W. E. Spahr. New York: Farrar and Rinehart, 1936.)

Resources are here treated as the natural and cultural foundation of economic group life. They are interpreted as functions of changing arts, wants, and social objectives. The old concept of "land" as a fixed supply is thus discarded and the concepts of "land" and capital are partially merged in the concept of resources. The shift from commodity mindedness to resource consciousness is appraised as to both historical causation and theoretical implication.

He has in progress:

An Organismic Theory of International Trade.

Economic Indices of Regional Strength and Weakness.

PROFESSOR ZIMMERMANN is directing the following research:

M. O. PHILLIPS. (Progress on doctoral dissertation.) The Place of the Tramp Steamer in World Shipping.

JOHN B. WOOSLEY has published:

*State Taxation of Banks*. Chapel Hill: University of North Carolina Press, 1935.

A study of the evolution of the complex legal and fiscal issues involved in the state taxation of national and state banks. For some fourteen years the legal status of bank taxation has been very precarious, and many states have been seriously circumscribed in their efforts to impose legally valid taxes for state and local purposes. The analysis of the methods now employed by the states leads to the suggestion that a maximum uniform rate on bank shares be authorized by Congress as a limit on the taxation of national banks by the several states.

The Permanent Plan for the Insurance of Bank Deposits. *The Southern Economic Journal*, II: 4: 20-43. April, 1936.

An analysis of the plan for the insurance of bank deposits and an appraisal of some of the issues involved in its operation.

A review of The Taxation of Banks by the Industrial Conference Board. *The Journal of Political Economy*, XLII: 6. December, 1935.

He has in progress:

A Study of the Portfolio of North Carolina Banks (in conjunction with the North Carolina Bankers Association).

PROFESSOR WOOSLEY is directing the following research:

JAMES FLOYD FLETCHER. (Progress on master's thesis.) A Financial History of the Carolina Power and Light Company.

B. B. HOLDER. (Progress on doctoral dissertation.) The Three State Banks of North Carolina: An Experiment in State Ownership.

JOHN B. McFERRIN. (Progress on doctoral dissertation.) An Analysis of the Financial, Economic, and Political Operations of Caldwell and Company.

G. T. SCHWENNING has published:

Dismissal Legislation in Latin American Countries. *American Federationist*, 144-156, February, 1936, and 265-274, March, 1936.

He has assisted in editing Volume II, Nos. 3 and 4 and Volume III, No. 1 of *The Southern Economic Journal*.

He is continuing his study of the dismissal wage.

PROFESSOR SCHWENNING is directing the following research:

E. H. ANDERSON. (Progress on doctoral dissertation.) A Synthesis of the Theories of Administrative Control Organization.

R. J. M. HOBBS has in progress:

Cases and Statutes Dealing with Government Control of Business.

CLARENCE E. HEER has in progress:

Recent Economic Trends in the Chicago Metropolitan Area.

PROFESSOR HEER is directing the following research:

C. H. DONOVAN. (Progress on doctoral dissertation.) The Influence of Certain Economic Theories on Fiscal Policy.

H. D. WOLF is directing the following research:

C. P. ANSON. (Progress on doctoral dissertation.) The Labor Movement in West Virginia.

M. A. EAKINS. (Progress on doctoral dissertation.) Labor Standards on Public Works Financed by Federal Funds.

F. H. BUNTING. (Progress on doctoral dissertation.) The Federal Relief Program and Policy.

HERBERT VON BECKERATH has published:

Two articles on America and the New Deal (in German). *Schmollers Jahrbuch*.

Politics and Economics. *Social Forces*. October, 1935.

Crises and Reform of the Western World. *Social Forces*. December, 1935.

A review of McGregor's Enterprise: Purpose and Profit. *Harvard Quarterly*.

He has in progress:

Some International Aspects of Capitalism and Its Present Crisis, which will be published in an early number of *The Southern Economic Journal*.

Research work on general problems of politics and economics in regard to the present crisis of the western civilization.

D. H. BUCHANAN has in progress:

Studies in Japanese Industrial and Commercial Development.

MALCOLM D. TAYLOR, as Chairman of the Committee on Research of the National Association of Marketing Teachers, is continuing his survey of the research work in marketing in progress in universities and colleges, in government bureaus, and in private research organizations throughout the United States. Summaries of parts of this study have appeared under the title Progress in Marketing Research in the following publications:

*The National Marketing Review*, I: 1: 87-93. 1935.

*The National Marketing Review*, I: 2: 177-188. 1935.

*The National Marketing Review*, I: 3: 279-282. 1936.

*The National Marketing Review*, I: 4: 370-377. 1936.

*The Journal of Marketing*, I: 1: 56-64. 1936.

*The Journal of Marketing*, I: 2: 156-168. 1936.

PROFESSOR TAYLOR is directing the following research:

CHARLES M. ANDERSON. (Progress on doctoral dissertation.) The Marketing of Funeral Supplies.

NIHAT FERIT YAPAR. (Progress on master's thesis.) Wastes in Marketing and Methods of Reducing Them.

M. S. HEATH has in progress:

Southern Transportation History.

PROFESSOR HEATH is directing the following research:

M. K. HORNE. (Progress on doctoral dissertation.) Some Aspects of the Volume of Savings in the South.

F. S. WILDER. (Progress on doctoral dissertation.) Some Class Variations in Standards of Living in North Carolina.

W. F. FERGER has published:

Distinctive Concepts of Price and Purchasing-Power Index Numbers. *Journal of the American Statistical Association*, XXXI: 258-272. June, 1936.

E. M. BERNSTEIN has published:

Public Expenditure, Prices, and the National Income. *The Southern Economic Journal*, II: 3. January, 1936.

A theoretical and statistical analysis of the manner in which enlarged public expenditure may affect prices, production, and income in periods of severe depression, with particular reference to conditions in the United States from 1932 to 1935.

The Rate of Return on Utility Property. *The Southern Economic Journal*, III: 1. July, 1936.

A discussion of the principles underlying the determination of the rate of return allowed on utility property, with a consideration of proposals for modifying the existing methods to prevent the allowance of excessive returns to utility companies.

He has in progress:

Trend Paper (with DUDLEY J. COWDEN).

A new type of graph paper that has been developed to permit the plotting of related trend and non-trend data. It is explained and illustrated in an article to be published in the January, 1937, issue of *The Southern Economic Journal*. It is believed that this type of graph paper will be useful for exploratory work, particularly in business cycle studies.

A manuscript on Recent Regulation of Public Utility Rates is nearing completion.

A contribution on the theory of the value of money, still in the formulative stage, will probably be ready for publication this year.

DUDLEY J. COWDEN has in progress:

Trend Paper. An article explaining a type of graph paper developed by E. M. BERNSTEIN and DUDLEY J. COWDEN.

Statistics in the Social Sciences. A book to be published in collaboration with F. E. Croxton of Columbia University by Prentice-Hall in September, 1937.

H. M. DOUTY has published:

A review of Nyman, Richmond C., and Smith, Elliott Dunlap, Union-Management Coöperation in the "Stretch Out." *The Southern Economic Journal*, III: 1: 87-89. 1936.

He has in progress:

Wage and Hour Legislation for the South, a pamphlet, which is being published by the University of North Carolina Press.

Wage Rates and Hours of Labor in North Carolina Industry.

C. E. KUHLMAN has in progress:  
The Lower Colorado River Authority.

The following doctoral dissertations were completed during the year:

FRED HOBSON ARNOLD. The Agricultural Adjustment Act as Applied to Cotton: An Example of Crop Control. (Under the direction of ERICH W. ZIMMERMANN.)

This is an attempt to appraise the economic consequences of the Agricultural Adjustment Act in its application to cotton. The first part of chapter one is devoted to the physical and social environment in the Cotton Belt of the South. Only those phases are included a knowledge of which is necessary to an understanding of the problems which the Cotton Adjustment Program attempted to solve, as well as of those which arose as a result of that program. The second part is an analysis of the economics of cotton and the economic behavior of cotton producers. In chapter two the historical background of the Agricultural Adjustment Act is reviewed—particular attention being given to the influence of the World War and its aftermath on American agriculture, the operation of the Agricultural Marketing Act, the agricultural situation in the spring of 1933, and the theoretical bases, aims, and machinery of the Agricultural Adjustment Act. Chapter three is a brief account of the application of the Act to cotton. Chapters four, five, and six are devoted to an economic appraisal of the cotton program. The points which are given most attention are the influence of the program on the cotton growers' income, the direct and indirect costs of the program, the impact of the program on other agricultural products, the effects of the program on general economic recovery, the division of the benefits between the various groups directly interested in cotton production, and the influence of the program on foreign production of cotton and on our cotton exports.

Although positive conclusions were, on the whole, avoided, the following conclusions appear to be the most reasonable. The program very materially increased the income of cotton producers, and this increase was somewhat greater than the total cost of the program. Producers of other agricultural commodities were not adversely affected by the cotton program. On the contrary, corn and hog growers were benefited by it. The program had relatively little effect on general economic recovery, but what effect it did have was of a favorable nature. The benefits accruing to cotton producers were very unevenly distributed between landowners and tenants. Though cotton tenants as a group were benefited to some extent, the economic condition of an indeterminate number was lowered by the program. The program acted as a stimulus to foreign cotton production, but was not responsible for all the increase in foreign cotton production which has occurred since 1933. Due to factors outside the United States, it is probable that most of the increase would have taken place in any case. The program caused a material decline in exports of American cotton. Part of this decline is of temporary character, but part of it is probably permanent.

HARRY MORTIMER DOUTY. *The North Carolina Industrial Worker, 1880-1930.* (Under the direction of H. D. WOLF.)

The purpose of this study is to examine the changing position of the industrial worker in North Carolina from the beginning of the industrialization of the state to 1930. Attention is focused largely upon the wage-earners in the cotton textile, hosiery, furniture, lumber, and tobacco industries.

After an introductory survey of the rise of industry in the State, the sources of the labor supply are described. Since the bulk of the labor supply was local in origin, particular attention is given to those forces responsible for the shift from agriculture to industry. Two chapters are then devoted to the important matters of wages and hours of labor during the entire period. For the years 1899-1929 rather comprehensive wage statistics are set forth. When the series of money wages are translated into real earnings, a fairly clear picture of the relative economic progress of the industrial workers results.

An effort is also made to measure changes in the health, housing facilities, educational opportunities, and social status of the wage-earning population. This material throws considerable light on the effect of industrialism upon labor. The story of the labor movement in the state is told in some detail, and the more important industrial disputes are briefly described. Finally, the record of legislative action for the protection of labor—especially with reference to child labor, hours of labor, and workmen's compensation—is examined.

Two broad conclusions are reached: (1) during the fifty-year period covered by this study the material well-being of the wage-earning population advanced, but in 1930 living standards remained distressingly low; (2) the efforts of the workers to achieve a larger measure of industrial freedom through labor organization had been defeated by the employers, aided by the coercive agencies of the state.

REX SHELTON WINSLOW. *A Study of Types of Approach Found in Recent American Economic Literature with Special Reference to the Organic and Pragmatic.* (Under the direction of MILTON S. HEATH.)

An inquiry into the reasons for the widely divergent theories of profit in American economic literature led to the discovery that these divergencies were but a manifestation of more fundamental cleavages in opinion as to the scope and method of economics. An examination of the controversy over scope and method in recent American economic literature disclosed that the issues underlying the controversy rested upon the adoption by economists of general thought patterns or types of approach having their origin in philosophic postulates.

The nature of the study was changed, therefore, from an examination of the outward manifestation of differences in theory found in a particular phenomena of economic interest, i.e., profit, to a search for the underlying issues of methodological controversy in current economic literature.

A beginning hypothesis was set up to direct the early work of the study. This hypothesis consisted of the theory that differences of scope underlay differences in method, and that the differences in scope were a product of implicit postulates concerning the nature of man's relationship to his universe. An epistemology consisting of a metaphysical dichotomy of reason and emotion and a preliminary taxonomy of four major thought patterns were devised as tools of analysis with which to probe for controversial issues. The four thought patterns, on the basis of a cosmological outlook, were named Newtonian, Darwinian, Hegelian, and Pragmatic; from the point of view of the epistemology they took the form of approaches to the knowing process and became, respectively, the deductive, the positive, the organic, and the telic thought patterns.

The epistemology and the taxonomy were then used to discover the nature of economic thought when approached from each of the four points of view. In economics the four approaches became the orthodox, the inductive particularistic, the historical or institutional, and the instrumental.

The study proceeded by setting up the characteristics of each of the thought patterns and then applying each type to samples of controversial literature of the period, beginning roughly with the third decade of the twentieth century. The analysis of this literature led to certain broad conclusions as to the general trend in economic thought and the reasons for methodological controversy. Conclusions as to the position of each type of thought pattern in the general field of methodology were also suggested.

The most fundamental aspect of economic thought during the period studied was the growth of uncertainty due to the decline in scientific and deterministic animism. It appeared that the social studies made a serious error in attempting to adopt, exclusively, the natural science outlook and technique. Controversy grew out of an intellectual division of labor. In splitting up the study of man and his relations with his environment into specialized fields after the natural science model, everything human and social tended to disappear from the content of the social studies.

For economics, the study concludes that the proper scope, as a separate discipline, is the general theory of rational choice in the use of resources within any given configuration of institutionalized values. Statistical and quantitative studies are not economics but history. The evolution of economic institutions is a part of interpretative history and theoretical sociology. Pragmatic or welfare economics is found not to be a separate type of economics but a point of view which will permit the economist to vitalize his work and lessen his participation in inter-discipline quarrels through a recognition that the problem of value is ultimately ethical and aesthetic.

The following master's thesis was accepted by the Department during the year:

JOHN JAMES OWENS. *Labor Legislation in South Carolina.* (Under the direction of H. D. WOLF.)

South Carolina, although predominantly an agricultural State, has, since 1880, experienced considerable growth in manufactures, particularly of textiles. The period 1880-1900 marked a growth in the manufacture of cotton goods that was nothing short of phenomenal. During that period the State in this industry rose from a position of comparative insignificance to a position second only to Massachusetts in the entire country. This rapid growth was due to an abundant supply of cheap labor and water-power. The fear of discouraging new industries and of injuring those already established, an idea nurtured by the manufacturers, effectively discouraged the enactment of any comprehensive program for the protection of the workers. There was no regulation of hours of labor until 1892. The first child labor law was enacted in 1903. Factory inspection and enforcement of labor laws were provided in 1909, when the Department of Agriculture, Commerce, and Industries was established with a Division of Labor thereunder. There has been marked improvement of labor laws since that time, but the State still falls short of most of the rest of the country in many respects.

#### DEPARTMENT OF EDUCATION

EDGAR W. KNIGHT has published:

One Hundred Years of Public Education in North Carolina. *North Carolina Education*, II: 6. February, 1936.

Some Educational Literature for 1935. *The Social Studies*, XXVII: 2. February, 1936.

Alexander Graham, 1844-1934. *North Carolina Education*, II: 5. January, 1936.

PROFESSOR KNIGHT is now conducting a survey of Hampton Institute, with the assistance of several specialists and consultants.

A. M. JORDAN is engaged in the following investigation:

A statistical analysis is being made of the records of about 20,000 students who were seniors in the North Carolina high schools in 1935. These records are the test scores which were obtained on the North Carolina High School Senior Examination. Up to the present, comparisons have been worked out for students who are going to college and for those not going. Students going to college score uniformly higher than those not going. This statement is true whether reference is made to the scores of the test as a whole or to those of the sub-tests. On the other hand, hundreds of students whose records are excellent are electing to remain at home; while many students whose records are worst of all are trying to continue their education at the college level.

PROFESSOR JORDAN has in progress Learning the High School Subjects, a chapter in C. E. Skinner's new text, *Readings in Educational Psychology*, to be published this winter by Farrar and Rinehart.

The following doctoral dissertations were completed during the year under the direction of the Department:

**HUGH PRESTON SMITH.** Some Limitations of the Educational Theory of Thomas Jefferson. (Under the direction of EDGAR W. KNIGHT.)

This study seeks to bring together certain materials relating to Jefferson's theory, plans, objectives, and efforts to establish a system of public education in Virginia. This study also undertakes to point out important phases of his theory and philosophy of education and to evaluate and criticize them in the light of modern educational science and recent developments in educational theory and practice.

Following a brief biographical account of Jefferson and his public services, the study undertakes to set out his theory of public education as expressed especially by his famous bill introduced into the Legislature of Virginia in 1779, "For The More General Diffusion of Knowledge" among the people of that State. This bill was based on Jefferson's theory of local self-government. He had faith that the people were capable of self-government if they had the opportunity to understand it through education. Jefferson believed that "ignorance and bigotry, like other insanities, are incapable of self-government." Also education in Jefferson's view was a means to universal peace, to the happiness of the people, to public security and strength and the preservation of liberty.

His educational plan, as described in the bill of 1779, which failed of passage, is analyzed and discussed in the light of changed conditions. Jefferson was strong for state support and for local control. The tendency in public education in this country during the past three decades has been toward high centralization. Would Jefferson approve?

The study reveals certain limitations upon Jefferson's plan: its selective character, the elimination of religious influence from the field of education, which he would have almost entirely secular, public educational support through direct taxes and public control of schools. It also shows Jefferson's interest in decentralized supervision and control especially of the lower schools, but increasingly centralized control in what is now called secondary and higher education. It would limit the amount of free and universal education and oppose compulsory education. The study definitely points to the dangers of high centralization of authority, especially partisan political authority, and in doing so points out, at least by implication, what appears to be an unhealthy trend in public educational administration in North Carolina.

**SAMUEL H. THOMPSON.** The Legislative Development of Public School Support in North Carolina. (Under the direction of EDGAR W. KNIGHT.)

This is a study of the legislative and constitutional provisions for educational finance in North Carolina. The study begins with the earliest legislation and traces the fiscal educational policy of the State through periods of in-

difference and hostility to the idea of public school support, of awakened interest in the subject in the second quarter of the nineteenth century, of the development down to the Civil War, with some reforms between that period and 1899, when the first direct State appropriation for public education was made in North Carolina, and of the movement for equalization during the past decade to 1933, when the State assumed both the entire support and control of the public schools for an eight months' term. Influence of court decisions on legislation dealing with school finance, and a comparison of state educational administration with other centralized agencies in the commonwealth are discussed. Also there is a treatment of the centralization of state school finance and control as expressed through provisions for school buildings, courses of study, high schools, the training and certification of teachers, and school libraries.

The nine chapters deal with efforts at school support during the Colonial Period, the influence of the permanent public school endowment, known as the "Literary Fund," methods of school support under the first public school law of 1839, the development of school support to the Civil War, the difficult days of school financing during the period of Reconstruction, the decisions of the courts on conflicts between constitutional and statutory legislation with reference to school support, and the support of schools through the so-called "per capita fund" and the equalization fund. The change from localism to centralization in school support and control is traced through the movement in the legislatures of 1931, 1933, and 1935 to complete control of the state school system by the State School Commission, which was created in 1933.

The following master's theses were completed during the year under the direction of the Department:

CLIFFORD R. ADAMS. A Comparison Between the Candidates Who Passed and Those Who Failed the Personal Interview for the Position of Investigator in the Pennsylvania Emergency Relief Administration. (Under the direction of A. M. JORDAN.)

When the eligible candidates for the position of investigator in the Pennsylvania Emergency Relief Administration are compared to the ineligible candidates for the same position, a statistically reliable difference is found between the two groups for age, while the difference approaches statistical reliability for number of dependents and for test scores. No statistically reliable difference between the two groups was found to exist for the amount of education, the amount of previous experience, the type of previous occupation, and the number of dependents. In some cases, the statistical significance of the difference was greater for the men, while in other cases it was found to be greater for the women.

OLA IRENE FLEMING. The Use of Pictures in the Teaching of Written Composition in High School. (Under the direction of PRESTON C. FARRAR.)

In this thesis an attempt was made to investigate the sources of pictorial material available for use in the teaching of written composition in high school, to locate the pictures most suitable for this purpose, to compile a classified list of them, and to show how they may be utilized to enrich composition work. The writer found that, while a limited use may be made of the reproductions of masterpieces, the most available source of pictures suitable for composition purposes is the front covers of periodicals, especially *The Saturday Evening Post*, *Collier's*, and *Liberty*. A comprehensive, classified list of over 250 suitable pictures from all sources was compiled. Copies of over 75 of these appear in the appendix. A discussion of methods in using pictures in written composition work, a few specimen lesson plans based upon typical pictures, and some resulting compositions written by high school students are included in the study.

MARY HENDRY INGLIS. *Some Economic Influences on Education in the United States: With Special Reference to Labor and Capital.* (Under the direction of EDGAR W. KNIGHT.)

The purpose of this study was to discover what were some of the economic influences which have affected modern education and how they affected it. The forces of the frontier, the American War of Independence, the Industrial Revolution, all destroyed the colonial and Old World policy. Improved transportation and communication awakened a feeling for a democratic educational system. The rising laboring class was conceded to be the earliest and most insistent proponent not only of equal educational opportunity for all but also of improved educational conditions and facilities for both pupil and teachers. Capital, as represented by business and patriotic organizations, was more interested in preserving the *status quo* and American ideals. Business men and official capitalism were not always in accord on controversial issues. Nor were labor and capital in accord with each other on many of these vital points. The teachers varied in their allegiance, tending to favor the viewpoint of capital on some questions and that of labor on others. The implications are that educational progress is affected by economic influences.

PETER GOURDIN DE SAUSSURE KERSHAW. *The Historical Development of Local Boards of Education in North Carolina and New Jersey.* (Under the direction of EDGAR W. KNIGHT.)

This study was undertaken to ascertain the theories which guided and the steps which were taken in two states in developing school systems that place such divergent emphasis on local boards of education. The school laws from 1839 to 1933, the theories and present practices in education of the states, and the opinions of present day educators as to the most desirable status of local boards were examined.

These states, it was found, gave almost identical powers to local boards in 1868. After this date, however, North Carolina increasingly centralized support and control of education until in 1933, with the adoption of a state supported system, local boards ceased to have any real significance. In New

Jersey, on the other hand, local boards have retained all but complete control over their school systems and they remain as they were in 1868, the most important unit in the state's educational system.

**META SWAIN LILES.** *An Integrated Unit Course of Study in Fifth Grade Geography with Emphasis Upon North Carolina.* (Under the direction of W. J. McKEE.)

This study was undertaken to set up an integrated, unit course of study for fifth grade geography suited to North Carolina needs and conditions, based upon the critically evaluated and integrated aims. Units of materials and procedures were secured from the best current practice in various parts of the United States.

Leaders of thought in the field of elementary geography were determined and were asked to recommend courses of study for fifth grade Geography. From these courses, from evaluated texts for fifth grade geography, from recent professional books on the teaching of elementary geography, and from the *Thirty-Second Yearbook of the National Society of Education*, aims, objectives, divisions of subject matter, smaller units of work, and procedures for teaching fifth grade geography were determined. Each of these was evaluated and each section integrated with the others and with the large aims.

As a result of this investigation a sample unit relating to North Carolina, and embodying the best current practice of geography teaching, was developed to indicate a way in which units might be developed to attain the desired aims.

**ROY FRANK LOWRY.** *Insuring Public School Property in North Carolina.* (Under the direction of GEORGE HOWARD.)

The problem of this study was to ascertain whether (1) the insurance program is conducted properly in North Carolina, (2) proper amount of coverage is carried on school property, (3) property insurance is costing too much, (4) the insurance program could be improved in North Carolina from the standpoint of efficiency and economy.

Data were collected from state financial reports, State Fund Laws for Insurance, statistics compiled by the State School Commission, and from public school audits, as well as from personal letters in answer to inquiries sent school officials.

Results reached showed that (1) many insurance practices in North Carolina are haphazard and inefficient; (2) six states which carry their own insurance save huge sums of money annually; (3) fire insurance on school property costs too much in North Carolina; (4) the loss ratio for school property is not as great as for all property in North Carolina; (5) the system of distributing insurance coverage to companies and agents is inefficient and brings criticism due to charges of favoritism.

**MARCUS B. SIMPSON.** *The Rental Textbook System in North Carolina.* (Under the direction of GEORGE HOWARD.)

As a background for the thesis, studies of the costs of books were reviewed, laws for adoption and change of textbooks in North Carolina were examined, and the laws which have been passed in regard to the renting of textbooks were collected. The study analyzes the administration and costs of the system, gives a short history of it in North Carolina, and tells as much as possible about how it works. Based on the findings of the study, a plan is offered for administering the system in North Carolina and for keeping check of the books.

MARGARET HARRISON SMITH. *The Development of the Scientific Method of Thinking as an Aim of Chemistry Teaching in the Secondary Schools of the United States.* (Under the direction of C. E. PRESTON.)

The scientific method of thinking, based on Dewey's analysis of a complete act of thought, is now widely recognized as one of the major objectives of chemistry teaching. It was the purpose of this study to discover how this objective originated, and how it attained its present position.

The problem has been approached from an historical angle. Three more or less distinct periods are discernible in the story of chemistry teaching: the introduction and establishment of the subject in the secondary school curriculum, 1800-1850; the era of mental discipline, 1850-1910; and the rise and establishment of the scientific method of thinking as a major objective in the teaching of chemistry.

Each of these periods has been examined to discover what the major aims were, how they developed, and, in the first two periods, how and why they were supplanted by other objectives. Finally, an account is given of the development of the latest of these objectives, namely, teaching the scientific method of thinking.

HILDEGARDE EWART WELLS. *The Influence of the Frontier on Education.* (Under the direction of EDGAR W. KNIGHT.)

This study attempts to show in what ways the development of the western frontier influenced the lives of the pioneer settlers, and how in turn the characteristics built up in frontier peoples reacted on the educational theories and systems which they built for themselves. The paper traces the development and influences of the College of Professional Teachers, the denominational colleges, the organization and control of the public school system, the land-grant college, co-education, and curriculum construction, with particular attention to both the constructive and destructive forces at work. Throughout the study special emphasis is placed on the democratic spirit as a guiding force in the educational development of the section and of the period.

#### SCHOOL OF ENGINEERING

T. F. HICKERSON has the following research nearing completion, which will be included in a book entitled *Statically Indeterminate Structures.*

Extending the method of Fixation Factors (announced in a previous *Research in Progress*) to the analysis of arched-members; in particular, the Rigid Frame Parabolic Bridge of variable cross section.

The development of formulas and the compilation of tables of coefficients giving the deflections at any section of continuous, restrained, and overhanging beams subjected to various loadings and restraining conditions; also the determination of bending moments resulting from the settlement of supports.

Devising a method of procedure for calculating secondary stresses in bridge trusses when the movements of the joints due to primary axial stresses are known. By means of special formulas involving the degree-of-fixation at the ends of the truss members, and the relative end deflections, the joint rotations are determined to any desired degree of accuracy. Two or three cycles of carrying over the rotations from one joint to the other are usually advisable. Finally, the bending moments are computed from the familiar Slope Deflection Theorem.

PROFESSOR HICKERSON has published during the year:  
Designing Highways for Greater Safety. *Popular Government*, March, 1935.

RALPH M. TRIMBLE is continuing studies on the size history of a rapid sand filter. The filter is now ten years old and has been in continuous use. The changes in size and shape of grain and in distribution of sizes in the upper layers are recorded periodically and combined with previous data.

PROFESSOR TRIMBLE has started a project involving the determination of mica content in fine aggregates used in mortar and concrete. The usual flotation methods separate other heavy minerals with the mica, and in some localities they represent a considerable amount of the total. Further separation by mechanical and electrical methods is being attempted.

With CHARLES T. G. LOONEY he is associated in the following joint projects:

A continuation of the design and construction of a device for investigating stress distribution in models of structures. Stresses are interpreted from color bands projected on a screen which occur when polarized light is passed through a transparent model of a structure under load. Comparison of results with those obtained with the Beggs deformeter on the same models is included in the project.

The development of a new method for determining the inherent stresses in structural members of metal. At present it is impossible

to measure experimentally the dead load stress without unloading or destroying the member. The method is based on measuring the deformations with the Huggenberger Tensometer in the region of a small drilled hole. The size of member, depth and diameter of hole, and the relation between magnitude of stress and deformation are investigated. Previous work on the method with another type of deformer has been done by PROFESSOR LOONEY at the University of Illinois.

RAYMOND F. STAINBACK has been engaged in the following research:

Investigation of magnetic fields in power transformers and air-core coils carrying alternating currents. Determination of phase relations between mutual and leakage fluxes in primary and secondary coils, using search coils with amplifier and cathode-ray oscillograph.

He has collaborated with R. M. TRIMBLE in design of means of taking traffic counts with radio-frequency apparatus.

JOHN C. GEYER and W. A. PERRY have published:

Textile Waste Treatment and Recovery.

This booklet which has been made available by the Textile Foundation, Inc., Washington, D. C., presents the material collected during a survey of the field of liquid textile waste disposal.

The report, although technical in nature, is written in laymen's language in order that it may be useful to manufacturer, chemist, engineer, and student interested in the problem of waste disposal. Among the subjects dealt with are: stream pollution and requirements for purified effluents; textile processes and the nature of the wastes produced; reduction of liquid wastes within the mill and the recovery of by-products; the methods used for treating textile wastes and the application of these methods for the treatment of certain specific wastes; the treatment of textile wastes in combination with municipal sewage; descriptions and diagrams of plants treating straight industrial wastes, and wastes in combination with sewage; and finally the need for research in the field of textile waste disposal, with suggested problems. For the use of those who wish to go into detail concerning certain phases of the problem, a classified bibliography of 340 references is included.

The following master's theses were accepted by the School during the year:

HSIANG LIN CHANG. Chemical Treatment of Rapid Sand Filter Bed for Cleaning Sand and Breaking up Mud Balls. (Under the direction of JOHN C. GEYER.)

The efficiency of various chemicals in cleaning rapid sand filters was thoroughly tested in the laboratory. Of the chemicals compared sulphuric

acid was found the most rapid in action and the most economical. Treatment with a 10% solution for thirty minutes gave satisfactory results with this chemical. Experiments with two foot diameter filter indicate that the penetration of acid into the bed takes place most slowly when the water level is drawn below the sand surface and the acid sprayed on the bed.

JOHN ALLAN MACLEAN. A New Measure of the Performance of Internal Combustion Engines. (Under the direction of COLIN CARMICHAEL.)

The engine indicator, the instrument commonly used for testing internal combustion engines, is shown to be unsatisfactory for testing high speed engines. A new measure of the performance of high-speed engines is proposed; this measure is the average pressure existing in the engine cylinders.

An instrument was devised and constructed for damping the pressure fluctuations of the gases from the cylinder so that the average pressure could be determined with an ordinary Bourdon gage. With this instrument experimental work was carried on with a gasoline engine and a Diesel engine to determine whether the average pressure could be used as an index to performance. It is shown by the test results that the average pressure clearly shows the effects of changes in engine operating conditions and that it is a direct measure of engine power. Thus a new measure of performance has been developed.

ERNEST L. MIDGETT. The Design and Calibration of a 6-inch Open Throat Wind Tunnel. (Under the direction of NEIL P. BAILEY.)

This report embodies an outline of the design, a complete calibration, and examples of results obtained from standard tests of a 6-inch open throat wind tunnel of the closed return type. A discussion of the relative merits of the different type tunnels, and the reasons for choosing this particular type, has been included in the design outline. The calibration includes discussions of the type of flow present in the test section of this tunnel with respect to air velocity variations in magnitude and direction. Also it includes discussions of the relative turbulence of the tunnel, its air inflow, and a complete set of flow direction charts and flow pictures. As examples of the test results obtainable from this tunnel there have been included discussions of the drag characteristics of spheres, the effect of the surface texture on the test results of airfoil models, and the pure scale effect of so small a tunnel. From this series of tests it may be concluded that although the tunnel is too small to be used in quantitative research, it is quite satisfactory as an indicating device of the trends of the aerodynamic qualities of a model.

#### DEPARTMENT OF ENGLISH

GEORGE R. COFFMAN has continued studies in the literary history and culture of fourteenth-century England. His immediate interests concern the influence of political, philosophical, and theological ideas on John Gower and his contemporaries and a comparative consideration of the impact of these on the different writers concerned.

PROFESSOR COFFMAN has published:

The Parable of the Good Shepherd, *De Contemptu Mundi*, and *Lycidas*: Excerpts for a Chapter on Literary History and Culture. *E. L. H.*, June, 1936. pp. 101-113.

He has edited Volume XXXIII of *Studies in Philology*.

He is continuing direction of the doctoral dissertations of MARY ELIASON on The Third Estate in Chaucer, *Piers Plowman*, and *The Towneley Plays*; and W. F. McNEIR on Certain Literary Traditions in a Selected Group of Elizabethan Dramatists.

GEORGE C. TAYLOR has the following research in progress:

"Hermione's Statue" Again.

Some Medieval Survivals in Elizabethan Drama.

Some Notes on Shakespeare's Language.

PROFESSOR TAYLOR is directing the following doctoral dissertations:

JAMES HOWELL. Rogues and Vagabonds in the Elizabethan Drama.

A. D. B. LANGSTON. Studies in the Consolation Books of the Renaissance.

W. J. OLIVE. Burlesque Elements in the Elizabethan Drama.

KESTER SVENDSEN. Studies in Science in the Elizabethan Epic.

ARTHUR PALMER HUDSON has published:

*Humor of the Old Deep South*. New York: The Macmillan Company, 1936, pp. xxiv, 548.

Primarily an anthology of regional humor, this book treats the country and the people of Mississippi and closely associated sectors of Tennessee, Alabama, and Louisiana, between 1540 and 1860. The region and its life are represented by anecdotes, character sketches, comic scenes, and tall tales written by contemporary men and women and published in a variety of forms. The sources are many and varied: almanacs, biographical writings, church histories, French and British colonial archives, local and state histories, magazines, newspapers, sporting journals, comic weeklies, novels, travel books, and unpublished manuscripts. The editor has grouped selections into twenty chapters, with appropriate introductions, about the early explorers, Indians, hunters, preachers, soldiers, doctors, lawyers and politicians, duelists, showmen, rivermen, land pirates and picaroons, schoolmasters and collegians, and women of various types. Critical and biographical material takes up about one-fifth of the book. Documentation is complete.

*Folksongs of Mississippi and Their Background*. Chapel Hill: The University of North Carolina Press, 1936, pp. xii, 321.

A study, with texts, of 157 folksongs (some with as many as a dozen variants) collected from oral circulation among white people in Mississippi.

Against the geographical, historical, social, and folk background sketched in four chapters, are presented, with appropriate critical introductions and headnotes, imported folksongs, including English and Scottish popular ballads and later pieces; five groups of folksongs chiefly of American origin; and a group of nursery, dialogue, and jocose songs, and songs used in singing games. Besides headnotes, some of considerable length, about one-third of the contents is concerned with critical and historical exposition. A bibliography and indexes of titles and first lines complete the apparatus.

*The Singing South: Folksong in Recent Fiction.* Sewanee, Tennessee: The University Press, 1936, pp. 30. Reprinted for the North Carolina Folklore Council from *Sewanee Review*, July 1936, pp. 268-295.

This essay was abstracted in *Research in Progress*, 1935, p. 96.

PROFESSOR HUDSON is directing the following research:

CHARLES L. PITTMAN. Wordsworth and the Scientific Movement. (Progress on doctoral dissertation.)

KARL PFEIFFER. Landor and His Contemporaries. (Progress on doctoral dissertation.)

A. C. HOWELL acted as Assistant Editor of *Studies in Philology* during the current year.

He has published:

Tennyson's "Palace of Art"—An Interpretation. *Studies in Philology*, XXXIII: 507-522. 1936.

He is directing the following doctoral dissertation:

EUNICE MACKAYE. Francis Bacon as a Historian.

DOUGALD MACMILLAN has completed a catalogue of the Larpent Collection of Plays in the Huntington Library.

PROFESSOR MACMILLAN has published:

The Uses of Original Sources in the Study and Teaching of Eighteenth-century Drama. *Proceedings, Twenty-fifth Anniversary Celebration of the Inauguration of Graduate Studies.* The University of Southern California, 1936, pp. 149-154.

Some Unrecorded XVIII Century Plays. (A reply to F. T. Wood.) *Notes and Queries*, 170: 193-194. 1936.

The Censorship in the Case of Macklin's *The Man of the World.* *The Huntington Library Bulletin*, 10: 79-101. October, 1936.

The three manuscript copies of the comedy in the Huntington Library submitted to the Examiner of Plays for the Lord Chamberlain's license serve as a basis for the study of the reasons for the suppression of the play. The

conditions leading to the refusal of the license are considered; the three texts are compared; and some conclusions as to the operation of the censorship are reached.

E. E. ERICSON has published:

The Vercelli Book. *London Mercury*, 34: 438. September, 1936.

Ambergris. *Notes and Queries*, 171: 160. August 29, 1936.

The Vercelli Book. *Notes and Queries*, 171: 138. August 22, 1936.

English Nose Literature. *Notes and Queries*, 171: 95. August 8, 1936.

American Political Parties. Translated into Chinese and published in the *Bulletin* of the National Central University (Nanking), November, 1935. (A lecture delivered before the Political Science Club of National Central University.)

Latin as an International Language. *Notes and Queries*: 171: 248. October 3, 1936.

That Darling Word *Requisitions*. *Notes and Queries*, 171: 277. October 17, 1936.

Mr. Woolston of London. *Notes and Queries*, 171: 278. October 17, 1936.

PROFESSOR ERICSON has had accepted for publication, to appear this fall, the following studies:

Some Corrections in Flom's *Old English Reader*. (*Beiblatt zur Anglia*.)

Happify in America. (*American Speech*.)

Burial at the Cross-Roads. (*Folk Lore*.)

A Distorted Japanese Word. (*American Speech*.)

A Scotch Dialect Contraction. (*Beiblatt zur Anglia*.)

"John Hort" and "Skipper Ireson." (*The New England Quarterly*.)

"Reaving the Dead" in the Age of Chivalry. (*Modern Language Notes*.)

(With ERVID E. ERICSON.) India in Revolution. University of North Carolina *Library Extension Publications*, 80 pp. (In press.)

Noun Clauses with *Because*. (*Anglia*.)

Morgan T. Callaway, Jr. (*Englische Studien*.)

He has the following research in progress:

A History of the English Language.

A Bibliography of the Writings on Old English Literature. (With KEMP MALONE and STEFAN EINARSSON of the Johns Hopkins University.)

A Bibliography of Homage Volumes. (With URBAN T. HOLMES.)

PROFESSOR ERICSON has been appointed consultant in Old English Linguistics to the Committee on Research Activities of the Modern Language Association of America.

The following theses and dissertations have been undertaken under PROFESSOR ERICSON'S direction:

DOROTHY FORD. A Study of Biblical Diction in the Middle English Period. (For the master's degree.)

IDELLE JONES. A Translation of Wulfstan's *Homilies*. (For the master's degree.)

JOHN W. McCAIN, JR. The Language of John Heywood. (For the doctor's degree.)

WALTER MOSES. The Language and Style of Thomas Fuller. (For the doctor's degree.)

W. L. WILSON. A Comprehensive Study of North Carolina Dialect. (For the doctor's degree.)

RICHMOND P. BOND has published:

Eighteenth Century Correspondence: A Survey. *Studies in Philology*, XXXIII: 572-586. 1936.

PROFESSOR BOND is continuing his research on Joseph Addison, seventeenth and eighteenth century periodicals, and neo-classic literary criticism.

He is directing the following doctoral dissertations:

D. A. BROWN. George Crabbe as a Satirist.

MARY RANDOLPH BUFFALO. The Neo-Classic Theory of Satire.

J. E. CONGLETON. The Neo-Classic Theory of Pastoral Poetry.

M. A. MOORE. Political Eulogy and Satire in English Poetry, 1714-1760.

E. C. MORGAN. The Politics of Joseph Addison.

H. T. SWEDENBERG. The Neo-Classic Theory of Epic Poetry.

RAYMOND ADAMS has published:

Henry David Thoreau, a biographical article for the *Dictionary of American Biography*, XVIII: 491-497, 1936. (In collaboration with HENRY SEIDEL CANBY.)

During the year he has issued in mimeographed form for distribution to scholars, collectors, and university libraries two annotated catalogues of books in his library:

A Booklist of American Communities, 127 titles.

The Thoreau Library of Raymond Adams, A Catalogue, 1088 titles.

ROBERT B. SHARPE has completed a subject-index of the articles on English drama, 1500-1642 in *Publications of the Modern Language Association*, Volumes I-L, for the fifty-year index which the Association is publishing this year.

He is continuing work on his study of the Rivalries of Jonson, Chapman, and Dekker as Dramatists.

He is directing the following research:

CLAUDE SEAWRIGHT. A Study of Massinger's Exposition. (Progress on master's thesis.)

H. K. RUSSELL, with A. E. ZUCKER, of the German department, and with MRS. RUSSELL, has completed a translation into English verse of the medieval German Redentin Easter play.

The following doctoral dissertations were completed under the supervision of the Department during the year:

GUY ADAMS CARDWELL, JR. Charleston Periodicals, 1795-1860: A Study in Literary Influences, With a Descriptive Check List of Seventy-five Magazines. (Under the direction of GREGORY L. PAINE.)

This study is based on the investigation of seventy-five magazines that were published or projected in Charleston, South Carolina, between the years 1795 and 1860. The study consists of two parts, the first being composed of five chapters treating major foreign and native literary trends and influences. A descriptive check list of all the publications forms the main body of Part Two, which also contains appendices that classify the periodicals and make ascriptions of authorship.

The importance of French and German literatures in their effects on the periodicals is discussed in Chapter One. From the time of the *Traiteur* (1795-1796), first of the Charleston magazines, through the last issue of *Russell's Magazine* (1857-1860), French literature exerted a continuous and varied influence. German literature, on the other hand, became an important force only in the second quarter of the nineteenth century, when the work of Coleridge, Carlyle, and various periodical writers in England and America began to stimulate interest in German thought. French equalitarianism had a vogue in Charleston, but the transcendental aspects of German literature never became popular.

Considering the dominance of English culture in Charleston, it is natural that English trends in taste and English writers should have been powerful in shaping the periodical literature. Selected English influences are dealt with in Chapters Two, Three, and Four. In Chapter Two, eighteenth century neo-classicism and sentimentalism are considered. One sees how Addison influenced the style and critical theory of ante-bellum Charleston editors and how the *Spectator* served as a model for the early periodicals. Illustrations indicate that Oriental, Gothic, and sentimental tales like those in eighteenth century English magazines occupied an honored place in the nineteenth century Charleston periodicals. In the third chapter Charleston's slow acceptance of nineteenth century English writers and literary fashions is discussed. Authors, we find, were frequently in or out of favor as they expressed themselves for or against American democracy and Southern slavery. The reception of Byron in Charleston was unlike that accorded most other nineteenth century English authors in that he became fashionable almost overnight. The characteristics and intensity of Byronism in Charleston are treated in Chapter Four.

In Chapter Five, demands for nationalism or regionalism in literature are considered. Such demands were rejected as ill-considered and narrow by the more humanistic critics; but in the main they tended to turn Charleston writers away from the literature of the European past, and they definitely stimulated a number of men to attempt the composition of a unique American or Southern literature. William Gilmore Simms was the most important advocate in Charleston of Americanism in literature.

The descriptive check list in Part Two constitutes the first detailed study of all the Charleston magazines. Illustrative historical sketches and complete bibliographical information are given for each of the publications that could be examined or about which information could be obtained. This check list is also a convenient finding list.

ERNEST HAYNES COX. *Certain Middle English Poetic Survivals in the Religious and Semi-Religious Poetry of the Sixteenth Century.* (Under the direction of G. C. TAYLOR.)

This is a study in the continuity of poetic traditions from Middle English into Renaissance English literature. It demonstrates the extent to which selected Middle English lyrical types survive in the religious and semi-religious poetry of the sixteenth century. These types are as follows: the *Life of Man* poems, of which there are several formulas; the *Ubi Sunt*; the *Dance of Death*; the *Debate of the Body and Soul*; the *Chanson d'Adventure*, the *Lament of Mary*; and the *Complaint of Christ*.

There are ten chapters, the first three of which are introductory in character. The first chapter defines the nature and scope of the investigation; the second treats of scholarship on medieval elements in sixteenth-century poetry; and the third points out the principal changes which occurred in religious and semi-religious poetry during the sixteenth century, particularly those changes effected by the English Reformation.

Chapters Three to Ten discuss the survivals in the sixteenth century of the Middle English types selected. The method of treatment is as follows: the type as it appears in Middle English is carefully described and its conventions are illustrated; then poems of the sixteenth century which appear to be survivals of the type are described and their possible connections with it are pointed out. Comparisons are made upon the bases of situations, themes, and linguistic formulas.

Chapter Four demonstrates that such forms of the *Life of Man* poems as "Earth Upon Earth," "Now in, now out," "The Messengers of Death," and "The Signs of Age," have numerous and easily recognized survivals. In Chapter Five a considerable number of survivals of the *Ubi Sunt*, in three characteristic medieval forms, are shown. Chapter Six traces the *Dance of Death* through the sixteenth century, showing the different degrees with which its traditions persist in literature and the significant changes which occurred in them. Chapter Seven treats of the *Debate of the Body and the Soul*, the survivals of which are neither numerous nor clearly distinguishable. The *Chanson d'Adventure* is discussed in Chapter Eight. The survivals of this type, which appear both in religious and in moral categories, are surprisingly numerous. In Chapter Nine two devotional types, the *Lament of Mary* and the *Complaint of Christ*, are treated. There are only scant survivals of the *Lament* in the sixteenth century, but there are five notable *Complaints of Christ* in that period. Chapter Ten sets forth the conclusions that several well-established types of the Middle English religious and semi-religious poems continued to have a literary history during the sixteenth century, although they were at times considerably modified in form, and that they formed notable portions of Renaissance literature.

LOUISE LANHAM. *The Poetry of William Cowper in its Relation to the English Evangelical Movement.* (Under the direction of RICHMOND P. BOND.)

This study undertakes to show that the poetry of William Cowper has more than an accidental and circumstantial relation to the religious revival in England in the eighteenth century. Its thesis is that Cowper's poetry, including even the best portions of it, is organically related to his religious experiences.

Chapter I attempts to evaluate previous literary and biographical studies of Cowper. In general the literary study has tended to assume that Evangelicalism was a deleterious factor in his life and art, and the biographical studies have tended to exploit the psychopathic element. Chapter II includes a discussion of scientific, metaphysical, and ecclesiastical backgrounds, against which the revival was in some sense a reaction. Chapter III constitutes a synthesis of Evangelicalism, offering definitions and parallels, setting forth doctrines, analyzing the nature of religious experience in the light of modern psychology, and suggesting the results of the religious revival in national character and standards of life.

The task of the fourth chapter of this study is a discussion of the *Olney Hymns* in relation to other verse of the same kind. After a consideration of

the historical development of church hymnody, the special character of the eighteenth-century hymn is set forth with reference to the contribution of Cowper.

The fifth chapter is devoted to a discussion of Cowper's Didactic Poems. A connection between *The Progress of Error*, the first of the group to be written, and an eighteenth-century work, *Thelyphthora*, by the Reverend Martin Madan, is established. Cowper's Evangelical affiliations are thus shown to have been responsible for his entrance upon a career of authorship. In discussing the poem *Charity* the chapter includes a study of Cowper's humanitarianism, and shows the connection between Cowper's anti-slavery sentiments and those of the Evangelical group, Wilberforce and others, who were successful in their efforts to abolish the British slave-trade. Apparently Cowper's religious tenets dictated practically the whole of the Didactic Poems. Yet the desire to gain the ear of the reading public led him to vary the seriousness of his discourse by the inclusion of less serious elements. In the course of writing these long "serio-comic" poems, Cowper is seen to be moving out of a strictly dogmatic presentation of his religious creed, toward a modification of his materials better suited to the purposes of poetry.

The sixth chapter, a study of *The Task*, attempts to show (1) that Lady Austen's influence, which has been traditionally overestimated, was not in conflict with Cowper's Evangelicalism, but a reinforcement of it; (2) that Cowper's *poésie domestique*, of which *The Task* is the best exponent, is closely related to his essential Puritanism; (3) that his humanitarianism in its various forms is in keeping with the spirit and purpose of the religious revival; (4) that even Cowper's love of nature, in which he anticipates Wordsworth, is integrally related to his religious faith and experience.

ANDREW JOHN MAHLER. *Risible Devices and their Employment in Victorian Literature.* (Under the direction of J. M. BOOKER.)

The purpose of this dissertation is threefold: (1) to formulate an objective chart of devices employed by writers of English literature designed to evoke a risible response; (2) to make a study of selected works by nine representative authors of English risible literature between the years 1823 and 1865 and of selected volumes of *Punch* between the years 1841 and 1865, based upon the above chart; and (3) to make a study of all the works of Lewis Carroll containing risible elements, based upon the same chart.

With these objects in view, the dissertation is divided into four sections and an appendix. Section One differentiates between three types of the Risible arising respectively from a feeling of eupepsia, from nervousness, and as a response to the comic. This third type is then studied with the object of detecting and assembling the devices that evoke a risible response to the comic. The result of this study is the isolation of 128 devices. Section Two gives a short sketch of the Risible before the nineteenth century in order to furnish a perspective of the trends in the use of risible devices for the better understanding of the use of them by Lewis Carroll and his immediate predecessors. Section Three is a study of selected works by Lamb, Hood, Planché,

Peacock, Surtees, Thackeray, Dickens, Barham, and Calverley, written between the years 1823 and 1865, and selected volumes of *Punch*, with the purpose of subjecting these works to the objective chart evolved in Section One. Section Four is a similar study of all the works of Lewis Carroll containing risible elements. The Appendix contains a series of tabulatory charts giving the results of the studies undertaken in Sections Three and Four.

The results of this study are the following: (1) An objective chart tabulating and describing 128 devices employed by comic writers to evoke the Risible has been devised. (2) Section Two indicates that by the beginning of the nineteenth century most of the risible devices known today had been experimented with at one time or another, and that the sense of humor had been fairly well developed. (3) Section Three shows that the main categories of devices employed by the writers during the period 1823-1865 were those of Satire, Wit, Want of Knowledge or of Skill, Diction, Personal Embarrassment, and Comic Verse. All the devices under the category of Nonsense were used, but used sparingly. The older and more frequent tried devices remained those most often employed; in addition, twenty-five new devices were introduced. (4) Section Four shows that although Lewis Carroll generally followed tradition in his use of risible devices, he had special changes and contributions to make, and after his work English risible devices were much richer in content than they had been before his appearance. It is under the category of Nonsense that he made his chief contribution; for, after *Alice*, Nonsense, which hitherto had been used apologetically by English comic writers, was quickly adopted by many as one of their most effective categories of devices.

HERMAN EVERETTE SPIVEY. *The Knickerbocker Magazine, 1833-1865: A Study of Its History, Contents, and Significance.* (Under the direction of GREGORY L. PAINE.)

This study traces the history, analyzes the contents, and indicates the significance in American literature of the *Knickerbocker*, a literary monthly published in New York from 1833 to 1865. Principally, the study traces the origin, development, and decline of the magazine; characterizes the poetry and prose in it; discusses the humorous element and the translations from foreign languages; characterizes the literary criticism in general and specifically the criticism of the most important English and American contemporary authors.

In 1833 the *Knickerbocker* began its career of thirty-three years, edited for three months by Charles Fenno Hoffman and for the next year by two others. For twenty-six years from May, 1834, the magazine was edited and partly owned by Lewis Gaylord Clark, whose amiable, humorous temperament chiefly determined the tone of the *Knickerbocker* during most of its life. From 1835 to 1860 the magazine, always purely literary, achieved its ideal of becoming a medium for talented literary aspirants of every American geographical section—"a ready and convenient channel into which every little rill of mind may pour its tributary stream."

Averaging over ten poems monthly, the magazine published about four thousand poems by six hundred writers, poetry adequately representing in

quality the popular American verse from 1830 to 1860. Although most leading American contemporary poets contributed, the most frequent authors were avocational, as distinguished from professional, writers. As a whole, the poetry was elegant and refined, but it lacked intellectual force and creative imagination.

William Ware, Richard Kimball, and John Treat Irving, Jr., were the best contributors of the twenty-odd serial novels. Although Irving and Hawthorne contributed the best of the six hundred tales, by nearly one hundred and fifty writers, many other significant writers, like William Gilmore Simms and Fitz-James O'Brien, contributed tales, generally better than the typical narrative and descriptive sketches. A few of the favorite contributors of other prose types were Irving, Charles Godfrey Leland, F. W. Shelton, and Francis Parkham. Furthermore, over three hundred translations, chiefly from German, were published. A distinctive feature was the pervading humor, especially in the "Editor's Table," bland rather than explosive.

Since the magazine purposefully became a journal for the multitudinous amateur writers rather than the few established ones, the average quality of the contents was naturally mediocre.

The literary criticism, chiefly in a special department, consisted of concise and informal comments on books, suggesting defects and excellencies and generally quoting illustrative passages. Despite the excellent literary tastes of the editor, however, the book notices were not learned or profound, but direct and sincere, more impressive for their quantity than their quality.

The genial mood, pervasive humor, and moral tone of the *Knickerbocker* blended to produce a journal of polite literature for the refined. This periodical, conducted to provide a variety of non-sectional and non-partisan literature and to serve talented literary aspirants with a sympathetic medium of communication with the public, was probably not equaled in longevity, literary quality, and popular affection by any other purely literary American magazine before 1860. Its most significant contribution to American literary history was probably its encouragement of multitudinous minor writers by providing a ready medium for their best productions and also by helpful criticism.

The following master's theses were completed during the year under the supervision of the Department:

SUE McGLAUGHAN BRETT. Samuel Pepys, Esq.: His Reading as Revealed in the *Diary*. (Under direction of A. C. HOWELL.)

The purpose of this study is to show the exact nature and extent of Pepys's interest in reading, in scholarship, and in general learning during the period of the *Diary*. A close scrutiny of his references to these matters reveals (1) that Pepys was a reader of remarkable frequency and volume, and one of unlimited scope of interest; (2) that his taste was superior and his judgment both independent and discriminating; (3) that his purchases of books were determined by his reading rather than by his collector-interest;

(4) that his greatest interests were studies bearing upon his office as a naval administrator, and studies in classical and romance languages, theology, history and biography, science and philosophy, music, and drama. In formal scholarship he was not pre-eminent, but in learning related to naval affairs he was unexcelled.

GEORGE WALLACE CHANDLER, JR. *The History and Present Status of Folk-Song Scholarship in the South.* (Under the direction of ARTHUR PALMER HUDSON.)

This study involves a survey of folk-song scholarship in the South from its beginning, insofar as its beginning could be determined, until the present. Material of research includes published works and data supplied by replies to questionnaires from fifty-four individual scholars and eleven libraries of the region. In order to determine the extent of scholarly interest, it was necessary to analyze every folk-song collection or study, published or unpublished, about which information could be obtained, that has been written by Southern scholars pertaining to folk-songs in the states of West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Missouri, Arkansas, Louisiana, and Texas, or to the South as a whole. The results have been organized into the following chapters: I. A History of Folk-Song Scholarship in the South Before 1920; II. Published Collections of Southern Folk-Songs; III. Periodical Articles Containing Folk-Songs and Critical Studies; IV. The Present Status of Folk-Song Scholarship in the South, Chiefly as Regards Unpublished Collections; V. Conclusion. For convenience of reference, an index has been provided.

It has been shown that folk-song scholarship in the South has been actively prosecuted since the third decade of the nineteenth century; that most of the work done to date has been in the form of collections; that no great synthesis or interpretation has thus far been attempted; that the tunes, or musical elements, except for a few notable studies of restricted regions or types, have not been adequately treated; that very little intensive or highly specialized work has been accomplished (for example, folk-song motives have not been exhaustively studied, and the relations of these songs to artistic literature have not been sufficiently appreciated or examined); but, finally, that present tendencies reveal signs that these shortcomings have been apprehended and will probably be remedied in the future.

JOHN LEE COULTER, JR. *Byron's Ethical, Religious, and Political Principles, as Revealed in his Judgment of Men.* (Under the direction of ARTHUR PALMER HUDSON.)

This thesis proceeds on the theory that Byron's principles—ethical, religious, and political—are more clearly revealed in his reactions to the characters of people whom he knew personally, and of whom he knew through readings in history and the journals of the day, than they are in his theoretic discussions, wherein his irrationality and tendencies toward wit and mystification obscure his true sentiments. It was thought that by such a method of

approach Byron might be caught off his guard, in the spontaneous revelation of his natural principles. The materials used are Byron's letters, his journals, his poems, and his recorded conversations. The thesis is divided into three chapters—"The Primary Virtues of the Private Person," "The Secondary Virtues of the Private Person," and "Byron's Political Principles." Byron is regarded as a person whose principles were essentially the orthodox principles of society in general. Where an inconsistency is found, as in the case of continence, it may be explained as arising from the conflict between practical and ideal principles commonly accepted. In the comparison of Byron's principles with his practice, shortcomings are pointed out, and an attempt is made to explain them in terms of temperament.

ELLA MAE DANIEL. *Plowed Ground*, a play of pioneer health work in rural North Carolina. (Under the direction of SAMUEL SELDEN.)

The play indicates some of the problems which faced young physicians in their fight for public health during the early years of county health departments in North Carolina. Through the story of its main character, his struggle and contribution, the play presents the prejudices of a rural community toward the young doctor and toward the changing of an old order. It also endeavors to serve as a commentary on an ignorant and petty rural group whose leaders propagate misunderstandings and engender bitterness and strife.

LILA M. DAVEY. *A Study of the Realistic Elements in the Works of Thomas Deloney*. (Under the direction of A. C. HOWELL.)

This thesis makes no attempt to present Thomas Deloney as a thoroughgoing realist; it is clearly recognized that particular elements of his work, namely plot and concept of character, are romantic. The purpose of the study, therefore, is to set forth only those elements that appear realistic: vignettes of contemporary life, examples of realistic dialogue, actualities, true facts of topography, real people and events. The first two chapters deal with formative influences. It is shown that Deloney's connection with the trades and his career as a ballad journalist had some bearing upon his realism; that his sources were largely what may be termed realistic—chronicle history, jest-book literature, and the popular drama. The last two chapters, under the titles "Reflection of Contemporary Life" and "Character Portrayal," point out concrete evidences of realism in the novels.

CARLOTTA DORETTE DELONG. *A Comparison of the Influence of Virgil on Milton and Spenser*. (Under the direction of GEORGE C. TAYLOR.)

Scholars have shown that Milton and Spenser were influenced by the works of Virgil. The purpose of this study of the *Paradise Lost* and *The Faerie Queene* is to show how the poets differed in their uses of the Virgilian borrowings. Chapter I gives a summary of Virgil's influence on Milton with selected quotations of the paralleling passages; Chapter II is a similar study of the Latin poet's influence on Spenser; Chapter III

brings together all the influences given in the first two chapters and compares the ways in which Milton and Spenser made use of the works of Virgil.

WILBUR DORSETT. *Pillar of Fire*, A Negro Drama in Three Acts. (Under the direction of FREDERICK H. KOCH.)

This play depicts the development of the first great crisis in the lives of a recently married mulatto girl and her husband, a middle-aged Negro preacher. New to her husband's town—a Negro settlement on the outskirts of a small Southern city—the girl does not feel free to associate with the people as one of their kind. They wrongly interpret her reticence as unwarranted aloofness and make her position a trying one. When she is mistaken by an outsider for a white woman she realizes for the first time the possibility of "passing" and escaping her hateful environment. The play concerns itself with her outward struggle with the prejudiced villagers and the inner struggle of her white and Negro impulses, which waver between denouncing or accepting her husband and her people.

KATHLEEN MAY KRAHENBUHL. *The Influence of Inigo Jones on Ben Jonson's Masques*. (Under the direction of ROBERT B. SHARPE.)

That Inigo Jones influenced Ben Jonson's masques is shown in a study of the principal masques of the latter and the part scenery played in changing the masque form. Jones introduced the fixed setting and used a curtain; Jonson followed by adding unity and continuity of idea and action to the literary part. The poet accommodated the abundance of machines and scenery used by Jones to his creation of the antimasque, and was later obliged to divide it into entries to justify further change of scene and to comply with Continental usage, since the foreign influence was predominant. Jones followed Italian models and Jonson sometimes received inspiration from Italian entertainments. In comparing the work of Jonson and Jones as to its transient and lasting value, we find that Jones was the best designer of his time and was appreciated then, but his fame lives only in his architecture and his contribution to the history of stagecraft; while Jonson's masques were appreciated by contemporaries and posterity for their literary value.

ARNOLD H. C. PENNEKAMP. *The Treatment of the Negro in the Literary Magazines of the South During the Reconstruction Period from 1865 to 1880*. (Under the direction of RAYMOND ADAMS.)

This treatise presents an objective study of the treatment of the Negro in the more significant literary magazines issued in the South during the so-called Reconstruction Period. In these magazines Southern writers endeavored to depict the plantation life of the Negro slave and the problems connected with the presence of the Negro in the South before and after the War of Secession. The magazine material has been arranged in four chapters: Chapter I. The Negro Before the War of Secession. Chapter II. The Negro During and After the War of Secession. Chapter III. Traits and Qualities of the Early Negro. Chapter IV. Types and Groups of Negroes. Chapters I and II contain much historical and sociological material relative

to the Negro and serve to some extent as a preparation for a better evaluation of Chapters III and IV, which deal more specifically with matters of a literary nature.

MUSETTE TAYLOR SPIERS. An Analysis of the Themes and Technique of the *Spectator*. (Under the direction of RICHMOND P. BOND.)

The purpose of this thesis is to show: that an analysis of the six hundred and thirty-five *Spectator* papers reveals a great variety of both theme and technique; that this diversity was the secret of that periodical's popularity and wide appeal; that the editors succeeded in their primary objective, which was to attack social problems of the day and to effect reforms in contemporary manners and morals without appearing antagonistic, militant, or didactic. The themes are here grouped under the following heads: Society and Morals; Politics, Government, and Economics; Education; Religion and Philosophy. The chapters on technique and the table of devices (club, letter, character, fiction) show the degree of importance within each paper and throughout the periodical of the use of exposition and the four major devices and of statements of editorial policy. A further aim of this paper is to establish a point of departure for students who wish to make an exhaustive study of any one theme or device of technique within the *Spectator*.

MERCEDES STEELY. The Folk-Songs of Ebenezer Community. (Under the direction of ARTHUR P. HUDSON.)

The purpose of this collection of 194 ballads and songs from a small North Carolina community is to present a representative body of folk-songs gleaned from a restricted area, to indicate the relation of the songs to the people of Ebenezer, and to suggest comparisons between the texts given and those contained in published collections.

The collection is prefixed by an account of how the material was gathered, a discussion of the community's attitude towards music and the dance, and a detailed presentation of the folk-lore background, including such items as games, folk tales, witch tales, superstitions, riddles, and home remedies. The material consists of thirteen main groups of pieces, each song having a head note which indicates the contributor and, if necessary, makes comment on the specific ballad. Over two-thirds of the pieces are accompanied by the tunes to which they were sung.

The groups are as follows: I. English and Scottish Traditional Ballads; II. Other Imported Ballads and Songs; III. Ballads of the Dead and Dying; IV. Love Songs; V. Songs About Marriage; VI. Songs About Negroes; VII. Work Songs; VIII. Soldier Songs; IX. Vagabond and Outlaw Ballads and Songs; X. Play-Party Songs; XI. Animal and Bird Songs, Nonsense Songs, and Nursery Rhymes; XII. Religious and Moralistic Songs; XIII. Miscellaneous Ballads and Songs.

The study is equipped with a bibliography, an index of titles, and an index of first lines.

## DEPARTMENT OF GEOLOGY

WILLIAM F. PROUTY has published the following:

Geology of the Coastal Plain of North Carolina. *Journal of the American Water Works Association*, 28: 4: 484-491. 1936.

Previous studies have shown that the basement rock underlying the Coastal Plain has a broad arch whose axis extends across North Carolina practically parallel with the Cape Fear Basin and that the Coastal Plain basement is much lower in Virginia to the northeast and in South Carolina to the southwest than is the case in North Carolina. Additional structural data concerning the Coastal Plain have been secured through magnetometer studies. This survey demonstrated that in the northeastern part of South Carolina the Coastal Plain basement rock is more steeply inclined toward the Atlantic in the near coast area than it is farther inland and that the previously discovered buried Triassic deposits are in a well-defined structural basin about 14 miles wide near Florence, S. C., and that this buried valley with its Triassic sediments can be traced by the magnetometer well into North Carolina.

PROFESSOR PROUTY has in preparation:

Carolina Bays—Current Explanations. For *Journal of Geology*.

Silurian Deposits of Eastern Tennessee. For Report of National Research Council.

He is continuing his studies on the origin of the Carolina Bays in the form of detailed studies of more isolated bays. He is also continuing his study of the character of Silurian deposits of Eastern Tennessee.

PROFESSOR PROUTY is supervising the following research:

ROSS HORNBECK. Topographic and Geological Map of a Portion of Morgan Creek Basin.

HENRY WATKINS. Origin of the Charleston, S. C., Phosphate Deposits.

WILSON LAIRD. Stratigraphy of Upper Catskill Sandstones and Conglomerates of Pennsylvania.

WILLIAM WHITE. Petrographic Study of Desert Sands.

JOHN McCAMPBELL. A Study of the Petrology of the Waccamaw (Pliocene) Formation of North Carolina.

G. R. MACCARTHY has published the following:

Magnetic Anomalies and Geologic Structures of the Carolina Coastal Plain. *Journal of Geology*, 44: 3: 396-406. April-May, 1936.

Reconnaissance magnetometer work on the Carolina Coastal Plain has shown that several striking anomalies exist in that region, and that many

of these anomalies may be correlated with the structural features of the basement rocks. Northeast-southwest structural trends have been observed, further evidence in favor of a northwest-southeast upwarp in the neighborhood of Wilmington has been obtained, and a concealed Triassic basin has been partially outlined.

This was also read as a paper at the 1936 meeting of the American Geophysical Union, Washington, April 30 to May 2, 1936.

He has completed for publication a paper entitled *The Carolina Bays*.

He has in preparation (with H. W. STRALEY, III) a paper dealing with the magnetic anomalies of the Wilmington, N. C., area.

PROFESSOR MACCARTHY is continuing his investigations of the magnetic anomalies of the Coastal Plain and also studies of the characteristics of Eolian Sands.

He is directing the following research:

W. R. JOHNSON. Geomagnetic Reconnaissance of the Northeastern Half of the North Carolina Coastal Plain.

JOHN W. HUDDLE has the following studies in progress:

Description of the Chattanooga shale conodonts.

A study of the micro-structure of the Order Conodonta.

Description of the Pleistocene Foraminifera of North Carolina.

He is supervising the following research:

R. A. EDWARDS. Cenozoic Ostracods of North and South Carolina.

ESTHER GREENE. Foraminifera of the North Carolina Cretaceous.

H. E. VITZ. Upper Silurian Ostracods of the Southern Appalachians, and the Cretaceous Ostracods of North Carolina.

SAMUEL T. EMORY has published the following:

Topography and Towns of the Carolina Piedmont. *Economic Geography*, 12: 1: 91-97. 1936.

A transportation pattern, with a consequent urban pattern, set by pioneer settlers of the Piedmont along topographic lines of least resistance has persisted and become intensified through a century and a half of regional development. Throughout the American era of big-city building the relative evenness of opportunity at many points of the transportation pattern developed many small urban centers, rather than one great city. While certain towns have outgrown others and the relative importance of cities has shifted from time to time, the fundamental nature of the transportation pattern has preserved and developed each of the old Piedmont villages. Because of heavy financial outlay and the force of long custom, it seems unlikely that the transportation pattern or the urban pattern of the Carolina Piedmont will be seriously disturbed and present towns should continue to grow with the development of the region.

He is continuing his research in the application of the principles of urban geography to Durham, North Carolina.

F. C. ERICKSON has in preparation the following papers:

Transhumance in Swiss Alpine Valleys.

Geographical Study of Miller's Cove, Tennessee.

H. W. STRALEY, III has published the following:

Nomenclature of Folds. *Pan-American Geologist*, LXIV: 335. 1935.

The Terminology of the Tectonic Forms Assumed by Igneous Rocks. *West Virginia Academy of Science*, IX: 75. 1935.

MR. STRALEY has had accepted for publication:

World Mineral Resources. To appear in January issue of *Economic Geography*.

He has in preparation with G. R. MACCARTHY, W. R. JOHNSON and J. C. McCAMPBELL a paper entitled:

Tracing Basic Dikes by Electrical and Magnetic Geophysical Methods.

MR. STRALEY is continuing the geomagnetic reconnaissance of the folded Appalachians of Virginia and the study of the adjustment in folding. With W. R. JOHNSON he is continuing his geophysical study of the pegmatite dikes of the eastern granite belt of North Carolina.

#### DEPARTMENT OF GERMAN

A. E. ZUCKER has completed the following research:

Ibsen, Hettner, Coriolanus, Brand. *Modern Language Notes*. February, 1936.

An Ahnfrau Scene in Schiller's *Wallenstein*. *Modern Language Notes*. February, 1936.

Translation of Redentin Easter Play (1464) with H. K. and MARY MARGARET RUSSELL.

Review of Liptzin, Solomon, *Richard Beer-Hoffmann*. *Germanic Review*. October, 1936.

Review of Anstensen, Ansten, *The Proverb in Ibsen*. *Provincial Sayings and Citations as Elements in His Style*. To appear in an early issue of *Modern Language Notes*.

PROFESSOR ZUCKER presented a paper: Goethe and Schiller Stage *Wallenstein* before a meeting of the South Atlantic Modern Language Association, Thanksgiving, 1935.

PROFESSOR ZUCKER is engaged on a history of the German stage at the hand of intimate descriptions of typical performances from medieval times down to the present day.

He is directing the following doctoral dissertation: LAWRENCE S. THOMPSON. Wilhelm Wajblinger.

He is directing the following master's thesis: JAMES COOK. An Edition of a Moravian Travel Diary of 1793.

W. P. FRIEDERICH is continuing his research particularly in eighteenth century literary relations and influences between Germany, France, and England. The investigations will continue for some time.

At the Modern Language Association in Cincinnati he read a paper on Lohestein's Treatment of French Dramatic Topics.

PROFESSOR FRIEDERICH has had accepted for publication in *Publications of the Modern Language Association* an article on Jakob von Graviseth's "Heuteliam" (an early representative of Swiss Enlightenment and a precursor of Montesquieu's *Lettres persanes*).

He is completing for publication a college textbook, *Eine kurze Geschichte des deutschen Volkes*.

The following doctoral dissertation was accepted by the Department:

F. E. COENEN. The Men-Characters in the Dramas of Franz Grillparzer. (Under the direction of A. E. ZUCKER.)

The main purpose of this study is an analysis of the men-characters in Grillparzer's dramas. To some extent it forms a complement to Wolf-Cirian, Francis, *Grillparzers Frauengestalten*, Stuttgart & Berlin, 1908.

Aside from the character analysis this study serves to evaluate a judgment that appeared in Johannes Volkelt's *Grillparzer als Dichter des Tragischen*, in 1888, and was repeated by almost every critic of Grillparzer since that time. Volkelt stated as his view that Grillparzer avoided the portraiture of mature, vigorous male characters; but he defined "manly" in his own manner according to which, for example, such a figure as Shakespeare's Hamlet is not a "manly" character. Through the fact that later critics have repeated Volkelt's stricture without the context of his definition a great injustice has been done Grillparzer.

This study of the thirteen completed dramas includes forty-seven men-characters. When the term "manly" is used in the sense the average reader would understand, namely in conformity with the dictionary definition: "brave, resolute, noble," it is found that twenty-five of the forty-seven men-characters appear "manly" beyond any doubt. Eight additional figures cannot be called

"manly" if this term is to include "noble" (in a moral sense), but they are by no means weak or effeminate. The remaining fourteen men would probably have to be classed as weak for one or the other of the following reasons: lack of courage, physical or moral, of perseverance, or because of their fanaticism, libertinism, corruption, gluttony, or greed.

In view of the fact that by far the majority of Grillparzer's men-characters are either "manly men" or at least not weaklings, it becomes evident that the author was capable of portraying such figures and did indeed present an extensive gallery of loyal, virile heroes.

## DEPARTMENT OF HISTORY

A. R. NEWSOME has published:

The Status of Archival Administration in the American States. National Association of State Libraries, *Proceedings and Papers*, 1935-1936. (Read before the American Library Association at Richmond, Va., on May 13, 1936.)

PROFESSOR NEWSOME has contributed the following sketches to *Dictionary of American Biography*, edited by Dumas Malone:

Thomas Polk, Vol. XV, 1935; Lemuel Sawyer, Vol. XVI, 1935; Jethro Sumner and John Louis Taylor, Vol. XVIII, 1936; Alfred Moore Waddell, Hugh Waddell, and Stephen B. Weeks, Vol. XIX, 1936.

H. M. WAGSTAFF has edited *The Strayhorn Letters*, which appeared in *North Carolina Historical Review*, October, 1936.

LOREN C. MACKINNEY has published:

Dynamidia in Medieval Medical Literature. *Isis*, XXIV: 400-414. 1936.

PROFESSOR MACKINNEY has prepared from manuscript sources a study concerning Medieval Medical Dictionaries and Lexicons, as a chapter in *Anniversary Essays in Honor of James Westfall Thompson* to be published in the fall of 1936).

A survey of alphabetically organized handbooks of medicine in the Latin manuscripts of European libraries.

With the aid rendered from the American Council of Learned Societies, and a leave of absence on the Kenan Foundation for the winter and spring of 1936, PROFESSOR MACKINNEY has completed a survey of early Latin medical manuscripts in European libraries, particularly those of French origin and in French libraries. The preliminary survey of this work, which has already been completed,

will serve as the subject for the Noguchi Lectures, to be given before the Institute of the History of Medicine of The Johns Hopkins University in December, 1936. The lectures in expanded form will be published some time in 1937 under the title *The Dark Age of Medicine in France*. Eventually the information gathered on this, and on a former, trip to France will serve as a basis for a monograph on Medicine in France during the Early Middle Ages.

PROFESSOR MACKINNEY has had accepted for publication in *The South Atlantic Quarterly*, an article, Postmorteming the Romans. This is a study of modern theories concerning Rome's decline and fall, and their use as propaganda in recent political campaigns.

With the assistance of FRANCES HARPER, PROFESSOR MACKINNEY is preparing *The Correspondence of Bishop Fulbert of Chartres* for publication as a volume of the Columbia University "Records of Civilization" series.

PROFESSOR MACKINNEY'S *Short History of Medieval Civilization* will be published by Farrar and Rinehart early in 1937.

HUGH T. LEFLER has almost ready for publication a volume "Pig-Iron" Kelley, Preacher of Protection, a study in the political and economic history of the United States, 1860-1890.

PROFESSOR LEFLER has edited the Social Science column of the *High School Journal* for the past year.

He has in progress a study of the Society for the Propagation of the Gospel in the Southern Colonies, and he is collaborating with R. H. Shryock of Duke University on a college textbook, Social and Economic History of the United States, to be published in 1937-1938.

FLETCHER M. GREEN has published:

Georgia's Forgotten Industry: Gold Mining. *Georgia Historical Quarterly*, XIX: 93-111, 210-228. 1935.

Duff Green: Industrial Promoter. *The Journal of Southern History*, II: 29-43. 1936.

Women of the Confederacy in War Times. *The Southern Magazine*, II: 16-21, 47-48. 1935.

The Historical Background of the Constitution. *The Federal Constitution. Bulletin of Emory University*, XXII: 5-15. 1936.

Georgia's Oldest Monuments. *Atlanta Journal Magazine*. January 5, 1936.

American Lawlessness and Civic Responsibility. *Wesleyan Christian Advocate*, 99: 14: 10-13; 15: 10-12. 1935.

PROFESSOR GREEN has written:

Foreign Affairs in Washington's Day and Our Own. (Accepted by Agnes Scott College *Alumni Bulletin*.)

Walter Lynwood Fleming: Historian of Reconstruction. (Accepted by *The Journal of Southern History*.)

Gold Mining in Ante-bellum Virginia. (Accepted by the *Virginia Magazine of History and Biography*.)

Georgia's Board of Public Works, 1817-1826. (Accepted by the *Georgia Historical Quarterly*.)

Gold Mining: A Forgotten Industry of Ante-bellum North Carolina. (Accepted by the *North Carolina Historical Review*.)

He has contributed sketches of Thomas Spalding and Linton Stephens to Vol. XVII, *Dictionary of American Biography*, 1935; Wiley Thompson, George Washington, Bonaparte Towns, and George Michael Troup to Vol. XVIII, 1936; and George Walton to Vol. XIX, 1936.

HOWARD K. BEALE has published:

*Are American Teachers Free? An Analysis of Restraints upon the Freedom of Teaching in American Schools*. New York: Charles Scribner's Sons. 1936. 855 pp. This volume appeared as part XII of the *Report of the Commission on the Social Studies in the Schools*. The Commission under whose auspices the book was written was set up by the American Historical Association. The work was financed by the Carnegie Corporation.

The book deals with the problem of freedom in American schools below the college level and in the period since the World War. There are chapters on the various subjects of teaching on which freedom is denied, on textbooks, on curriculum-making, on appointments, on tenure, on private schools, and on teachers of Negroes. Other chapters deal with the pressures that restrict freedom. Finally, the book offers an analysis of the relation of the purpose of education to freedom, a discussion of the means by which more freedom can be attained, and an attempt to answer the question, "How much freedom is possible or desirable?"

Our Revolutionary Heritage of Freedom to Criticize. *Classmate* and the *Epworth Highroad* of January, 1936, published by the Methodist School Publications.

Gideon Welles, Secretary of the Navy, 1861-1869. *Dictionary of American Biography* (Dumas Malone, ed.), XII: 629-632.

With DEAN HENRY W. HOLMES of the Harvard School of Education, FRANK W. BALLOU, Superintendent of the Schools of Washington, D. C., MERLE E. CURTI of Smith College, and ROGER BALDWIN, director of the American Civil Liberties Union, PROFESSOR BEALE published:

Academic Freedom in the Public Schools. Report of a General Conference held during the Session of the Harvard Summer School, July 22-25, 1935. *Harvard Teachers Record*, V: 202-222. October, 1935.

PROFESSOR BEALE has in press:

*A History of Freedom in Teaching in American Schools*, Charles Scribner's Sons, to appear early in 1937 as one volume of the report of the Commission on Social Studies in the Schools of the American Historical Association.

Educational Freedom and Democracy, to appear in the *Independent Woman*, November, 1936.

Propaganda Influences within the School, to appear as one section of the *Yearbook for Teachers*, to be published in December, 1936, by the National Council on Social Studies.

He has in preparation:

*Theodore Roosevelt, a Biography*, being written for publication as one volume of the "American Political Leaders Series," edited by Allan Nevins of Columbia University and published by Dodd, Mead, and Company.

JOSIAH C. RUSSELL has published:

*The Shorter Latin Poems of Master Henry of Avranches Relating to England*, an edition in collaboration with J. P. HEIRONIMUS, of the University of Wisconsin, under the auspices of the Mediaeval Academy of America.

He has in press:

*Dictionary of Writers of Thirteenth Century England*, to be published by the Institute of Historical Research of the University of London. It will appear in the autumn of 1936.

Social Status at the Court of King John. To appear in *Speculum*.

Medieval Population. To appear in the *Journal of Social Forces*.

He has in preparation:

Editions of the chronicles attributed to Peter of Ickham, and (with J. P. HEIRONIMUS) of the poems of Nicholas of Rievaulx.

Studies of the life and architecture of Elias of Derham (with H. L. HONEYMAN, editor of *Archaeologia Aeliana*), of seating arrangements and attendance at the medieval English great council, and of the chronicles of medieval Spain.

C. H. PEGG has had published during the year:

Sentiments républicains dans la presse parisienne à partir du retour de Louis XVI jusqu'au rapport des sept comités. *Annales historiques de la Révolution française*, juillet-août, 1936.

CECIL JOHNSON has published:

A Note on Absenteeism and Pluralism in British West Florida. *Louisiana Historical Quarterly*. January, 1936.

He has had accepted for publication:

A Book review of Ambler's *Washington and the West* in the *North Carolina Historical Review*.

He has in progress a monograph on British West Florida.

J. A. McGEACHY, JR., Teaching Fellow in European History, 1935-1936, has had accepted for publication in *Speculum* sometime in 1937 a seminar paper prepared under the direction of PROFESSOR MACKINNEY, *The Glossarium Salmonis and its Relationship to the Liber Glossarum*.

This is a detailed study, from manuscript photostats, of the relationship of three early medieval dictionaries (glossaria.) The result is the correction of the accepted idea of the origin of the *Glossarium Salmonis* (i.e., that it was derived from a Munich glossary), and the proof of its derivation, directly from the *Liber Glossarum* which exists in a ninth century manuscript and which served as the major source for the *Du Cange Glossary* of modern times.

The following doctoral dissertations were accepted by the Department during the year:

WELDON BROWN. *Attempts at Reconciliation between Great Britain and her American Colonies, 1774-1783*. (Under the direction of HUGH T. LEFLER.)

This study analyzes the efforts to prevent a complete separation of England's American colonies. The conciliatory proposals of Lord North's cabinet, the various documents of the Continental Congress expressing a desire for reunion, the plans and efforts of the Whig leaders in Parliament, the propositions of private individuals revealed in pamphlets, letters, and newspapers, and the influence of the problem of reconciliation on the formation of the Franco-American alliance embody the broad outlines of the discussion.

The solution offered by the Continental Congress was simply a return to the conditions before 1763. The efforts made by the mother country involved

three main plans: Lord North's plan of 1775, exempting from parliamentary taxation any colony that would give a definite sum of money for the common defense of the empire, to be at the disposal of Parliament, and fix an adequate appropriation for the support of its own civil government; the offer of the Howe peace commission of 1776, which proposed to grant pardons to the colonists individually or collectively upon their request for it; and Lord North's propositions of 1778, restoring pre-1763 conditions, ceding everything but absolute independence, and virtually repealing the Declaratory Act of 1766. The Carlisle peace commission vainly tried to induce the colonies to accept this final plan, but it was too late. The failure of the second petition to the King in 1775, the beginning of the war, the Declaration of Independence, the Franco-American alliance doomed to failure any plan after 1776 short of absolute independence.

The proposals of the minority in Parliament never had the least chance of acceptance by the majority, and the very efforts of the Whigs to obtain a reconciliation irritated the American rebels, who determined to obtain a full separation. Private proposals had no influence on the course of events and merely showed in most cases an inability to view broadly the question of reconciliation. France was alarmed at the possibility of a reconciliation, and her one policy throughout the war was directed against a reunion. British peace proposals hastened the formation of the Franco-American alliance, while the likelihood of such an alliance led Lord North to rush his conciliatory propositions of 1778 through Parliament and to America.

Before 1776 the mother country, and especially the King and his ministers, did not think the colonies would or could effectively resist British force. It was not until Burgoyne surrendered and France allied against Britain that the ministry fully realized that America was serious and that the empire was actually breaking up. Had the ministry foreseen this danger earlier, an obstinacy and pride common to England and America might have been reduced to a willingness to view reconciliation in a more reasonable light. However, there is no evidence available from past history of a reconciliation between a mother country and her rebellious colony or colonies after war has actually begun between them. In such a war reunion depends on force, not compromise.

MARTHA ELIZABETH EDWARDS. *Decius. A Study of the Roman Empire in the Middle of the Third Century.* (Under the direction of W. E. CALDWELL.)

Messius Quintus Traianus Decius became Emperor of the Roman Empire in the fall of 249. Like the majority of the emperors of the third century, he was a provincial of senatorial rank who had made an enviable record for himself in the army. He had been sent by Philip to put down disturbances among the army in the Balkans. But the army, fearing punishment for insubordination, saluted Decius upon his arrival as Emperor. Thus it was necessary for him to contend in battle with his former chief for the imperial crown.

As soon as he was fully established as Emperor, Decius endeavored to reinvigorate the morale and patriotism of the people by reviving the censorship; and apparently with the same idea he issued an edict requiring every inhabitant of the empire to sacrifice to the Roman gods and the Roman Emperor. Unfortunately, this last measure resulted in the Decian Persecution. His fame, however, rests upon the efficiency and skill with which he instituted a program of road building, and united the forces of the empire to meet the threat of a barbarian invasion. Although he died in the Gothic War which followed, doubtless his foresight in making adequate preparation saved the empire from being completely overrun at this time.

The conclusions derived from a study of the literary sources, the coins, the inscriptions, and the papyri concerning the political, economic, social, religious, and cultural conditions in the empire during Decius' reign (249-251) are important for the light they throw on the third century.

In the political situation there was a contradiction; for the revolutions which won for the period the term "military anarchy" seem to have been confined to the elections of the emperors. They do not appear to have materially affected the machinery of the imperial government, for there is evidence that the imperial agents and the provincial officials coöperated with Decius in carrying out his edict and commands.

There is evidence of great material prosperity. The well-to-do classes enjoyed many luxuries; they lived in comfortable homes, dressed well, and led happy, care-free lives. The cities built temples and baths, and furnished gladiatorial shows and plays for all the people. On the other hand, the small landowners were finding it difficult to maintain their economic independence, and their farms were being absorbed by the larger estates. As a result more people were reduced to the subsistence level; the markets for industrial products were decreased, and the entire economic system was threatened. The proletarians in Rome, although dependent on charity for part of their support, played little part in the economic decline of Rome.

The third century saw the first serious clash between the bourgeoisie and the peasants. In fact Rostovtzeff lays much of the troubles of the third century upon this conflict. The year 250 still found the Roman state predominantly Pagan, although the Christians were growing in prestige and importance. Racially, there had, of course, been changes since the foundation of Rome. But there were certainly no signs of physical or mental deterioration. Culturally there were signs of decline. This is especially apparent from the engravings on the coins which show a lack of naturalness and creativeness. The literature is also inferior to the best Latin works. Yet the third century produced the great jurist Ulpian and gave to the world Neo-Platonism.

LAWRENCE F. LONDON. The Public Career of George Edmund Badger. (Under the direction of A. R. NEWSOME.)

The purpose of this monograph is to make a study of the public career of George Edmund Badger as a southern Whig of the nationalist school, showing the part which he played in the affairs of the nation, and of his state, North

Carolina. It is not a complete biography of Badger, for that was not possible, since the majority of his personal papers have been destroyed. The study is based largely upon contemporary newspapers and public documents.

A study of the periods, 1840 to 1855 and 1860 to 1862, the years Badger was most active in politics, constitutes the major part of this work; while the first forty-five years of his life, 1795 to 1840, have been treated in a summary manner as a background for his later career. George Edmund Badger was, for many years, an important figure in the public affairs of North Carolina, and for a shorter period, a prominent personage in national affairs. Although never very popular with the people of his state as a whole, he was highly respected by all. Those few who knew him intimately, and were of the same political party, admired him as a man of unusual intellect and of great personal charm. As a statesman he received full recognition from his state and the nation.

After an exhaustive examination of all possible sources, the writer has found that Badger exerted a significant influence upon the political history of North Carolina and, to a less extent, on that of the nation.

The following master's theses were accepted by the Department during the year:

JOHN ALEXANDER McGEACHY, JR. Intellectual Interests of the Roman Nobility as Portrayed in the Works of Q. Aurelius Symmachus. (Under the direction of WALLACE E. CALDWELL and L. C. MACKINNEY.)

This study undertakes to examine the life and works of Quintus Aurelius Symmachus, distinguished orator and leader of the pagan element of the Roman aristocracy, for the purpose of evaluating the intellectual level of the senatorial class in the fourth century A.D. The *Letters*, *Relations*, and *Orationes* of Symmachus form the basis for an analysis of the cultural interests of the senatorial class in the fields of letter-writing, oratory, the study of classical authors and emendation of texts, education, history and historiography, poetry, reading and study, and philosophy. The works of Symmachus portray a society in which literary and intellectual pursuits were an absorbing passion, but they reveal at the same time a decadent civilization, enslaved to artificial rules of form, immersed in antiquarian interests, and totally lacking in vitality and originality.

PETER B. SCHROEDER. Manchukuo and the American Policy of Nonrecognition. (Under the direction of MITCHELL B. GARRETT.)

This study includes a brief survey of Japanese-American relations from 1900 to 1931, and as well a consideration of the basic factors determining Japanese foreign policy. The bulk of the thesis concerns the effect on Japanese-American relations of the creation of the state of Manchukuo, the doctrine of nonrecognition, and America's extraordinary collaboration with the League during this crisis. The restatement of the "Japanese Monroe Doctrine" is discussed in its bearing on the relations between Japan and America.

In the concluding chapter it is pointed out that a consideration for the multi-lateral pacts on which the world's peace structure rests leaves America no choice but to continue its policy of nonrecognition of Manchukuo, and that only a responsible civilian government in Japan can break the impasse in Japanese-American relations.

### THE SCHOOL OF LAW

M. S. BRECKENRIDGE has published during the year:

Bills and Notes—Adoption of Printed Seal, 14 *North Carolina Law Review* 80-87, December, 1935.

JAMES H. CHADBOURN has published during the year:

A Summary Judgment Procedure for North Carolina, 14 *North Carolina Law Review* 211-237, April, 1936.

ALBERT COATES has published during the year:

"Crime is Local," 14 *North Carolina Law Review*, June, 1936, dealing with the historical development of territorial limitations on the powers of arrest, trial, and punishment for crime in North Carolina.

FRED B. McCALL has published during the year:

Revision of North Carolina Estate Laws, *University News Letter*, Vol. XXII: No. 11. May 20, 1936.

Book Review, Leach's *Cases and Materials on the Law of Future Interests*, 36 *Columbia Law Review* 1018. June, 1936.

DONALD W. MARKHAM has published during the year:

Trust Investments in North Carolina, 14 *North Carolina Law Review* 160-181, February, 1936.

Bankruptcy—Rights of Partially Secured Creditors, 14 *North Carolina Law Review* 79-80, December, 1935.

Usury—Affirmative Relief for the Debtor, 14 *North Carolina Law Review* 114-115, December, 1935.

JOHN E. MULDER has published during the year:

Obstacles to Effective Legislation, a paper read before Association of American Law Schools, New Orleans, December, 1935; published in 31 *Illinois Law Review* 24, May, 1936.

Book Review, Patterson's *Cases on Contracts*, 36 *Columbia Law Review* 342, February, 1936.

Book Review, Robinson, *Law and the Lawyers*, 14 *North Carolina Law Review* 405, June, 1936. (With J. F. DASHIELL.)

E. M. PERKINS has published during the year:

The Influence of State Competition in the Adoption of Regressive Taxes: The North Carolina Sales Tax, 14 *North Carolina Law Review* 53-73, December, 1935.

M. T. VAN HECKE has published during the year:

Disbarment—Acts Not in Capacity of Attorney Antedating Incorporated Bar—Constitutionality, 14 *North Carolina Law Review* 374-380, June, 1936. (With B. IRVIN BOYLE.)

M. T. VAN HECKE. Book Review, A Study of the Business of the Federal Courts, The American Law Institute. Part II, Civil Cases, 14 *North Carolina Law Review* 125-127, December, 1935.

The School of Law has the following studies in progress:

ALBERT COATES.

Historical Development of the Agencies for the Investigation of Crime, the apprehension of criminals and their powers of arrest, search and seizure in North Carolina, to be published in the December, 1936, *North Carolina Law Review*.

Growth of the Law Governing the Use of Scientific Aids to Crime Detection and Criminal Prosecutions in North Carolina, to be published in the February, 1937, *North Carolina Law Review*.

Prosecution of Criminal Cases in North Carolina: Warrant and Indictment, to be published in the April, 1937, *North Carolina Law Review*.

Appeal in Criminal Cases in North Carolina, to be published in the June, 1937, *North Carolina Law Review*.

F. W. HANFT.

Utilities Commissions as Expert Courts, to be published in the December, 1936, *North Carolina Law Review*.

Book Review, Robson, W. A., *Civilization and the Growth of Law*, to be published in the December, 1936, *North Carolina Law Review*.

FRED B. McCALL. The Destructibility of Contingent Remainders in North Carolina, to be published in the February, 1937, *North Carolina Law Review*.

Work continued on the North Carolina Estates Revision Commission.

A. C. McINTOSH. Courts and Law in North Carolina during the Colonial Period, with special reference to the County Courts and the

law therein administered. Work continued on this project, sponsored by the American Legal History Society. (With BRYAN BOLICH, Duke University.)

CHARLES S. MANGUM, JR. and R. H. WETTACH.

Work continued on A Study, begun in 1934, to determine the Legal Status of the Negro, with Particular Reference to the South.

Particular studies have been made concerning legal and practical aspects of the Negro in relation to serving on juries, voting, education and problems of discrimination as illustrated by residential and other forms of segregation.

JOHN E. MULDER.

Waiver of Contractual Rights, in partial fulfilment for degree of Jur. Sc.D., Columbia University.

Waiver of Contractual Rights, as Applied to Fire Insurance Contracts, to be published in *Journal of American Insurance*.

The Defaulting Plaintiff in North Carolina, to be published in the *North Carolina Law Review*.

Book Review, Patterson's *Essentials of Insurance Law*, to be published in *Missouri Law Review*.

E. M. PERKINS.

A Cumulative Index to the *North Carolina Law Review*.

M. T. VAN HECKE.

Constitutional and Statutory Right of Trial by Jury in Equity Cases, to be published in the *North Carolina Law Review*.

#### THE LIBRARY

ROBERT B. DOWNS has published:

(With HARVIE BRANSCOMB.) A Venture in University Library Coöperation. *Library Journal*, LX: 877-879. 1935.

Mobilization of Library Resources. *School and Society*, XLIII: 368-370. 1936.

Regional Planning of Document Collections in the South. American Library Association, *Public Documents*, 162-172. Chicago, 1936.

New Avenues for University Library Extension Service. *American Library Association Bulletin*, XXX: 820-822. 1936.

American Library Association, Report of Committee on Resources of Southern Libraries. American Library Association, 1936, pp. 26.

A study of problems connected with building up research collections in Southern Libraries. Accompanied by maps and tables showing the distribution of present book resources in the South.

## DEPARTMENT OF MATHEMATICS

ARCHIBALD HENDERSON has published:

New Aspects of Relativity. *Journal of the Elisha Mitchell Scientific Society*, 52: 1. July, 1936.

PROFESSOR HENDERSON is engaged in the elucidation of certain aspects of the "New Relativity" of E. A. Milne and Leigh Page, from the geometrical point of view. He is also working on the problem of the Voigt-Lorentz Transformation, as extended to three-dimensional space, in order to bridge over the gap not hitherto filled by authors of works on relativity.

JOHN W. LASLEY has published:

On Monge's Differential Equation. *The American Mathematical Monthly*, XLIII: 5. May, 1936.

PROFESSOR LASLEY is studying the possibility of the determination of base curves for which associated curves have certain duplicate parts.

He is directing the following research:

NESTORE DI COSTANZO. (Progress on master's thesis.) On the Relation between Projective Geometry and the Theory of Equations.

R. D. VOGLER. (Progress on master's thesis.) Certain Methods of Approximation for the Theory of Equations.

E. T. BROWNE has the following research in progress:

Concerning Conjugate Matrices.

If  $M_1$  is a square matrix of order  $n$ , and if  $M_2, \dots, M_n$ , are matrices of the same type which possess the following properties:

- (1) The  $M$ 's are commutative in pairs;
- (2) If  $\lambda$  is a scalar,  $I$  the unit matrix and  $f(\lambda)$  a scalar polynomial of degree  $n$  such that the following identity holds:

$(\lambda I - M_1) (\lambda I - M_2) \dots (\lambda I - M_n) = f(\lambda)I$ , then the  $n-1$  matrices  $M_2, \dots, M_n$  are said to constitute a complete set of conjugates with respect to  $M_1$ . P. Franklin has shown that there always exists such a set of conjugates with respect to any assigned matrix  $M_1$ . It is the purpose of this paper to investigate the existence of still more general sets of conjugates than those obtained by Franklin and to make a detailed study of their properties.

PROFESSOR BROWNE has under his direction the following:

H. M. NAHIKIAN. (Progress on doctor's dissertation.) Matrices Commutative with a Given Matrix.

It is well known that every matrix which is expressible as a polynomial in the partial elements of a given matrix  $A$  is commutative with  $A$ . However, there are matrices commutative with  $A$  which are not so expressible. It is the purpose of this paper to find necessary and sufficient conditions on a matrix in order that it may be expressible in terms of the partial elements of  $A$ , and to apply these results to the solution of algebraic matrix equations.

H. V. PARK. (Progress on doctor's dissertation.) Matrices  $A$  and  $B$  Such That  $AB$  and  $BA$  Have the Same Reduced Characteristic Function.

If  $A$  and  $B$  are two square matrices of the same order, it is known that  $AB$  and  $BA$  have the same characteristic function, although not necessarily the same reduced characteristic function. It is the purpose of this paper to find necessary and sufficient conditions on  $A$  and  $B$  in order that  $AB$  and  $BA$  may have the same reduced characteristic function.

The following doctoral dissertation was accepted during the year by the Department:

EDWARD ALEXANDER CAMERON. On Loci Associated with Certain Osculants of a Plane Curve. (Under the direction of J. W. LASLEY, JR.)

Among the family of four point conics defined at a point of a plane curve, there are three of more than usual interest, namely, the osculating parabola, the osculating equilateral hyperbola, and the ellipse of minimum eccentricity. These conics and their associated points and lines have certain relations connecting them that constitute some interesting geometry. A few such relations believed to be new are pointed out in this study.

If the point of contact at which the osculants are defined is allowed to move along the base curve, the points and lines associated with the osculants determine curves associated with the base curve. The investigation of these associated curves is the primary purpose of the dissertation.

Parametric equations referred to a fixed reference frame are derived for these associated curves. Intrinsic representations are obtained in cases where feasible.

By specifying that the base curve has a particular form, the species of the associated curve is determined in a number of cases.

The parabola, called Transon's parabola, which is the envelope of the axes of the four point conics at a point, is subjected to the same investigation as the above mentioned osculants.

The following master's theses were accepted during the year by the Department:

MARSHALL CORNETT BELL. The Solution of Pell's Equation. (Under the direction of E. T. BROWNE.)

This paper is concerned with the equation  $x^2 - Ny^2 = \pm A$ , where  $N$  is any positive integer not a square, and  $A$  is any integer. The problem was to obtain necessary and sufficient conditions that there exist rational numbers,  $x$  and  $y$  satisfying this equation, and to find such solutions in case any exist. Four methods of solution are presented.

The equation was solved by continued fractions for the different cases arising from the relative sizes of  $N$  and  $A$ , and for negative values of  $A$ , including the special case of  $A = -1$ . The way to secure an infinite number of solutions was shown. Second, known Automorphs were used to solve Pell's Equation. It was shown that, since the least positive solution was known, all solutions may be secured by raising this solution to all positive integral powers. Third, since one solution was known, an infinite number of other solutions were obtained by pure geometric means. It was shown that these results conform exactly to formulæ obtained by Leonardo of Pisa and Euler. Finally, a method of solution by trigonometric functions was summarized.

TALMAGE HOYLE LEE. Normal Matrices. (Under the direction of E. T. BROWNE.)

A matrix  $A$  was defined by Toeplitz in 1918 to be normal if  $A$  is commutative with the transpose of its conjugate,  $\bar{A}'$ . This paper is concerned with a study of this rather large class of matrices. After a brief résumé of previous work on this subject, a second canonical form is developed for a normal matrix  $A$ . This form puts into evidence the moduli of the characteristic roots of  $A$ , which are precisely the square roots of the characteristic roots of  $A\bar{A}'$ .

Conditions are then given under which the sums and products of normal matrices are also normal.

After showing that every normal matrix  $A$  can be expressed uniquely in the form  $A = B + iC$  where  $B$  and  $C$  are commutative Hermitian matrices, a method of building up normal matrices is given.

Finally, a proof is given that any scalar polynomial in a normal matrix  $A$  is normal also.

J. LOUISE McDANIEL. Some of the Properties of Longchamps' Circle. (Under the direction of A. S. WINSOR.)

With centers  $A, B, C$ , the vertices of an obtuse triangle  $ABC$ , and radii equal to opposite sides respectively, describe three circles which intersect in pairs on circumcircle of triangle  $ABC$ . With the intersection of the three radical axes of the above circles as a center describe a circle cutting  $(A), (B), (C)$  orthogonally. This circle is called Longchamps' Circle.

Longchamps' Circle  $(L)$  has a radius equal to the diameter of the polar circle  $(H)$  of triangle  $ABC$ .  $L$  is the symmetric of  $H$  as to  $O$ .  $(L)$  is coaxial with a circle whose center is  $H$  and radius equal to diameter of  $(O)$ .  $(L)$  is orthogonal to circles whose centers are mid-points of sides of triangle  $ABC$  and whose radii are equal to corresponding medians.  $(L)$  intersects  $(O)$  in isotomic points with respect to sides of triangle  $ABC$ . The radical axis of  $(L)$  and  $(O)$  is the isotomic conjugate of the Lemoine line of  $ABC$  with respect to its sides. These and other properties have been proved in this paper.

CHARLES CURTIS WILLIAMS. On Certain Methods of Approximation for Plane Curves. (Under the direction of JOHN W. LASLEY, JR.)

It is the purpose of this paper to set forward various methods of approximation for plane curves, with examples illustrating the procedure followed in each case. For means of comparison the folium of Descartes is used throughout. An historical background precedes the work, followed by four different methods of approximation in respective order: method of limits, method of series, method of undetermined coefficients, and the method of the analytic diagram.

#### DEPARTMENT OF MUSIC

During the past year GLEN HAYDON has published the following reviews:

In *Books Abroad*:

Andre de Hevesy, *Liszt, ou le roi Lear de la Musique*.

Andre de Hevesy, *Vie de Mozart*.

Luigi Parigi, *Storia della Musica*.

Arnaldo Bonaventura, *Rossini*.

Kurt Arnold Findeisen, *Gottes Orgel, Roman um Bach und Händel*.

In the *Daily Oklahoman*:

Ewen, *The Man With the Baton*.

Mills, *A Fugue in Cycles and Bels*.

John Tasker Howard, *Ethelbert Nevin*.

Theodore M. Finney, *A History of Music*.

He is writing a textbook on Musicology, and is directing the following research:

PETER HANSEN. A Study of French Opera between Lully and Rameau.

PROFESSOR HAYDON is also preparing a translation of Jeppesen's *Counterpoint*.

BENJAMIN F. SWALIN has completed:

Das Violinkonzert der deutschen Romantik. (Doctoral dissertation. University of Vienna, 1932.)

Three Articles on Russia.

PROFESSOR SWALIN has the following research in progress:

Translation into English of the dissertation mentioned above.

Preparation of a book entitled A Study of Modern Orchestral Works.

Rossetti and the Pre-Raphaelites.

He has read the following papers:

The Violin Concertos of Louis Spohr. Washington-Baltimore Chapter of the American Musicological Society, Chapel Hill, Nov. 24, 1936.

The Brahms Violin Concerto. American Musicological Society, Chicago, Ill., December 27, 1936.

### MUSEUM OF NATURAL HISTORY

J. M. VALENTINE has had accepted for publication the following paper:

Raciation in *Steniridia andrewsi* Harris, a Supplement to Speciation in *Steniridia*. (*Journal of the Elisha Mitchell Scientific Society*, 52: 2. 1936, in press.)

This is a taxonomic analysis of a single species of cychrine beetle on the basis of its geographical and ecological races or subspecies. The present paper, together with Speciation in *Steniridia* (*Journal of the Elisha Mitchell Scientific Society*, 51: 2. 1935), constitutes an attempt to interpret the species concept in terms of anatomical and ecological data. Eleven subspecies are listed, of which three are new; synonymy is discussed.

MR. VALENTINE is continuing his research on the evolution, adaptation, and ecology of carabid beetles.

### LABORATORY OF PHARMACOLOGY

WM. DEB. MACNIDER has published:

A Study of the Acquired Resistance of Fixed Tissue Cells Morphologically Altered Through Process of Repair.

I. The Liver Injury Induced by Uranium Nitrate, A Consideration of the Type of Epithelial Repair which Imparts to the Liver Resistance Against Subsequent Intoxications. *Journal of Pharmacology and Experimental Therapeutics*, LVI: 359. 1936.

II. The Resistance of Liver Epithelium Altered Morphologically as the Result of an Injury from Uranium, Followed by Repair to the Hepatotoxic Action of Chloroform. *Journal of Pharmacology and Experimental Therapeutics*, LVI: 373. 1936.

III. The Resistance to Chloroform of a Naturally Acquired Atypical Type of Liver Epithelium Occurring in Senile Animals. *Journal of Pharmacology and Experimental Therapeutics*, LVI: 283. 1936.

## SCHOOL OF PHARMACY

HENRY M. BURLAGE has completed the following research during the year:

Studies on Three U. S. P. & N. F. Preparations by Shortened Procedures; *Journal of American Pharmaceutical Association*, **25**: 123-28. 1936. (With W. J. SMITH.)

Assay of the Official Sulfur Ointments. *Journal of American Pharmaceutical Association*, **24**: 945-948. 1936. (With CHARLES E. BRADY.)

Determination of Mucilage Content of Psyllium. *Journal of the Association of Official Agricultural Chemists*, **19**: 104, 1936.

PROFESSOR BURLAGE has been engaged in the following studies during the year:

A Survey of Drugs and the Drug Industry of North Carolina. (With M. L. JACOBS.)

Constituents of White Snake Root.

Phyto-chemical Studies of *Eremocarpus setigera*.

The Examination of the Volatile Oil of *Heracleum lanatum*.

*Chrysopsis graminifolia*, its Composition and Preparations.

He is working on a book on The Medicinal Plants of North Carolina. (With M. L. JACOBS.)

M. L. JACOBS has completed the following research during the year:

A Study of Some New Solvents in Alkaloidal Assaying, Especially Methylene Chloride and Isopropyl Ether. A part of this research was presented before the American Pharmaceutical Association in August, 1936.

PROFESSOR JACOBS during the year has been engaged in the following studies which are still in progress.

A Phyto-chemical Study of *Cracca virginiana* L., Growing Around Chapel Hill.

A Survey of Drugs and the Drug Industry in North Carolina. (With H. M. BURLAGE.)

PROFESSOR JACOBS is writing a book on The Medicinal Plants of North Carolina. (With H. M. BURLAGE.)

## DEPARTMENT OF PHILOSOPHY

LOUIS OSGOOD KATSOFF has completed:

Postulational Methods II. *Philosophy of Science*, **3**: 1: 67-89. January, 1936.

Postulational Methods III. *Philosophy of Science*, 3: 3: 375-417. July, 1936.

Group Theory for Truth Values I. Read to the Association for Symbolic Logic at the Harvard Tercentenary, September 1, 1936. An abstract appeared in *Journal of Symbolic Logic*, 1: 2: 61. June, 1936. *Bulletin of American Mathematical Society*, XLII: 9: 641. Part I. September, 1936.

Undefined Concepts in Postulate Sets. Read to the Southern Society for Philosophy and Psychology, Atlanta, Georgia, April 10, 1936. (Accepted for publication by the *Philosophical Review*.)

Mathematical and Social Unrest.

Philosophy and the Sciences. Read to Faculty Philosophy of Science Society of The University of North Carolina.

He has the following research in progress:

A Commentary on Hegel's *Wissenschaft der Logik*.

Hegel and Croce on the "Begriff."

Group Theory for Truth Values II.

A textbook in Logic.

Philosophy of Mathematics.

The Theory of Sets of Definitions.

A Logical Analysis of Rhine's work on Extra-Sensory Perception.

M. Pasch on the Definition of Number.

The Mathematical Philosophy of C. S. Peirce.

The following work has been completed by students in the Department of Philosophy:

CONNIE JONES BURWELL. How do We Know? A Study of Hegelian Epistemology. (Read to the Southern Society for Philosophy and Psychology at Atlanta, Georgia, April 10, 1936. (Under the direction of H. H. WILLIAMS and L. O. KATTSOFF.)

This epistemological investigation is based upon the Hegelian conception of the *Idee*, which includes in its process the concomitant development of individual mind, from potentiality to Absolute Mind, as well as the world of objectivity in Relation to which this Mind functions. The process of individual development and the process of acquiring particular knowledge, as identical, both involve three essential stages: namely, opposition, relation, and harmony.

KENNETH C. HAYES. The Logical Development of the Concept of Light. (Awarded Buchan Prize in Philosophy. Under the direction of LOUIS OSGOOD KATTSOFF.)

An application of Hegelian principles to a problem in Physics.

## DEPARTMENT OF PHYSICS

ARTHUR E. RUARK published the following:

General Theory of Fluctuations in Radioactive Disintegration. *Physical Review*, XLIX: 355. 1935. (With LEE DEVOL.)

He has in press:

Modern Atomic Physics, 2nd edition, to be published in January, 1937, by John Wiley and Sons, New York. About 400 pages. (With members of the Physics Staff of the University of Pittsburgh.)

The Distribution in Time of Counts due to a Constant Source and its Daughter in Equilibrium. (With LEE DEVOL.)

PROFESSOR RUARK has the following research and writing in progress:

Gamma Ray Spectra of Substances in the Radium Series.

Second edition of *Atoms, Molecules and Quanta*, with HAROLD C. UREY.

He is directing the following researches:

FOREST E. BRAMMER. Photo-Disintegration of Beryllium.

MARY HODGE. Radioactive Fluctuations, studied with a New Automatic Apparatus.

C. C. JONES. Cloud Chamber Study of Positrons and Electrons produced by Cosmic Rays and by Gamma Rays.

D. R. McMILLAN. Crystal Study of Gamma Ray Spectra.

J. A. OSTEEEN. Alpha Particles of Actinouranium.

OTTO STUHLMAN, JR. has completed the following researches:

The Technique of Producing Low Pressure High Frequency Electrical Discharges Due to a Solenoid Immersed in the Gas under Examination. (Read before the American Physical Society, Washington Meeting, April 1936.)

A Maxwellian Distribution as Observed in Effervescence. (Read before The Southeastern Society of Physicists, Atlanta Meeting, March 1936.)

PROFESSOR STUHLMAN has the following studies under way:

The Near Ultra-Violet Band Spectra of Iodine.

The Physical Characteristics of Woven Wire Screens to be used as Neutral Spectrographic Intensity Reducers.

Selective Radio Frequency Absorption in Gases.

E. K. PLYLER and his students have continued their studies on the infrared absorption of liquids and mixtures of liquids. The following papers have been published:

The Infrared Absorption Spectra of Mixtures of Alcohol and Water. *Journal of the Optical Society of America*, XXVI: 149: 1936. (With DUDLEY WILLIAMS and R. D. WEATHERFORD.)

The absorption spectra of absolute ethyl alcohol and alcohol containing water were studied in the region from  $1.5\mu$  to  $5\mu$ . In the water-alcohol mixtures there appeared a band at  $2.8\mu$  not characteristic of either alcohol or water. For small concentrations of water the intensity of this band was found to increase with increasing water content. The presence of the band at  $2.8\mu$  was interpreted as indication of association between the water and alcohol molecules. This result is in agreement with the anomalous changes in volume and in specific heat which take place in mixtures of alcohol and water.

The Infrared Absorption Spectra of Mixtures of Acetone and Water. *Journal of Chemical Physics*, IV: 154: 1936. (With DUDLEY WILLIAMS.)

A study of the infrared absorption spectra of acetone containing water revealed an associational band in the region  $2.7\mu$ . This band was studied for concentrations of water varying from 0.5 per cent to 70 per cent by weight. The intensity of the associational band increased with the water content of the mixture. When the water content was large, the  $3\mu$  water band overlapped the associational band. Absorption spectra were obtained for ten mixtures. It was found that concentrations of water as low as 0.1 per cent could be detected by the presence of this band.

The Reaction Rates of Propionic and Acetic Propionic Anhydrides. *Journal of Chemical Physics*, IV: 90: 1936. (With E. S. BARR.)

The infrared absorption spectra of mixtures of water with acetic propionic anhydride and with propionic anhydride have been measured in the region from  $5\mu$  to  $6.4\mu$ . The intensity of the bands was found to decrease with time. By using the relative intensity of the anhydride band the reaction rate was calculated for three concentrations. The reactions were unimolecular but the value of the reaction constant was different for each concentration, its value being approximately proportional to the concentration of the water. The value of the reaction constant of acetic propionic anhydride was about twice the value of the constant for propionic anhydride. A table is given of the values of the reaction constants for the different concentrations.

The Near Infrared Absorption Spectra of Acid and Basic Solutions. *Journal of Chemical Physics*, IV: 92: 1936. (With E. S. BARR.)

The infrared absorption spectra of  $H_2O$  and aqueous solutions of HCl, HBr, NaOH, KOH,  $ZnBr_2$ ,  $ZnCl_2$  and  $Na_2CO_3$  have been measured from  $1.5\mu$  to  $2.8\mu$ . Bands were observed at  $2.30\mu$  and  $2.45\mu$  in hydroxides, at  $2.30\mu$  and  $2.55\mu$  in acids, and at  $2.30\mu$ ,  $2.45\mu$  and  $2.55\mu$  in hydrolyzing salts. The band at  $2.30\mu$  is produced by hydration and  $2.45\mu$  band by the OH ion.

The Infrared Absorption Spectra of HCl in Benzene. *Physical Review*, XLIX: 215. 1936. (With DUDLEY WILLIAMS.)

The infrared absorption of benzene and a solution of HCl in benzene has been measured in the region from  $2.5\mu$  to  $4.2\mu$ . The absorption band of benzene at about  $3.38\mu$  is increased in intensity and shifted to longer wave-lengths in the solution for the same cell thickness. Other benzene bands in the region from  $2\mu$  to  $3\mu$  did not show an appreciable change in intensity or position. It was concluded that the absorption in the region of  $3.4\mu$  was due to the HCl in solution. When the ratio of the absorption of the solution to the absorption of the benzene is found, there appears a band with center at about  $3.49\mu$ . The relation of the absorption to the dipole moment is discussed.

The Reaction Rate of Acetic Anhydride and Water. *Journal of Chemical Physics*, III: 679. 1936. (With E. S. BARR.)

The infrared absorption of acetic acid and acetic anhydride has been measured from  $1\mu$  to  $6.5\mu$ . A number of bands were observed below  $5\mu$  which were similar for the two substances and were attributed to CH bonds. An intense band was found in acetic anhydride at  $5.45\mu$  and in acetic acid at  $5.75\mu$ . By measuring the intensity of these bands at different times, the reaction velocities of equivalent amounts of anhydride and water were determined. This method offers a new and independent means of determining reaction velocities and related constants. The reaction was approximately unimolecular for any concentration. The reaction constant decreased as the time increased. A different value of the constant was obtained when different concentrations were used. The reaction constant was also determined for three different temperatures. The values of the reaction constant and other constants were tabulated. The error is estimated to be 10 per cent.

The Infrared Absorption of Solutions of Acids in Heavy Water. *Journal of Chemical Physics*, IV: 460. 1936. (With DUDLEY WILLIAMS.)

Abstracts of other researches which have been completed are given in the section on theses.

Papers which have already been published on the basis of theses are the following:

The Infrared Absorption of Cyanides and Thiocyanates. *Journal of Chemical Physics*, III: 664. 1936. WALTER GORDY and DUDLEY WILLIAMS.

Effects of Isomerism on Infrared Absorption Spectra. *Journal of Chemical Physics*, IV: 85. 1936. WALTER GORDY and DUDLEY WILLIAMS.

The Infrared Absorption of Acid Solutions. *Journal of Chemical Physics*, II: 306. 1936. E. S. BARR (with E. K. PLYLER.)

JOHN A. WHEELER published the following researches:

Coulomb Wave Functions. *Terrestrial Magnetism and Atomic Electricity*, p. 443, December, 1935. (With G. BREIT and F. L. YOST.)

Coulomb Wave Functions in Repulsive Fields. *Physical Review*, XLIX: 174. 1936. (With F. L. YOST and G. BREIT.)

Dependence of Nuclear Forces on Velocity. *Physical Review*, L: 643. 1936.

Comparison of Majorana-Heisenberg and Velocity Dependent Forces. *Physical Review*, L: 675. 1936. (With KATHARINE WAY.)

PROFESSOR WHEELER presented the following papers:

The Cross-Section for the Production of Triples at the November meeting of the American Physical Society in Baltimore. (Abstract published in *Physical Review*, XLIX: 197. 1936.)

The Interaction between Alpha Particles at the annual meeting of the Southeastern Society of Physicists in Atlanta, March, 1936.

PROFESSOR WHEELER and his colleagues have the following research in progress:

The Mathematical Treatment of Nuclear Scattering and Disintegration Processes.

The Scattering of Alpha Particles in Helium.

KATHARINE WAY has published the above-mentioned work with JOHN A. WHEELER and is now preparing for publication a paper on The Photoelectric Disintegration of the Deuteron.

HERMON PARKER is working with PROFESSOR WHEELER on Elastic and Inelastic Collisions of Deuterons in Heavy Hydrogen.

PAUL E. SHEARIN has the following research in progress:

The Energy Levels of Nuclei Between Oxygen and Calcium.

Studies of Molecular Changes with the Help of Infrared Spectra.

The following doctoral dissertations have been accepted by the Department during the year:

ERNEST SCOTT BARR. The Infrared Absorption of Aqueous Solutions of Acids from  $1.7\mu$  to  $6.5\mu$ . (Under the direction of E. K. PLYLER.)

The infrared absorption spectra of aqueous solutions of HBr, HCl, HF, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, HCOOH, and C<sub>6</sub>H<sub>5</sub>COOH in the region from  $1.7\mu$  to  $6.5\mu$  have been obtained. It was found that in addition to the familiar water bands, there were strong absorptions at  $2.4\mu$  and  $5.5\mu$ .

From a study of NaCl, NaBr, ZnCl<sub>2</sub>, ZnBr<sub>2</sub> and Na<sub>2</sub>CO<sub>3</sub> it was concluded that the  $5.5\mu$  band was due to the hydration of the undissociated acid molecule.

This belief was consistent with the fact that the band changed slightly in position, roughly with the change in weight of the acid molecule.

The absorption bands at  $3.5\mu$  and  $3.8\mu$  found in HCl and HBr respectively when they are in the gaseous state were not found in the solutions.

Under better resolution, the  $2.4\mu$  band was found to be complex. The components of the band were separated and two of them assigned probable origins.

Indications were found that, even in the case of strong electrolytes, there were a great number of undissociated molecules at ordinary concentrations.

A suggestion as to the utilization of the results of this study was given.

SHERWOOD GITHENS, JR. The Striking Potential of High Frequency Discharges in Hydrogen as Conditioned by Frequency. (Under the direction of OTTO STUHLMAN, JR.)

It is shown that the many disagreements in the experimental evidence concerning the dependence of the striking potential of the high frequency glow discharge upon frequency may be attributed to errors in the measurement of the potential. In order to obtain direct experimental information upon this subject, an oscillator was designed, constructed and calibrated which accurately measures the potential of its output, over a range of frequencies from 4.75 to 11 megacycles. Striking potentials were observed in hydrogen purified by filtration through palladium, using internal brass electrodes separated 1.4 cm. The values obtained were independent of frequency and followed Paschen's Law between 70 and 130 mm. pressure, with frequencies of excitation ranging from 5 to 11 mc. Below these pressures, a correlation of the changing appearance of the discharge with the variations in striking potential observed led to the conclusion that when the decreasing pressure reaches the critical value for the electrode separation, the glow begins to strike between points increasingly farther apart than this distance, until the critical pressure for the diameter of the discharge tube is reached. When the decreasing pressure is approaching these two critical values, the striking voltage exhibits a dependence upon frequency, being less for the higher frequencies. Information is also given concerning the time of residual excitation of hydrogen after the cessation of a discharge.

DUDLEY WILLIAMS. The Infrared Absorption of the Cyanides. (Under the direction of E. K. PLYLER.)

Aqueous solutions of seven inorganic cyanides, two thiocyanates, and one cyanate were studied in the region from  $1.2\mu$  to  $7.5\mu$ . In all the materials a characteristic absorption band was observed in the region from  $4.6\mu$  to  $4.9\mu$ . The exact position of the band was found to be different for the various compounds. This characteristic absorption was attributed to changes in the vibrational energy of the bound CN group. In the cyanate solution a double band appeared in the region of  $7\mu$  which was not characteristic of the other cyanide and thiocyanate solutions. Hydrolysis and solvation effects were observed in some of the solutions.

In order to determine the effects of isomerism on this characteristic absorption, the absorption of four organic cyanides, two organic thiocyanates, and the corresponding isomers were studied in the region from  $1.0\mu$  to  $6.5\mu$ . The intense band at  $4.4\mu$  in the normal cyanides appeared at a wave length longer by  $0.2\mu$  and with doubled intensity in the isocyanides, the variations in wave length and intensity being nearly the same for all cyanide compounds studied. In the case of the thiocyanates the variation in wave length of the characteristic  $4.6\mu$  band for the two configurations is less in the cyanides, whereas the intensity differences are greater. No other bands in these organic compounds were appreciably affected by the isomerism in the cyanide group.

In the absorption spectrum of aqueous solutions of hydrocyanic acid an intense band was found at  $4.75\mu$  and also a less intense band at  $4.95\mu$ . The band at  $4.95\mu$  can be attributed to a small amount of the isomer HNC. Several other weak bands appear which may be given a similar interpretation. The positions of the bands arising from HCN and HNC indicate weaker binding forces in HNC. These results are shown to be in accord with the modern theories of chemical binding.

The following master's theses have been accepted by the Department during the year:

FRANCIS BEALL BREAZEALE. On the Use of Wire Screens as Neutral Light Diminishers. (Under the direction of OTTO STUHLMAN, JR.)

Mechanical light reducers in the form of woven wire screens and perforated plates have been used more or less successfully as neutral light diminishers. Diffraction phenomena prevented them from being ideally applicable. This work deals essentially with the transmission properties of blackened woven wire screens for monochromatic radiation, as to their quantitative reproducibility for a beam of parallel light. Two optical systems were investigated. Screens were examined for magnitude of errors when used in slightly diverging and converging rays, and in a second optical system containing no lens with near monochromatic filters in connection with a parallel beam of light. The intensity reductions, when wire screens were used, were measured by means of a photronic cell and sensitive galvanometer. Wratten and Zeiss color filters were used. A tungsten lamp at a color temperature  $2400^\circ$  K was the source of illumination. Transmission properties of screens for various spectral regions were also examined. The comparative neutrality of screens showed that for the longer wave-lengths, the screens and grey gelatine filters are about equally neutral; but that for short wave-lengths, screens are quite superior to neutral gelatine intensity reducers.

RAYMOND LEVERING DRISCOLL. An Apparatus for Automatic Analysis of Fluctuations in Radioactive Disintegrations. (Under the direction of ARTHUR E. RUARK.)

An apparatus has been developed which records the total number of events occurring in a Geiger counter and the number of intervals between

events which are longer than some chosen interval  $T$ . This apparatus makes possible tests of the Bateman fluctuation formula at a much greater rate and with much less labor than previous arrangements permitted. A theory has been constructed for the interpretation of the results obtained, and experimental runs show that the performance is excellent. The time resolving power of the apparatus is about one millisecond.

**TIMOTEO GATICA.** The Infrared Absorption of Mixtures of Water and Alcohol. (Under the direction of E. K. PLYLER.)

The purpose of the investigation was to determine the state in which water exists in mixtures with propyl and methyl alcohol. The absorption spectra of the mixtures were carefully studied from  $1.0\mu$  to  $9.0\mu$  with special attention to the regions between  $2.3\mu$  and  $3.4\mu$ ,  $4.4\mu$  and  $5\mu$ ,  $5.5\mu$  and  $7.1\mu$ . The addition of small amounts of water causes a shift of the  $3\mu$  liquid water band to shorter wave length, and the  $6.18\mu$  water band to longer wave lengths. A gradual transition is observed from alcohol type to liquid water type of transmission as the concentration of water is increased. The position of the water absorption in the  $2.7\mu$  and  $6.3\mu$  regions indicates that, in the mixtures studied, at low concentrations, a part of the water exists as single unassociated molecules and that the remainder exists in the associated state characteristic of liquid water. The water molecules are possibly distorted by the surrounding alcohol molecules.

**WILLIAM LAMONT SMITH.** Disintegration of the Beryllium Nucleus by Gamma Rays; Search for Photo-Disintegration of Potassium; Decay Periods of Neutron Induced Activity of Silver; Ratio of Silver Activities Produced by Fast and Slow Neutrons. (Under the direction of A. E. RUARK.)

The relative effect of the gamma rays from  $Ra(B+C)$  and  $RdTh$  in disintegrating the beryllium nucleus was determined by examining the neutron induced activity in silver. The ratio of the detected activities was found to be  $0.738(1 \pm 0.147)$ .

A search was made for photo-disintegration of potassium. A small effect was found, but further work is necessary to determine whether it is genuine.

Rough determinations of the decay periods of silver were made. The long period was found to decay with a half life of 2.27 min., while that of the short period was found to be 22 seconds.

**JAMES WILSON WHITE.** The Infrared Absorption of Ethyl Alcohol and Phenol. (Under the direction of EARLE K. PLYLER.)

An infrared absorption spectrum analysis of ethyl alcohol, phenol, and various mixtures of the two was made in order to determine if there is any reaction between ethyl alcohol and phenol. Ethyl alcohol, one molar, five molar, and ten molar solutions of phenol in ethyl alcohol, and pure phenol were studied, and their absorption spectra between  $1.1\mu$  and  $9.0\mu$  were obtained. Peculiar behavior of the absorption bands in the regions around

1.55 $\mu$ , 3.00 $\mu$ , and 8.00 $\mu$  lead to the following conclusions: First, a reaction of some kind does take place when ethyl alcohol is mixed with phenol. Second, this reaction may be association between the phenol molecules themselves when in the presence of alcohol. Third, the reaction may be association between the OH group in alcohol and the OH group in phenol.

#### DEPARTMENT OF PHYSIOLOGY

H. WARD FERRILL has completed and has in press the following investigation:

The Relation of the Adrenal Glands to Experimental Pancreatic Diabetes. (Part of this investigation was submitted to the University of Chicago in partial fulfillment of the requirements for the degree of Doctor of Philosophy.)

In view of so much conflicting evidence in regard to the rôle which the adrenal glands might play in diabetes, both experimental and clinical, it was decided to investigate the problem on a large series of animals. The animals were operated upon in the following manner:

Group I. Pancreatectomy followed sometime later by unilateral adrenalectomy.

Group II. Pancreatectomy followed by unilateral adrenalectomy and demedulation and denervation of the remaining gland.

Group III. Reversal of above operations.

Group IV. Controls: only pancreatectomy.

Insulin requirement was taken as the criterion of severity of diabetic condition. From the results obtained it was concluded that there was no relationship between the adrenal medulla and experimental diabetes.

#### DEPARTMENT OF POLITICAL SCIENCE

W. W. PIERSON has had accepted for publication in *The Hispanic American Historical Review*, to appear in November, 1936, the following article:

Francisco de Arango y Parreño.

This is a study of a distinguished Cuban statesman and jurisconsult (1767-1837) who was active in many public offices and who was the proponent of many reforms. His advocacy of the abolition of mercantilist restrictions and the adoption of free trade caused him to be regarded as a disciple of Adam Smith. His state papers and some of his letters have been printed in two volumes. These published works have been the basis of this article.

W. S. JENKINS is engaged in the preparation of a volume on *The Amending Process in the United States*, which he expects to publish in 1937.

JAMES W. FESLER has published:

Federal Administrative Regions. *American Political Science Review*, XXX: 257-268. 1936.

Standardization of Federal Administrative Regions. *Social Forces*, XV: 12-21. 1936.

PROFESSOR FESLER has published the following book reviews:

Robert Luce, *Legislative Problems* (*North Carolina Law Review*, 1936).

Finla G. Crawford, *Our Government Today* (*Social Forces*, 1936).

Selden C. Menafee, *A Plan for Regional Administrative Districts in the State of Washington* (*American Political Science Review*, 1936).

He has completed studies for the President's Committee on Administrative Management, which deal with methods for improving Federal administration.

#### DEPARTMENT OF PSYCHOLOGY

J. F. DASHIELL has brought to completion a manuscript for a new textbook, *Fundamentals of General Psychology*, to be published by Houghton Mifflin Company to replace the one published by them in 1928. The new book will run to some 550 pages with 154 figures.

PROFESSOR DASHIELL has continued as editor of the series, *Publications in Psychology*. New York: McGraw-Hill Book Company. Seven books have been added to the series during the year.

He has assumed editorship of *Psychological Monographs*, one of the five official journals of the American Psychological Association. Two volumes of monographs have been prepared during the year.

He has become an associate editor of the *Journal of Psychology*.

A. G. BAYROFF has published:

The Experimental Social Behavior of Animals, I. The Effect of Early Isolation of White Rats as Measured by Two Periods of Free Choices. *Journal of Comparative Psychology*, 21: 67-81. 1936.

Two groups of rats of approximate genetic equality were separated from their mothers when nineteen days old. Those of one group were reared in isolation and those of the other were reared in groups. When approximately 115 days old each animal was offered one choice a day for sixty days between a compartment containing food alone and a compartment containing, in addition to food, two white rats. After a month's interval they were given another series of sixty daily choices, this time neither compartment containing food.

The results showed few cases of social preferences (going consistently to a compartment with rats), these being best observed in those rats that had been reared in solitude.

A. G. BAYROFF has completed his study on the Use of Air Blasts as Substitutes for Electric Shock in Animal Learning Problems.

The use of shock has been subjected to much criticism: the difficulties of maintaining constant shocking current in spite of wide variations in bodily and contact resistance, the possibilities of incapacitation of the animals, etc., have been only partially overcome by the use of high-resistance high-voltage circuits, saturated vacuum tube circuits, etc. The control of current density is still a problem. Furthermore, the usual method of shocking introduces a second learning problem which may delay the learning of the major problem.

Accordingly, air blasts as substitutes for electric shock were employed in the acquiring of a simple light discrimination by white rats. The general results show little difference between the rate of learning with the air blasts and with electric shock. It appears, then, that air blasts may be used as substitutes for electric shock.

HARRY VOORHIES BICE has been continuing the work with the Word-Association Test, reported in *Research in Progress*, October, 1935, which aims at devising a word list and frequency tables that will furnish more ready access to emotional complexes than does the Kent-Rosanoff. (Under the direction of HARRY W. CRANE.)

Altogether 1000 white and 200 Negro college men and women in North Carolina, and 50 white college men and women in California, have been examined by a white male, a white female, or a Negro male examiner. All are individual tests. The results are at present being tabulated. The relation of the sex and race of the examiner to those of the subjects is being studied. From the results of the tests administered to whites in North Carolina, a Frequency Table is in process of construction, to be used as a standard with which to compare the results of the other tests, and as a set of norms to which other workers in the field may refer.

EDITH WLADKOWSKI is making an intensive study of the Time Factors involved in the Word Association researches being carried on in the department. She has administered tests to 250 each of white college men and women and to 145 children of Mooseheart Orphanage. Mean reaction times and standard deviations are being determined. Frequency Tables for the orphanage children are being constructed. (Under the direction of HARRY W. CRANE.)

MILDRED MENDENHALL (with GRIFFITH W. WILLIAMS of the University of Rochester) has published:

The Application of a Test of Suggestibility to a Group of Epileptics. *Journal of Genetic Psychology*, 14: 422-437. 1936.

Under the standardized test of suggestibility in which they are given the "falling forward" suggestion, normal subjects will make positive responses preponderantly. When the test was applied to one hundred female epileptics, it was found that seventy per cent gave zero responses. Not only does this differentiate the epileptic from the normal, but it reveals a trait in common with manic patients, as previously determined.

DOROTHY RETHLINGSHAFFER has been conducting a Comparison of Mentally Defective and Normal Children in the Resumption of Interrupted Activities. (Under the direction of J. F. DASHIELL.)

Mentally defective and normal children of equal mental ages (six to ten) are compared in the resumption of interrupted activities. A study by Paul Köpke (unpublished) indicated a difference in the resumption by two groups, mentally defective and normal. The investigation here reported repeats in part Köpke's study with certain improvements: the intelligence quotient is determined for each subject, number of subjects used is increased, and new situations are added in which the two groups may be compared.

D. D. WICKENS is interested in the Transference of the Conditioned Response. He has worked out apparatus devised first to train the flexor movement of the middle finger to the sound of a buzzer and then to test the degree to which the extensor movement of the same finger will reveal effects of that training. (Under the direction of J. F. DASHIELL.)

S. W. J. WELCH has been testing for the possibility of establishing Delayed Responses in Raccoons when the stimuli involve Pattern Vision instead of spatial cues. (Under the direction of J. F. DASHIELL.)

The test requires that each animal "get" a cue displayed (which is changed from trial to trial), and then, after very short delay, "apply" it by choosing that one of a set of alternative doors on which that cue appears.

ALBERT C. CORNSWEET has been at work on Intra-Uterine Neural Behavior of Albino Foetuses Intra-Organically Intact. (Under the direction of J. F. DASHIELL.)

This research concerns itself with a detailed study of intra-uterine neural behavior of the rat (*Mus Norvegicus Albinus*) foetuses, when still attached to all the extra-embryonic membranes within the pregnant albino rat. This problem involves an original operative technique and procedure so as to approximate and to simulate the exact physiological conditions of mammalian life, through organic attachments, anaesthetization, mode of stimulation, methods of observations, and subsequent results.

Mr. Cornsweet has been following up a co-incidental discovery that with dosages of ether administered for various periods of time to rats, and also upon recovery from etherization, marked behavioral tendencies are exhibited of progressive appearance-disappearance in a cephalo-caudad direction.

H. W. MARTIN is continuing research on the Development of Some Judgmental Processes. (Under the direction of J. F. DASHIELL.)

This is an experimental analysis of improvement in judging other persons in regard to (a) height, (b) weight, (c) chronological age, (d) mental age, and (e) introversion-extroversion. Each subject is observed by a group of judges, either in person or in motion picture photographs or both. The rates of improvement by the judges in approximating objective measurements of the traits are being plotted and analyzed.

#### SCHOOL OF PUBLIC ADMINISTRATION

W. B. SANDERS (with W. C. EZELL) has completed and has had accepted for publication *Juvenile Court Cases in North Carolina, 1929-1934*.

PROFESSOR SANDERS is directing the following master's theses:

EMILY VAUGHAN. A Follow-Up Study of Delinquent Girls Committed to Training Schools by the Durham County, North Carolina, Juvenile Court, July 1, 1926-June 30, 1934.

MAMIE ROSE MCGINNIS. A Social Analysis of Cases Appearing Before the Rowan County, North Carolina, Juvenile Court, 1929-1934.

KIRKWOOD L. HANRAHAN. The History and Administration of the Eastern Carolina Industrial Training School for Boys, Rocky Mount, North Carolina.

#### DIVISION OF PUBLIC HEALTH

M. J. ROSENAU has published:

Serendipity. *Journal of Bacteriology*, 29: 91. 1935.

Mental Hygiene and the Public Health. *Mental Hygiene*, 19: 8. 1935.

*Preventive Medicine and Hygiene*. Sixth Edition. New York: D. Appleton-Century Company. 1935. 1481 pp.

R. E. FOX has published:

Social Security and the Development of Public Health Work in North Carolina. *Transactions of the Medical Society of the State of North Carolina*. 1936, p. 586.

#### DEPARTMENT OF ROMANCE LANGUAGES

WILLIAM M. DEY has published:

The Pessimism and Optimism of Alfred de Vigny. *Studies in Philology*, XXXIII: 405-416. 1936.

He is continuing his work on Stendhal and his contemporaries.

PROFESSOR DEY is directing the following research:

J. A. DOWNS. (Progress on doctoral dissertation.) The Development of Lyric Poetry in France, 1790-1820.

A. L. CHEEK. (Progress on master's thesis.) The Prose Plays of Victor Hugo.

STURGIS E. LEAVITT has published:

A Bibliography of Theses Dealing with Hispano-American Literature. *Hispania*, XVIII, 169-82. 1935.

*Hispano-American Literature in the United States. A Bibliography of Translations and Criticism, 1932-1934 (With Additional Items from Earlier Years)*. Chapel Hill: University of North Carolina Press. 1935. 21 pp.

Hispano-American Literature in the United States, 1935: A Bibliography of Translations and Criticism. *Hispania*, XIX: 201-210. 1936.

He is working on a bibliography of biography and literary criticism in Spanish America; a study of the *comedia de figurón* in Spain; the *tradición* in Spanish America.

PROFESSOR LEAVITT is directing the following research:

L. L. BARRETT. The Rôle of the Supernatural in the Theatre of the *Siglo de Oro*.

P. H. CUMMINGS. A Glossary of the Academy Editions of Lope de Vega.

J. V. McCALL. The Dramatic Works of Luis Mariano de Larra.

W. A. McKNIGHT. Antonio Hurtado y Valhondo.

W. R. WEAVER. (Progress on doctoral dissertation.) A Preliminary Survey of the Mechanical Devices used in Staging the Plays of the *Siglo de Oro*.

U. T. HOLMES has published the following:

Gerald the Naturalist. *Speculum*, XI: 110-121. January, 1936.

Villon's *Testament*, Lines 1610-11. *Modern Language Notes*, LI: 33-34. January, 1936.

French Words with *e* for *o* in Unaccented Initial Syllables. *Language*, XI: 231-237. September, 1935.

*The Works of Du Bartas*, Vol. I. Chapel Hill: The University of North Carolina Press. 1935.

He has the following in press:

Chaucer's *tydif*. *Philologic Quarterly*.

O. Provençal *heulh de veire* and *colom*. *Modern Language Notes*.

Med. Latin *mancus*, O. French *mangon*. *Publications of the Modern Language Association*.

*A History of Old French Literature*, to appear in the spring of 1937.

He has completed the following:

Old French *esterminals*.

The Works of Du Bartas, Vols. II and III. (With J. C. LYONS and R. W. LINKER.)

PROFESSOR HOLMES is preparing an edition of the Old French epic *Berthe as grans piés* for the *Classiques français du moyen age* series (published in Paris). He also has in preparation a detailed study of the Celtic element in the French vocabulary.

The following doctoral dissertations are in progress under his direction:

D. E. FRIERSON. The Franco-Venetian dialect of the *Chansons de geste*.

G. C. S. ADAMS. A Study of the Variants of *Domina* and *Femina* in the French and Provençal Dialects.

C. M. WOODWARD. The Variants of *Caballus* and *Equus* in the French and Provençal Dialects.

J. CORIDEN LYONS has continued work on the edition of the poetic works of Guillaume de Salluste, Sieur du Bartas. (In collaboration with U. T. HOLMES and R. W. LINKER.)

PROFESSOR LYONS has also continued investigation on a project to reveal the customs and manners of life of Frenchmen of the period of the Renaissance, using for this end details furnished by the popular prose story-tellers of the age.

RALPH S. BOGGS has published:

Folklore Elements in *Fray Gerundio*. *Hispanic Review*, IV: 159-169. 1936. (Delivered previously as a paper before the South Atlantic Modern Language Association at Athens, Georgia, Thanksgiving, 1935.)

The study shows that a number of folklore elements are present in this masterpiece novel of the neoclassic eighteenth century. Short comparative studies are made of the proverbs.

Pretonic  $\bar{I}$  Stays in Spanish. *Hispanic Review*, IV: 282. 1936.

It is usually stated that all vowels except  $\bar{a}$  drop in pretonic position in Spanish; yet preserved examples of  $\bar{i}$  show that this vowel stays.

PROFESSOR BOGGS compiled the American items for *Volkskundliche Bibliographie für die Jahre 1929 und 1930*. Berlin: Walter de Gruyter, 1935. He made the same compilation for 1931-1932 and for 1933-1934, not yet published.

He is continuing the Old Spanish Dictionary and Spanish Bibliography projects with the help of N. Y. A. students.

PROFESSOR BOGGS and F. C. HAYES are continuing their work on the *Diccionario Histórico de los Refranes Españoles*, with the assistance of the N. Y. A. and the Smith Research Fund.

With the help of a Smith Research Fund grant and the loan of a recording apparatus by the American Council of Learned Societies, PROFESSOR BOGGS recorded folklore, in June, 1936, in Ybor City, Tampa, Florida, in the largest Spanish-speaking colony in the Southern Region.

He is directing the following doctoral dissertations:

T. E. WRIGHT. Index of French Folktales.

J. Y. CAUSEY. Edition of the *Poema de Alfonso Onceno*.

STERLING A. STOUDEMIRE has completed the following studies:

Dionisio Solís on the Madrid Stage.

Metastasio in Spain.

W. L. WILEY has published:

The Love Tales of Antoine de Baif. *Studies in Philology*, XXXIII: 1. January, 1936.

PROFESSOR WILEY has had accepted for publication:

A Review Article on Recent Critical Works in the French Renaissance (for the April, 1937, issue of *Studies in Philology*).

He read at the May, 1936, meeting of the Philological Club the following paper:

Plagiarism and Imitation in the French Renaissance. (For abstract, see p. 115.)

R. W. LINKER has completed:

The Works of Guillaume de Salluste, Sieur du Bartas. Volumes II, III. (With U. T. HOLMES, JR. and J. C. LYONS.) Volume I was published in 1935 by the University of North Carolina Press.

He has in progress A Mediaeval Italian Anthology. (With L. L. BARRETT.)

G. C. S. ADAMS has in press the following items:

O. French *aumuce*, English *amice*. *Studies in Philology*.

*A Census of the French and Provençal Dialect Dictionaries in American Libraries* (with C. M. WOODWARD), a bulletin of the Linguistic Society of America.

L. L. BARRETT has in progress A Mediaeval Italian Anthology. (With R. W. LINKER.)

The following doctoral dissertations were accepted by the Department during the year:

FRANCIS CLEMENT HAYES. *The Use of Proverbs in the Siglo de Oro Drama. An Introductory Study.* (Under the direction of S. E. LEAVITT and R. S. BOGGS.)

The purpose of this thesis is to determine the value and influence of proverb-lore in the *Siglo de Oro* drama. Preliminary chapters trace the increasing popularity of proverbs in Spain from the fourteenth century to 1700 and study the usage of proverb-lore in Spanish drama before Lope de Vega. The body of the work concerns the use of proverbs as titles and motives of plays. The practice of utilizing proverbs as titles, begun by Lope de Vega, lasted throughout the Golden Age, and these titles were frequently employed not only as motives of plays but also as sources of plots. Proverbs had such a powerful influence on the thinking of the dramatists of the period that hundreds of plays either bear titles taken directly from proverb-lore or are given titles of a distinctly proverbial tone. The phraseology of dramatic dialogue was so influenced by proverbs that frequently a proverbial ring was given to speeches when no proverb was present in the mind of the author. No playwright, apparently, escaped this influence. Both comic and non-humorous masterpieces contain proverbs skilfully placed, the former employing them abundantly, the latter sparingly.

The appendices contain two tentative lists: one of major and minor collections of proverbs made before the year 1700, and the other of some 230 Golden-Age dramas bearing proverbial titles.

The following master's theses were accepted by the Department during the year:

FREDERICK JACKSON ALLRED. *Malherbe and Jean Passerat: An Application of the Former's Principles of Grammar and Rhyme to the Poetry of the Latter.* (Under the direction of J. C. LYONS.)

Some 6000 lines of the poetry of Jean Passerat were examined, with the purpose of finding whether this poet, whose productive period lies between the years 1559 and 1602, was adhering to twelve grammatical and versification

precepts which were prescribed after 1605 by Malherbe. Positive results were achieved, inasmuch as it was found that Passerat showed an adherence to Malherbe's rules amounting to a total percentage of 82%. The indication of these results is that Malherbe was only following a general tendency when he made his precepts and not formulating new rules as he has been credited with doing.

Besides the results of the actual examination of Passerat's verse, there are chapters on the poetical period preceding Malherbe, Malherbe's reforms in general, and the life and work of Jean Passerat.

DOROTHY BRADLEY. *Satire in the Works of Alfred de Musset.* (Under the direction of W. M. DEY.)

Alfred de Musset disclaimed the title of satirist. He did not enjoy this type of writing; therefore the amount of satire is limited. From a survey of his complete works, it is attempted in this study to point out the extent of his satire.

Chapter I is composed of literary satire, which comprises his condemnation of romanticism in general with his specific criticism of the "roman," the "journal," the theatre, music and art. In summation is Musset's own literary credo, which fortifies his criticism of the above.

Chapter II reveals Musset's political and social criticism. He discloses the instability of the French government, the ruthless scheming of the legislators and the folly of revolutions. Similarly he denounces the censorship of the press and the theatre. There is a treatment of Musset's reaction to Saint-Simonism and Humanitarianism, with the author's criticism of the doctrines of each.

Chapter III points out Musset's satire of moeurs: it includes a vituperation of the lewdness of the century, a light psychological study of the peculiarities of men and women, and a whimsical picture of French society in general.

Musset's satire, though small in quantity, is spirited and forceful.

RUTH FOSTER CAMPBELL. *Life and Social Customs of the Sixteenth Century as Seen in the Contes et Discours d'Eutrapel*, of Noël du Fail. (Under the direction of J. C. LYONS and URBAN T. HOLMES.)

The introductory chapter of this thesis, opening with a description of the frame-work of the *Contes et Discours d'Eutrapel*, continues with an indication of the facetious and didactic quality of the work and terminates in a brief sketch of Du Fail's life, with the idea of relating the man to the century which he so graphically depicts.

Chapter two seeks to picture the brilliant panorama of sixteenth century types that move separately or in groups through the pages of this collection of tales. Here, the author, introducing noble, peasant, merchant, and soldier in rapid succession, has occasion to deliver himself of some of his most telling satire upon human vanities.

Chapter three summarizes Du Fail's analysis of the three-fold weakness of the Catholic church of his day. His *exposé* concludes upon a hopeful note

for renewed spiritual aspiration through regeneration from within the Church itself.

Chapter four pictures the struggles of the schools of Paracelsus and Hippocrates for supremacy in the sixteenth century medical world. Heightened interest is lent to the story of the treatment of disease from the mingling of sense and superstition in the medical practice of the period.

Chapter five, on the Law, shows Du Fail's frank presentation of the state of justice in his century. The author does not hesitate to seek out and flay abuses in the courts and among the legal profession, of which he was a member.

In chapter six, the contemporary literary influences evident in Du Fail's *Contes* are stressed as a means for partial reconstruction of the literary background of the century. The study concludes with a *résumé* of the scholarly life of Du Fail's day as the most accurate means for celebrating the curiosity and enthusiasm of the Renaissance world in which Du Fail passed his existence.

CLYDE HULL CANTRELL. *El Gran Capitán* as a Theme in Spanish Drama. (Under the direction of STERLING AUBREY STOUDEMIRE.)

The introductory chapter is an historical study of the life and exploits of the "Great Captain," Gonzalo Fernández de Córdoba, leader of the Spanish armies in Italy in the fifteenth and sixteenth centuries. The eleven plays included in the study are treated from the standpoint of their adherence to history and their indebtedness to previous plays. The dramatists who treat this theme are Lope de Vega, Cañizares, Hernando Pizarro, Gil y Zárate, Rodríguez Rubí and Marquina. In general one can say they have either followed oral tradition or changed history to suit their purpose, a trait that has always been predominant in Spanish historical drama. Most of the plays tend to glorify the deeds and depict the lofty character of this mighty warrior, who was one of the greatest soldiers to fight under the Spanish banner. The bibliography includes a list of plays studied and a list of source and critical material consulted.

WILLIAM BENJAMIN NAPIER. *The Reception of Victor Hugo in the Restoration Press*. (Under the direction of WILLIAM MORTON DEY.)

The study examines the reviews of Hugo's early poetical work in several of the contemporary journals, chosen for their literary or political significance. These reviews are then examined in the light of the political alliances of the journals and the findings correlated. The evidence of the findings indicates that Hugo's successful *début* was due in no small degree to his political affiliations.

ISABELLA ELIZABETH PAYNE. *The Sovereign in the Plays of Guillén de Castro y Bellvis*. (Under the direction of STURGIS E. LEAVITT and STERLING A. STOUDEMIRE.)

The purpose of this thesis was to study the king in the plays of Guillén de Castro y Bellvis. The plays have been discussed under four categories:

plays based upon Spanish history, plays founded upon Spanish ballads, plays using mythological and Biblical sources, plays with unknown sources. Twenty-four plays have been considered.

Four steps have been followed in the consideration of the first three groups of plays, namely: a consideration of the material upon which they were based; a summary of the play; an attempt to discover Guillén de Castro's reason for adhering to, modifying, or rejecting his source material; and a comparison of the king in the source and the play. In the fourth group only a summary and a study of the king were presented.

The conclusion reached was that Guillén de Castro evidently preferred to depict the baser qualities of the kings to whom he gave important rôles. The good sovereigns have relatively unimportant rôles.

ANNA MARY SANFORD. Symbolism in the Theater of François de Curel. (Under the direction of WILLIAM LEON WILEY.)

This thesis is a study of the symbolistic traits in the dramas of the late François de Curel. It includes a kaleidoscopic view of Symbolism in poetry, music, the novel, and the drama from about 1880 to 1930. By means of discussion of the various symbolistic qualities of the several dramas an attempt is made to establish Curel's place in the theater of Symbolism. It is concluded that the intangibility and lack of external element of the ideas for which he is noted qualify Curel for a very definite place in the Symbolistic theater.

#### DEPARTMENT OF RURAL SOCIAL-ECONOMICS

S. H. HOBBS, JR. has edited the University News Letter which has appeared twenty-five times during the year, each issue being devoted to some economic or social topic of concern to the State.

He is at work on a revision of his book on *North Carolina: Economic and Social*.

He has directed the research work of the North Carolina Club.

He has prepared several reports on North Carolina counties for the Rural Electrification Authority.

He was on leave of absence during the Spring Quarter and the summer serving as the national field supervisor of Rural Social Research, Works Progress Administration,—forty-one state units.

PAUL W. WAGER has had his leave of absence extended to January 1937. He is serving as Chief of the Land-Use Planning Section, Land Utilization Division, Resettlement Administration, Region IV. His work consists in directing the classification of land in the states of his region—North Carolina, Virginia, West Virginia, and Kentucky, the research necessary to determine the best long-time use of each area, and other studies bearing on land use, such as studies in the field of taxation and credit.

## DEPARTMENT OF SOCIOLOGY

HOWARD W. ODUM has published during the year:

*Southern Regions of the United States*. Chapel Hill: The University of North Carolina Press. 1936. 664 pp. Some 600 maps and charts and tables in addition to text matter.

This volume presents the findings of the Southern Regional Study: The South's Capacity for Social and Educational Development, a three year study made for the Social Science Research Council. The materials are discussed under the following captions: The Composite Picture: A Syllabus and Summary; A General Measure of the Southern Regions; A New Regional Analysis: Southern Regions in the National Picture; Regions of Natural Richness and Abundance; Regional Technology, Deficiency, and Waste; An Agrarian Country; Industry and Wealth; The Southern People; Institutions and Folkways; States and Regions; Towards Regional Planning; Bibliography and Source Materials; Acknowledgments and Plan of Study.

Testing Grounds for Social Planning. The Promise of the South, a Test of American Regionalism. *Plan Age*, 2: 2: 1-26. February, 1936.

Realistic Premises for Regional Planning Objectives. *Plan Age*, 2: 3: 7-21. March, 1936.

Cotton and Diversification. *Problems of the Cotton Economy*. *Proceedings* of the Southern Social Science Research Conference held in New Orleans, March 8, 1935. Section III, pp. 50-71. Dallas, Texas: The Arnold Foundation, 1936.

Promise and Prospect of the South: A Test of American Regionalism. A paper read before the American Political Science Association, Atlanta, Georgia, December 26, 1936, published in the *Proceedings* of the Eighth Annual Session of the Southern Political Science Association.

PROFESSOR ODUM has completed a manuscript on Franklin Henry Giddings: American Pioneer in Sociology, to be published as a chapter in a volume on American Sociology, edited by E. B. Reuter.

On March 16, 1936, PROFESSOR ODUM presented a paper on Planning for Equilibrium between American Agrarianism and Urbanism before the Urbanism Discussion Group of the University of Illinois.

PROFESSOR ODUM read a paper on The Rôle of State Planning and Democratic Reconstruction before the Third Annual Conference on Regional Planning, at the University of Illinois, April 8, 1936.

On May 1, 1936, PROFESSOR ODUM read before the Alpha Kappa Delta at the University of Wisconsin, a paper on The Errors of Sociology, to be published in *Social Forces*, March, 1937.

PROFESSOR ODUM read a paper on The Competing Rôle of Public Welfare Agencies with Educational Activities before the meeting of the Educational Policies Commission in Chicago on May 9, 1936.

PROFESSOR ODUM read before the University of Alabama Institute of Public Affairs, June 25-26, 1936, the following four papers: Six Americas in Search of a Faith; The South in the National Picture; Alabama in the South and the Nation; Regional Planning in the American Democracy. To be published in the *Proceedings* of the University of Alabama Institute of Public Affairs.

PROFESSOR ODUM, in collaboration with HARRIET L. HERRING, is completing the study of A University and Its State: North Carolina, 1900-1930.

PROFESSOR ODUM is directing the following research projects:

HARRY ESTILL MOORE. (Progress on doctoral dissertation.)  
Theories of Regionalism.

STANLEY STEVENS. An Inquiry into the Technique of State Planning.

PROFESSOR ODUM is directing a series of supplementary studies in "These Southern People"—a development from the Southern Regional Study and planned ultimately to be a companion volume to *Southern Regions of the United States*.

PROFESSOR ODUM is continuing his major project in folk-sociology featuring especially folk-regional society.

PROFESSOR ODUM planned and directed the work of the Institute on Southern Regional Development and the Social Sciences held at the University of North Carolina, June 17-27, 1936. A Review and Summary of Findings of this Institute have been published in mimeographed form.

PROFESSOR ODUM has edited Volume 14 of *Social Forces*.

For reports of the research activities of the following, see section entitled, "Institute for Research in Social Science," pp. 101-106.

ERNEST R. GROVES. Marriage and the family, the American woman, mental hygiene.

T. J. WOOFER, JR. Studies in southern population and rural research.

GUY B. JOHNSON. Studies of Negro participation in southern life, Negro attitudes, Negro leadership, and Indians of North Carolina.

RUPERT B. VANCE. Regionalism, social demography, human geography, southern cotton economy and tenancy, southern leadership.

HARRY E. MOORE. Theories of regionalism.

LEE M. BROOKS has published:

Racial Distance as Affected by Education. *Sociology and Social Research*, XXI: 2. 1936.

The College Teaching of Contemporary Problems. *Education*, 57: 3. 1936.

PROFESSOR BROOKS completed in May, 1936, a manuscript on the adoption of young children. (With EVELYN C. BROOKS.)

HAROLD D. MEYER is continuing his work on the book *The Recreation of a Region*.

PROFESSOR MEYER made a study of the teaching of sociology in the secondary schools of the Southern Region. A report of this study was given at the meeting of the Southern Sociological Society in Atlanta, April, 1936.

He is making a study, in coöperation with MISS BEARD of Sweetbriar College and MR. STOUT of State Teachers College, Johnson City, Tennessee, on certification of teachers for secondary schools, the course content, and ways in which departments of sociology may aid the secondary schools in the teaching of sociology.

PROFESSOR MEYER is directing a study, with the state directors of recreation of the Works Progress Administration in the Southern Region, on recreational personnel and training for recreation leadership.

The following doctoral dissertations were completed under the direction of the Department during the year:

RUTH YEOMANS SCHIFFMAN. Occupations in the United States and the South, 1910-1930. (Under the direction of MARION R. TRABUE.)

A statistical presentation of data regarding the occupational distribution of the population, 10 years old and over, for 1910, 1920, and 1930. Tabular material and interpretations are given for the United States as a whole; for the three southern census areas, the South Atlantic, the East South Central

and the West South Central; for two of the six regions as established by the Southern Regional Committee, namely the Southeast and the Southwest; and for each of the eighteen southern states and the District of Columbia.

The present distribution of the total population of the country, of the population 10 years old and over, and the changes which have occurred in these distributions since 1900 are presented in the first chapters of the thesis because of their importance in the understanding of occupational distributions.

The greater part of the statistical data are based on the decennial reports of the United States Bureau of the Census, but these data have been assembled and compiled according to a special outline prepared by the Institute of Women's Professional Relations. This outline allows more adequate and reliable comparisons of the three decennial reports of the United States Census, and its use here is one of the chief values of this study.

The major divisions of occupations as determined by the Bureau of the Census have been followed throughout the thesis, namely: Agriculture, Forestry and Fishing, Extraction of Minerals, Manufacturing and Mechanical Industries, Trade, Transportation, and Communication, Public Service, Professional Service, Domestic and Personal Service, and Clerical Occupations. A chapter is devoted to the most outstanding changes which have taken place in the past thirty years in these ten major divisions of occupations.

Some of the more unusual and more interesting interpretations of the material deal with the socio-economic distribution of gainful workers in the southern states as compared with the entire United States, with the distribution of the population according to non-agricultural occupations, and according to white population in non-agricultural pursuits.

The following conclusions were reached:

1. The occupational distribution of the working population of the South in 1930 closely resembles the distribution of the gainfully occupied in the United States in 1910.

2. Certain changes in occupational distribution which have occurred in the United States between 1900 and 1920 have occurred in the South in the last decade, 1920-1930. This would denote an occupational lag in the southern states as compared to the country as a whole.

3. Future occupational changes may be expected in the South similar in character to those general trends noted for the United States in recent decades.

4. In general, it seems possible to expect that the total number of persons engaged in Agriculture in the South will decrease; that the number engaged in Forestry and Fishing and Extraction of Minerals (never very important numerically) will continue to remain about the same; that the number engaged in Domestic and Personal Service, although it has decreased in the United States in recent years, will not change very greatly; but that the total number engaged in all other major divisions of occupations will increase noticeably.

5. Redistribution of the working population of the South and of the United States will be affected in the future, as it has been in the past, by mechanical ingenuity of the people, by changes in social habits, by the amount of labor supply in a given area, by the resources of the region, etc.

Trends in occupational distribution in the past years have shown that as our technical aids and skills increase, the number of persons engaged in production decreases in relation to the volume of production and the number of persons engaged in services, both professional and personal, tends to increase.

7. The future occupational distribution of the people of the United States and of the South calls for better trained workers, more intelligent participants in public affairs, and individuals concerned with a goal of a better social order.

The following master's theses were completed during the year under the direction of the Department:

CHARLOTTE GARTH ADAMS. Recent Trends in Applied Human Biology: A Study of Sterilization and Birth Control as Methods of Improving the Race. (Under the direction of RUPERT B. VANCE.)

The genes causing defective mental development are widely scattered through the population and are chiefly recessive. More of the "feble-minded" are born of normal parents than of "feble-minded" parents. Sterilization is urged as a method of caring for individual delinquents but not as a method of race betterment.

Birth Control is recommended as a method of limiting families that are themselves limited economically. Birth control information and methods have been available to the lower classes in Holland for many years, with the result that Holland has a low infant and maternal death rate as well as a low general death rate. The birth rate in Holland has not declined to the extent it has declined in England and the United States, where birth control devices have not been available to the lower classes.

ELIZABETH WHITBECK DONOVAN. The Theory of Social Control Since Edward Allsworth Ross, 1901-1936: A Study in the Development of a Sociological Concept. (Under the direction of RUPERT B. VANCE.)

The study is an attempt to analyze the concept of social control as set forth by Edward Allsworth Ross in his work of 1901 and then to survey the major outlines of its development since that time. No general agreement was found among sociologists as to definition and scope of the concept. Indeed the term is marked by increasing vagueness as it is followed out to its margins. As developed since Ross modern studies appear to be of a more particularistic and less ethical and evaluative character. They have reflected markedly the influence of Sumner's contribution of folkways and mores, of Cooley's primary group concept, and Faris' indications as to its importance for control. Apparently recent writers have given more attention to studies of means of control than to those of agencies, and in these the influence of modern communication is revealed clearly. The future would seem to lie with clarification and experiment.

CARLO LAWRENCE LASTRUCCI. Marriage Adjustment As a Condition of Marital Happiness—Personality Adjustment in Marriage. (Under the direction of ERNEST R. GROVES.)

This thesis is an attempt to explain the reasons for maladjustment and the means of adjustment in marriage as related to original maladjustments in the personality before marriage. The main emphasis throughout is the effect of pre-conditioned attitudes, ideas, ideals, tastes, and expectations upon the degree of adjustment achieved in the marital state. The relationship of pre-conditioned social ideals and means of influencing the thoughts and expectations of individuals as related to the actual expectations and experiences of marriage form the main body of treatment. The material has been gathered from many direct and indirect sources, all pertinent to the treatment of the subject. Contrary opinions have been expressed throughout to show the divergencies of thought on the current issues and the relative values of various aspects of marriage. The conclusions attempt to correlate the reflection of our contemporary social ideals and values and the effects of various social hypocrisies as creating and being conducive to maladjustment in marriage under the average expectations; the present social ideals and mores are antagonistic to the average degree of happiness expected by most persons in marriage.

OLIVER BRUCE THOMASON. Commercial Recreation of the South-east—A Study of Commercial Recreation of a Region. (Under the direction of HAROLD D. MEYER.)

The commercial aspects of recreation for the Southeast Region are surveyed in order to determine the region's place in the national picture; to compare indices as to regional abundance; and to speculate as to the future of commercial recreation as a dominant force in the recreational life of the southern people. Facts and incidents are related that definitely link the early development and beginnings of some forms of commercialized leisure activities with the early history and culture of the region. Comparative studies are made of the theater and motion picture houses, the automobile and the radio by states of the Southeast Region and by other regions of the United States. It is concluded that commercial recreation is a dynamic force in American life because of the influence it exerts in enlarging and extending man's social contacts; in transforming modes of life; and in modifying cultural patterns and moral standards. It is further concluded that the Southeast Region, because of its great diversity and abundance in human resource characteristics, as expressed in its dominant rural population, in its large Negro population, and in its comparatively large youth group population, represents an ideal area for the complete functioning of recreational activities on a commercial basis.

#### DEPARTMENT OF ZOOLOGY

H. V. WILSON has published:

Some Critical Points in the Metamorphosis of the Halichondrine Sponge Larva. *Journal of Morphology* 58: 285-345, 4 plates. 1935.

The paper deals with the intimate structure of the motile and metamorphosing larva. The interior of the larva is syncytial, not cellular. The

epithelial cells of the larva unite syncytially with one another and their nuclei are drawn into the interior. Around these nuclei cytoplasmic bodies are cut out of the syncytium and thus the collar cells are formed. The larval epithelial cells do not then become the collar cells. Only their nuclei are specifically determined. The syncytium breaks up also into other cells. Non-nucleolate cells pass to the surface and form epidermis. Also non-nucleolate nuclei, not in cell bodies but in the general syncytium, are drawn to the surface, the surface layer then condensing around them to form epidermis.

PROFESSOR WILSON is continuing his investigations on the cellular biology of sponges, more particularly on the degeneration of thin syncytial membranes which break up into cells or pieces after treatment with drugs.

R. E. COKER has published during the year the following papers:  
(With VERA MILLSAPS and RUBY RICE.) Swimming Plume and Claws of the Broad-Shouldered Water-Strider *Rhagovelia flavicincta* Bueno (Hemiptera). *Bulletin of the Brooklyn Entomological Society*, 31: 3: 81-85. June, 1936. (One plate.)

The Plan of the Swimming Plume and the claws in the cleft of the middle tarsus of *Rhagovelia* as found at Chapel Hill, North Carolina, are described and illustrated. This remarkably specialized apparatus seems not before to have been properly described or illustrated.

(With E. W. CONSTABLE.) A New Multiple Constant Temperature Apparatus for Experimental Work in Biology. *Journal of the Elisha Mitchell Scientific Society*, 52: 1: 27-34. July, 1936. (With two plates and two text figures.)

There has not been available hitherto a convenient and practicable apparatus permitting the maintenance simultaneously of temperatures above and below room temperature, and the control of given temperatures to a fraction of a degree over long periods of time. Such an apparatus was much needed in the research work of the senior author. The apparatus now described was designed, with the junior author responsible for details of design and construction, and has been in effective operation for nearly two years. The apparatus should have a wide usefulness and be capable of modification for many special purposes.

R. E. COKER has been engaged in a study of the influence of temperature on form of the head of a Cladoceran and a report of the results is nearing completion for publication.

C. D. BEERS is continuing a cytological and taxonomic study of certain protozoa parasitic in the body cavity and the digestive tract of earthworms.

D. P. COSTELLO completed, during the past summer, the investigation begun two years ago at the Hopkins Marine Station of Stan-

ford University, on the effects of ultracentrifugal forces on the structure and development of the eggs of the nudibranch molluscs. An article on this subject will be published in the near future.

HELEN M. COSTELLO, in collaboration with DONALD P. COSTELLO, is continuing an investigation begun during the summer of 1936 at the Hopkins Marine Station at Pacific Grove, California. The investigation is concerned with the structure and cell lineage of an acelous turbellarian.

The following doctoral dissertation was completed during the year under the supervision of the Department:

MILDRED IRENE BOLIEK. Syncytial Structures in Sponge Larvae and Lymph Plasmodia of Sea Urchins. (Under the direction of H. V. WILSON.) Published in the *Journal of the Elisha Mitchell Scientific Society*, 51: 252-289, 5 plates. 1935.

The interior of the *Lissodendoryx* larva is syncytial. The epithelium disappears as such, the whole body becoming syncytial. Some epithelial nuclei are lost, others are carried into the interior. The syncytium then begins to break up into cells. In certain retarded larvae the outer ends of epithelial cells remain for a time recognizable indicating that these cells metamorphose *in situ*. Under adverse conditions the syncytial interior early breaks up into conspicuous cells, in general independent and with distinct ectoplasmic membranes, a pathological reaction which conceivably is adaptive.

In the drawn perivisceral fluid of *Lytechinus* the leucocytes fuse syncytially. The flagellate cells do likewise. "Lymph balls," largely syncytial, may be formed at will and kept alive for days. Degeneration eventually sets in, the syncytia breaking up in part into rounded uni- or multi-nucleate masses with pycnotic nuclei bearing no resemblance to the original cellular components of the ball.

The following master's theses were completed during the year under the supervision of the Department:

EUGENE PLEASANTS ODUM. The History of the Germ Cells in the Toadfish, *Opsanus tau*. (Under the direction of H. V. WILSON.)

The toadfish was found to be a favorable form for the study of the greatly disputed question of the fate of the early, so-called primordial germ cells. Before formation of the gonad the germ cells are large, conspicuous, and uniformly distributed along a genital ridge. As the gonad develops the germ cells, although remaining in number about 200, become smaller and greatly scattered among the more abundant stroma cells. Sex differentiation occurs in embryos of about 15 mm. length. In the female, the evidence indicates that the primordial germ cells degenerate, to be replaced by a much more abundant second crop of germ cells numbering over 2,000, which probably originate from stroma cells. In the male, the primordial germ cells persist in the

anterior part of the gonadial fold, which remains small and indifferent as to sex characters, but are not present to any great extent in the posterior part which differentiates to form the primordium of the testes.

HARRIET TAYLOR. An Inquiry into the Conditions Governing Cyclomorphosis in *Daphnia*. (Under the direction of R. E. COKER.)

The experiments and conclusions of earlier investigators as to the cause of seasonal variation in Cladocera are reviewed. Original experiments with *Daphnia longispina* of University Lake, Chapel Hill, N. C., lead to the following conclusions: (1) Head form in the *young* is determined by temperature, as both Addlestone and Coker have found, and (2) the critical temperature lies between 11.1°C. and 15.1°C.; (3) temperature is not the chief factor determining the head length of the *adult*, for previous work in this laboratory has shown that pointed-headed young do not necessarily develop into pointed-headed adults and it is now found that a pointed-headed young, after losing the point, may regain it to form the pointed-headed adult; (4) the possibility remains that nourishment controls the maintenance of head length or its postnatal development; (5) causes of head length in the young and in the adult of *Daphnia longispina* of University Lake must provisionally be considered as distinct problems.

#### INSTITUTE FOR RESEARCH IN SOCIAL SCIENCE

Substantial grants from the Laura Spelman Rockefeller Memorial and the Rockefeller Foundation made to the University of North Carolina, for the study of problems in the social sciences arising out of state and regional conditions, led to the establishment in 1924 of an Institute for Research in Social Science. The work of the Institute represents, therefore, a specific program of regional social research, study, and interpretation, with studies in local government, southern historical backgrounds, socio-economic activities (including studies in social-industrial relationships), crime and criminal justice, the Negro, folklore and folk backgrounds of the southern people, social institutions, public welfare and child welfare, and human geography of the American South. While chosen for the most part from the state and regional field, research projects are selected with a view to their generic value and for their possible contribution in both method and content.\*

THE INSTITUTE has published during the year:

*Southern Regions of the United States*. By HOWARD W. ODUM. Chapel Hill: The University of North Carolina Press. 1936. 664 pp. Some 600 maps and charts and tables in addition to text matter.

\*For a further statement regarding the establishment and the purposes of the Institute and for book lists of publications, see *Research in Progress*, 1928-1929, pp. 95-97; 1929-1930, p. 80; 1930-1931, p. 89; 1931-1932, p. 90; 1932-1933, p. 91; 1933-1934, pp. 95-96.

*Southern Population and Social Planning.* By T. J. WOOFER, JR. Chapel Hill: The University of North Carolina Press. 1936. 10 pp. (Southern Policy Papers No. 1.)

*How the Other Half Is Housed.* A Pictorial Record of Sub-Minimum Farm Housing in the South. By RUPERT B. VANCE. Chapel Hill: The University of North Carolina Press. 1936. 16 pp. (Southern Policy Papers No. 4.)

For a report of the research activities of HOWARD W. ODUM in the Southern Regional Study, the results of which have now been published in *Southern Regions of the United States*, as listed above, and in studies of the southern people, folk-regional society, regional and state planning, see section entitled "Department of Sociology," pp. 93-94.

ERNEST R. GROVES has published during the year:

*Readings in Mental Hygiene.* (With PHYLLIS BLANCHARD.) New York: Henry Holt and Company. 1935.

*Preparation for Marriage.* New York: Greenberg. 1936.

PROFESSOR GROVES has ready for press a manuscript on the American woman.

PROFESSOR GROVES is directing the following research projects:

BERNICE MILBURN MOORE. (Progress on doctoral dissertation.) Age and Sex Distribution of the People as Conditioning Factors in Cultural Participation: A Study in Regional Demography of the United States.

J. McLEAN BENSON. (Progress on master's thesis.) Sterilization, with Special Emphasis on Orange County, North Carolina.

LUCILE AYERS GODBOLD. (Progress on master's thesis.) The Influence of Women on the Evolution of American Religion.

ETHEL CREWE HAWKINS. (Progress on master's thesis.) Family Discipline as a Conditioning Influence on Children from One to Six Years of Age.

CARLOS LASTRUCCI. (Master's thesis.) Marriage Adjustment as a Condition of Marital Happiness: Personality Adjustment in Marriage. (For abstract, see Department of Sociology.)

PROFESSOR GROVES planned and directed the second one week's Institute in Teaching Marriage and the Family held at the University of North Carolina, July 6-10, 1936.

T. J. WOOFER, JR., has published during the year:

*Southern Population and Social Planning*. Chapel Hill: The University of North Carolina Press. 1936. 10 pp. (Southern Policy Papers No. 1.)

DR. WOOFER has ready for press a manuscript on a study of the plantation in relation to farm tenancy.

DR. WOOFER has continued as coördinator of rural research under the Works Progress Administration and is directing the completion of a dozen monographs in the field of rural research.

ROY M. BROWN is bringing up to date and concluding a study of crime and criminal justice in North Carolina.

HARRIET L. HERRING assisted in directing H. M. DOUTY's doctoral dissertation on *The North Carolina Industrial Worker, 1880-1930*. (For abstract, see Department of Economics.)

During the summer, 1936, Miss HERRING wrote the final report of a study on *Part-Time Farming in the Eastern Cotton Belt*, to be published as a monograph this fall by the Research Division of the Works Progress Administration.

In collaboration with HOWARD W. ODUM, Miss HERRING is completing the study of *A University and Its State: North Carolina, 1900-1930*.

Miss HERRING is also completing her history of the textile industry in the South.

KATHARINE JOCHER assisted HOWARD W. ODUM in preparing for press the manuscript of *Southern Regions of the United States* (University of North Carolina Press, 1936).

DR. JOCHER edited and prepared for publication the *Review and Summary of Findings* of the Institute on Southern Regional Development and the Social Sciences, University of North Carolina, June 17-27, 1936. (Mimeographed.)

DR. JOCHER has also assisted in editing Volume 14 of *Social Forces*.

GUY B. JOHNSON continued work as supervisor of the research being conducted by the Commission on Interracial Coöperation in a *Study of the Participation of Negroes in Southern Life*.

DR. JOHNSON has continued research on the Indians of North Carolina and has outlined a plan for the study of present-day Indian and mixed groups in the Southeast.

With H. V. BICE, DR. JOHNSON made a study of the interracial experiences and attitudes of Negro college students.

DR. JOHNSON prepared a paper on Negro Leadership in the United States for the first annual meeting of the Southern Sociological Society, Atlanta, Georgia, April 1, 1936. (To be published in the *American Journal of Sociology*.)

DR. JOHNSON also prepared a paper on A New Southern Policy toward the Negro, which he read before the Institute on Southern Regional Development and the Social Sciences, Chapel Hill, June 22, 1936. A summary of the recommendations in this paper is included in the *Review and Summary of Findings* of the Institute.

RUPERT B. VANCE has published during the year:

Regional Planning and Social Trends in the South. *Proceedings*, Southeastern Library Association, Memphis, Tennessee, 1935.

Cotton and Tenancy. *Problems of the Cotton Economy. Proceedings* of the Southern Social Science Research Conference held in New Orleans, March 8, 1935. Section II, pp. 18-39. Dallas, Texas: The Arnold Foundation, 1936.

Regional Planning with Reference to the Southeast. *The Southern Economic Journal*, III: 55-65. July, 1936.

*The South's Place in the Nation*. Washington, D. C.: Public Affairs Committee, 1936. 32 pp.

The Old Cotton Belt. Chapter III, pp. 124-163, in *Migration and Economic Opportunity*, edited by Carter Goodrich. Philadelphia: University of Pennsylvania Press. 1936.

DR. VANCE has served as research technician on the Committee on Population Problems of the National Resources Committee.

DR. VANCE is continuing research on:

Southern folk leaders in politics in the post-reconstruction period.

The function of government aid in helping tenants to own farms. This is a comparative study of foreign experience with special reference to tenancy in the Cotton Belt.

Theoretical consideration of regionalism, social demography, and human geography in relation to problems of the South and of social planning.

The South's capacity to support population.

DR. VANCE is directing OLIVE M. STONE in a study of agrarian movements in Alabama.

DR. VANCE also directed the following research:

CHARLOTTE GARTH ADAMS. (Master's thesis.) Recent Developments in the Theories of Human Biology. (For abstract, see Department of Sociology.)

ELIZABETH WHITBECK DONOVAN. (Master's thesis.) The Theory of Social Control Since Ross, 1901-1935. (For abstract, see Department of Sociology.)

EDWIN M. PERKINS has published during the year:

The Influence of State Competition in the Adoption of Regressive Taxes: The North Carolina Sales Tax, 14 *North Carolina Law Review* 53-73, December, 1935.

MR. PERKINS has in progress A Cumulative Index to the *North Carolina Law Review*.

OLIVE M. STONE, under the direction of RUPERT B. VANCE and with the aid of the Elmhirst Fund, continued her historic study of the Alabama farmer, a study of agrarian movements in Alabama.

STANLEY STEVENS, under the direction of HOWARD W. ODUM, made an inquiry into the technique of state planning.

HARRY ESTILL MOORE published during the year:

Folk Implications in Pareto's Sociology. (With BERNICE MILBURN MOORE.) *Social Forces*, 14: 293-300. December, 1935.

MR. MOORE, under the direction of HOWARD W. ODUM, is completing his study of Theories of Regionalism.

MR. MOORE, with BERNICE MILBURN MOORE, investigated the theoretical possibilities and implications of the reintegration of agrarian culture in the United States.

MR. MOORE presented to the Institute on Southern Regional Development and the Social Sciences held at Chapel Hill, June 17-27, 1936, findings of a study on The Importance of Theoretical Considerations in Plans for Regional Development.

MR. MOORE has in progress:

A continuation of the study of theoretical aspects of regionalism.

An exploration of the essential characteristics of Americanism.

BERNICE MILBURN MOORE published during the year:

Folk Implications in Pareto's Sociology. (With HARRY ESTILL MOORE.) *Social Forces*, 14: 293-300. December, 1935.

MRS. MOORE, under the direction of ERNEST R. GROVES, is completing her study of Age and Sex Distribution of the People as Conditioning Factors in Cultural Participation: A Study in Regional Demography of the United States.

MRS. MOORE, with HARRY ESTILL MOORE, investigated the theoretical possibilities and implications of agrarian culture in the United States.

BENNETT WALL continued his study of the Pettigrew family of North Carolina under the title of Three Generations of a Southern Plantation Family.

## RESEARCH ORGANIZATIONS

### PROCEEDINGS OF THE ELISHA MITCHELL SCIENTIFIC SOCIETY

OCTOBER 8, 1935, TO MAY 12, 1936

362ND MEETING, OCTOBER 8, 1935

W. C. DAVISON: *Medical Problems Peculiar to North Carolina.*

A number of diseases common in North Carolina were described. These included "blue gum negro bite," caused by spirochetes and curable by arsenamine, fungus infections caused by blastomycetes or actinomycetes and curable in most cases by the administration of iodides, and lung abscesses following amebic dysentery. With regard to pellagra, it is now believed to be a resultant of three factors: (1) a dietary deficiency; (2) exposure to sunlight; (3) intestinal infections. North Carolina is second to Alabama in the incidence of pellagra and it is most prevalent in the month of June in this state.

The treatment of arthritis by artificial inducement of fever was described and the question was raised whether fever may not be nature's method of combatting a diseased condition.

The use of the ketogenic diet for the treatment of epilepsy was discussed and it was stated that this treatment causes improvement in 50-75 per cent of the cases.

The recent epidemic of poliomyelitis was discussed. This epidemic was unusual in that it reached its peak in early June although most previous epidemics reached their peak in September.

In conclusion some remarks were made on intestinal parasites, empyema, anemia, Malta fever, and infant mortality.

363RD MEETING, NOVEMBER 12, 1935

G. R. MACCARTHY: *Magnetic Anomalies and Geologic Structures on the Carolina Coastal Plain.*

A magnetically disturbed zone, roughly parallel to the coast, has been outlined on both sides of the North-South Carolina border. This zone consists of a number of sub-parallel strips of alternately high and low intensity in the vertical component of the earth's magnetic field. It has been traced from the vicinity of Myrtle Beach to Wilmington, and apparently continues further in a northeasterly direction. This disturbed zone probably represents a folded and perhaps a fractured belt in the crystalline basement rocks which are buried under about 2000 feet of Coastal Plain sediments in this region, and seems to be very similar to the disturbed zone which has been reported from the Florida peninsula.

The complete paper will appear in an early issue of the *Journal of Geology*.

**EDWARD MACK, JR.:** *The Size and Shape of Molecules.*

Chemists and physicists have speculated about the existence of particles of matter for a very long time, and have used the idea of the atom and the molecule in their thinking and theorizing, even though there was no very definite evidence for the objective existence of such particles. Within the past fifty years, however, a great mass of rather convincing evidence has been accumulating, which leads to the view that atoms and molecules actually do exist. Indeed it is possible to deduce, by using certain physical methods, the sizes and the shapes of atoms and molecules.

The most powerful tool, so far developed, for determining the dimensions of these particles and something about their shapes is the method of x-ray analysis. (Here was given a brief description of the physical principle involved, and several scaled models were shown of the crystal lattices of sodium chloride, copper, iron, iodine, diamond, graphite and benzene.)

Another approach to size and shape, especially in the case of long hydrocarbon chain molecules with a polar, water-soluble, group at one end of the molecule, is the oil-film method developed in this country largely through the genius of Dr. Langmuir. (Here a blackboard description was given of the orientation of such stick-like molecules on a water surface, and the method was presented for estimating the cross-section and the length of the molecules from the area and thickness of the oil-films.)

Of the half-dozen other methods which may be employed, one further method was described, namely the approach through measurement of the rate of diffusion of a volatile substance into air or the rate of viscous flow of a volatile substance down a capillary tube. From diffusion coefficients or from viscosity coefficients (at several temperatures) the collision areas of the molecules may be calculated. By matching these areas against the average shadow areas of models, made to scale, definite conclusions about size and shape of the molecules may be reached.

364TH MEETING, DECEMBER 10, 1935

**T. P. NOE, JR.:** *The Determination of Stress in an Elastic Body.*

The principle of least work, developed by Castigliano, states that the internal work done in any structure by the application of outer forces will be the least possible, consistent with equilibrium. The application of this principle to the solution of statically indeterminate reactions and stresses in redundant members of trusses is quite familiar to engineers. However, the principle may also be used as a criterion for selecting from a number of possible cases the most probable distribution of stress intensity over a given cross section. The truth of the result obtained will depend upon whether the correct distribution has been included in the group tested.

As an illustration, the distribution of stress in a curved beam, subjected to pure bending, will be considered. For this case there are two variations of stress intensity that have been advanced and used by engineers: namely, that of linear variation (planar stress) and that of hyperbolic variation

(planar strain). The two assumptions yield quite different results and only recently has it been determined by experiment that the hyperbolic variation is correct. The same result may be obtained by comparing the value of the total internal work computed on the basis of the two proposed distributions, the hyperbolic variation producing the least value for the internal work when the curved beam is subjected to a known external loading.

The fact that the internal work serves so well as a selective process is all the more interesting because the value of the internal work varies but slightly as the type of stress distribution considered is changed radically.

JOHN A. WHEELER: *The Formation of the Chemical Elements.*

Chemical analysis of samples of the earth's crust, of meteorites, and spectrochemical studies of the atmospheres of the sun and other stars give evidence that on the whole the earth is similar in its composition to the universe as a whole. Figures kindly supplied by Professor G. von Hevesy lead to the following estimates of the abundance of the more common isotopes in the solar system:

16 } 8 } O	..... 52%	29 } 14 } Si	..... 0.8%
23 } 11 } Na	..... 0.6	30 } 14 } Si	..... 0.8
24 } 12 } Mg	..... 10	32 } 16 } S	..... 2.6
25 } 12 } Mg	..... 1.3	40 } 20 } Ca	..... 0.9
26 } 12 } Mg	..... 1.3	54 } 26 } Fe	..... 0.6
28 } 14 } Si	..... 12	54 } 26 } Fe	..... 12

Heavy atoms, in comparison, are relatively rare; for example, only 0.0000026% of all atoms are estimated to belong to the species  $^{209}_{83}\text{Bi}$ .

Experiments have shown in the past few years that fast charged particles (protons,  $^1_1\text{H}$ ; deuterons,  $^2_1\text{H}$ ; and alpha particles,  $^4_2\text{He}$ ) are capable in close collisions of transmuting the lighter nuclei into heavier ones, often with the release of much energy. Objections to an explanation of element building on this basis are two in number: it has not proved possible in the laboratory to transmute the elements of medium and high atomic weight in this way; and at stellar temperatures, of the order of 10,000,000 degrees absolute, the charged particles are moving with an energy a hundred thousand times too small to be effective in collisions with light nuclei.

Promise of at least a partial accounting for the formation and relative abundance of the chemical elements comes from experiments of Enrico Fermi in 1934-35. Slow neutrons were found strikingly effective in transmutations of the type  $^1_0\text{n} + ^{127}_{53}\text{I} \rightarrow ^{128}_{53}\text{I}$ , where the heavy isotope formed

is unstable and disintegrates, giving an element of atomic number one unit higher, Xe, and an electron. So efficient are neutrons in producing nuclear changes that the presence of only a small proportion of them within a star would very quickly give rise to an extremely large liberation of heat, through the transmutations they bring about. Spectrochemistry does not tell whether neutrons are present in the stars. We may hope in the next few years to learn the answer to this question, and to trace in detail the successive changes through which the heaviest elements are built up from the lightest.

365TH MEETING, JANUARY 14, 1936

(*Joint meeting with the Philological Club*)

J. O. BAILEY (English): *Science—Preserver or Destroyer? Some Literary Futurities.* (For abstract see pp. 113-114.)

366TH MEETING, FEBRUARY 11, 1936

R. W. BOST: *A Decade of Organic Chemistry.*

A review of some of the most important developments in organic chemistry during the last decade was given. The following topics were discussed: vitamins, hormones, anesthetics, disinfectants, perfumes, detergents, cracking of hydrocarbons, synthetic fuels, refrigerants, plant stimulants, synthetic resins, plant pigments and insecticides.

367TH MEETING, MARCH 3, 1936

E. W. MCCHESENEY: *The Analysis of Proteins.*

The proteins are perhaps the most important compounds found in living matter, and it is essential to the progress of biological chemistry that their structures and composition should be elucidated. In 1820 Braconnot discovered the first amino acid to be found in a protein; namely, glycine. The discovery of others followed rather rapidly until it became apparent about 1900 that proteins were made up entirely of alpha-amino acids. This led Fischer and Hofmeister to propose the "peptide" hypothesis of protein structure, which remains the most satisfactory conception. The recent work of Astbury on the X-ray diagrams of proteins tends to lend further support to the view.

Although accurate methods have been devised for the determination of some of the amino acids, our knowledge of the composition of many of the proteins is far from complete, ten to forty per cent usually being unaccounted for. The remainder may represent undiscovered amino acids or analytical inaccuracies.

A fruitful method of study has been the separation of groups of amino acids having similar properties. A good example is the method of Foreman for the dicarboxylic amino acids. This aided Dakin in his discovery of hydroxyglutamic acid. In an attempt to repeat Dakin's work, the author found that casein yields a large fraction of amino acids which have water-insoluble barium salts. The principal component of this fraction is glutamic acid, but

hydroxyglutamic acid is present and aspartic acid is absent. In addition a compound precipitable by phosphotungstic acid is present and it appears to be different from anything previously described. It is not one of the diamino acids, and gives a strong diazo reaction. Further work with a view toward determining its nature is in progress.

DONALD P. COSTELLO: *Some Effects of Centrifugal Force on Marine Eggs.*

During the past 30 years the centrifuge has proven to be an instrument of extraordinary delicacy for bringing about a new distribution of the formed materials in certain living cells. The egg cells of many animals after being subjected to such treatment show a characteristic distribution of the fat, the yolk, and the pigment. The forced movement of these components through the egg, displacing the protoplasm, does not seem to injure the living substance, nor impair greatly its capacity for development. By the use of the centrifuge it has been possible to study many problems connected with the possible rôle of certain substances which might be thought to determine the future course of development.

The centrifuge used was an air-turbine ultracentrifuge of the Beams type, which gave forces up to 270,000 times gravity. Some unfertilized eggs of the marine worm, *Nereis*, centrifuged at 250,000 times gravity for 15 minutes, or at 100,000 times gravity for 60 minutes, subsequently developed, apparently normally.

The accumulation of vital dyes in particular formed cell components, rather than their coloration of the hyaline protoplasm, has also been demonstrated by the use of these high centrifugal forces. This indicates that the methods of measurement of the hydrogen ion concentration of hyaline protoplasm, employing such dyes, are completely inadequate.

Other problems related to the formation of the fertilization membrane have been studied in eggs of other marine forms using these high centrifugal forces.

368TH MEETING, APRIL 14, 1936

J. N. COUCH: *Some Recent Advances in Botany.*

369TH MEETING, MAY 12, 1936

H. M. BURLAGE: *The Development of the United States Pharmacopoeia and Formulary.*

Beginning with the Period of the Egyptian Papyri (previous to 1000 B. C.) works dealing with medicines and their preparations were discussed. From 1000 B. C. to 1000 A. D. was the period of works of individuals; 1000 A. D. to 1500, the period of Antidotariums; 1500 to 1800, City Pharmacopoeias; and 1800 to date, National Pharmacopoeias. The development of the U. S. Pharmacopoeia was discussed through the present eleventh revision, with emphasis on the work of revision, the pharmacopoeial conventions and

their compositions, important changes and trends, and a comparison of these changes, trends and contents with other National Pharmacopoeias was discussed.

The National Formulary—previously called the National Formulary of Unofficial Preparations and a companion work of the U. S. Pharmacopoeia—is a product of the American Pharmaceutical Association. The ways and means of its development and revision were discussed. The relationship of these two national works in the enforcement of the Pure Foods and Drug Act was emphasized.

### THE PHILOLOGICAL CLUB

OCTOBER 8, 1935

RAYMOND W. ADAMS. Thoreau Speaks to Concord Lyceum; Some New Thoreau Essays.

After a tracing of the origin and evolution of the New England lyceum from a religious lecture series to natural history lectures in keeping with the widespread interest in natural history during the early years of the nineteenth century, the history of the lyceum at Concord, Massachusetts, is sketched with some detail. The manuscript records of Concord Lyceum show the active part which Henry Thoreau had in that organization during the years of its greatest influence; they show that the lyceum audiences had none too high an opinion of Thoreau; and they show that Thoreau was in the habit of presenting as lectures before the lyceum essays which were to appear later as parts of more ambitious literary products.

Recently two Thoreau manuscripts have come to light which seem to have been intended for lectures before Concord Lyceum. The first of these, concerning the educative value of giving children close contact with wild nature may be entitled "Native Berries." The second, a defense of the rights of his townspeople to the scenery rapidly being appropriated by private owners of the land, is clearly a lecture intended for Concord ears—and intended to set some of those ears burning.

NOVEMBER 6, 1935

HENRY B. DEWING. Procopius and Sixth Century Constantinople.

Procopius was a Greek who lived in the reign of Justinian (527-565 A.D.) and had opportunity for close inspection of the great governmental machine that was the Roman Empire of his day through serving as secretary of the general Belisarius. He wrote a fairly complete history of the wars carried on by Justinian and his testimony is of first importance to the modern historian, as being based on personal observation.

For some unknown reason, Procopius became embittered and wrote, but did not publish, a "debunking" tract which is full of vilest slander and violently hostile criticism of the very persons who appear as the heroes of his history, his chief targets of attack being the Emperor and the Empress—the latter is the *bete noire* of the piece.

This latter work was unearthed by a scholar in the tenth century, and has been the subject of a bitter debate as to its authorship; however, the consensus of modern scholars accepts the work as written by Procopius, while acknowledging that the cause of the author's embitterment is unknown.

DECEMBER 3, 1935

WERNER P. FRIEDERICH. *Cosmopolitan Aspects of Eighteenth Century Swiss Literature.*

A study of the Swiss literature in the eighteenth century illustrates that it is wrong to separate it according to its languages and to treat its authors as if they were purely French or German writers. Switzerland, in that period, was the exact opposite of the political, literary, and moral system of Versailles, and her thinkers—Rousseau from Geneva and Bodmer from Zürich were leaders in the struggle against Voltaire's and Gottsched's neoclassicism. Gessner and Haller joined in an effort to bring new and irrational life and imagination into Europe's literary products.

Even more than a forerunner of new thought did Switzerland serve then as now as a transmitter of cultural property from one country to another—especially of English literature to the continent and of German literature to France. Beat Ludwig von Muralt, in his *Lettres sur les Anglais et les Français*, was the first to prefer English manners and thoughts to the French, and in Zürich there later arose a whole school of anglophile translators—a school headed by Bodmer with his translation of Milton's *Paradise Lost*. In the transmission of German culture to France, two French-Swiss names have to be considered above all: Mme. de Staël, her *De la Littérature considérée dans ses rapports avec les institutions sociales*, and especially her *De l'Allemagne*. Her work of international understanding is continued by Benjamin Constant in his *Réflexions sur le théâtre allemand*, his "translation" of Schiller's *Wallenstein* and his *Réflexions sur la Tragédie*. Switzerland indeed offers no great contribution to the literature of Romanticism; but as a preparer of new thought, as a mediator and reconciler of foreign cultures, she has fulfilled a noble task.

JANUARY 14, 1936

J. O. BAILEY. *Science—Preserver or Destroyer? Some Literary Futurities.*

Scientific fiction, defined as fiction whose subject-matter is concerned with invention or discovery in the natural sciences and consequent adventures, and produced throughout the nineteenth century and currently in the twentieth on three levels—by literary men of first rank (Poe, Wells, Kipling, etc.), by popular novelists, and by writers for the "pulp-paper" magazines—contains not only interpretation of scientific discovery, but also social criticism, usually as fictional discussion of the effects of imaginary inventions and discoveries upon society. Conclusions reached are of two kinds, optimistic and pessimistic. Optimistic conclusions are that science is to develop tremendously,

is to improve the race, is to eliminate warfare, and is to be socialized and bring about universal socialization in a state made able to provide economic abundance. Pessimistic conclusions are that science shows man to be a loathsome animal eventually to be superseded, the machine age brutalizes man, mechanisms for destruction will cause the collapse of civilization, progress is cyclic with a lapse into barbarism inevitable, and resources for life in the universe are doomed finally to exhaustion.

FEBRUARY 4, 1936

Y. Z. CHANG. Milton's Cathay and China.

MARCH 3, 1936

WILLIAM WELLS. Blake's Understanding and Use of the term "Imagination."

In theory Blake uses the term *imagination* to name the whole creative process from the first moving of the spirit of the artist to the completion of the work. It is this conception of the word that gives point to the well known Blakean aphorism, "The eternal body of man is the Imagination." Whenever Blake writes directly about the relation between the purpose and the work of the artist he never explicitly acknowledges that the labor of revision is an integral part of the artistic process or even that the artist has to work with resistant material.

In practice Blake sometimes does admit the need of the artist to criticize his inspiration (as the variants of *The Tyger* show); but frequently he refuses to recast what he has written or correct what he has drawn, even if upon review he finds his writing or drawing unintelligible; he is prone to suspect as an ally of his enemy Reason any definable purpose that sharpens the images of his mind. Yet imagination in Coleridge's sense of the term is the greatest of Blake's qualities of mind. So it may be regretted that he refuses to grant to such a mighty faculty the bounds it deserves: the despotism of vagrant thoughts is far more oppressive to the creative genius than the tyranny of will or even of reason.

APRIL 7, 1936

RALPH S. BOGGS. Folktale Motives in the Old Testament.

This paper indicates a few of the many possibilities available in the Old Testament to the competent folktale scholar. Recent numerous advances in folktale scholarship have not yet been utilized in studying the Old Testament. A bare list of many Old Testament folktale themes is given, to convey a general idea of the material in hand. Three choice motives are discussed in detail, and are related chiefly with Stith Thompson's *Motif-Index of Folk-literature* and with current American variants. These three motives are: Samson's Riddle Tale, Jonah and the Whale, the Garden of Eden. This material is to be regarded as fragments of Hebrew, and world, culture that drifted into the Old Testament along with many other manifestations of primitive Hebrew civilization.

A. M. WEBB, Duke University. *Leopardi*.

MAY 5, 1936

W. L. WILEY. Plagiarism and Imitation in the French Renaissance.

The question of imitation was prominent in the criticism of Greek and Latin writers. The Italians of the fifteenth and sixteenth centuries sought to elaborate upon the principles of the Ancients and to define proper forms of imitation. French authors of the sixteenth century were greatly influenced by this background of Classical and Italian theory.

Before 1550 in France, it was considered legitimate to copy very closely one's source material. There was no question of plagiarism. After the middle of the century, French critics were more insistent upon originality and poetic invention.

#### SOCIETY OF THE SIGMA XI

The principal activities of the North Carolina Chapter of the Society of the Sigma Xi during the year were as follows:

November 20, 1935. DR. W. D. BANCROFT, Professor of Physical Chemistry, Cornell University, addressed the Chapter, his subject being: The Physics and Chemistry of Color Changes in Leaves.

February 4, 1936. DR. H. V. WILSON, Professor of Zoölogy, University of North Carolina, addressed the Chapter, his subject being: Cell Behavior in the Development of Sponges.

March 6, 1936. The annual lecture was delivered by DR. C. P. BERKEY, Professor of Geology, Columbia University. His subject was: Geologic Elements of Certain Great Engineering Projects.

May 23, 1936. DR. J. P. HARLAND, Professor of Archaeology, University of North Carolina, addressed the Chapter on the subject: Archaeology and Art.

During the year fifteen full and twelve associate members were elected to the Chapter.

# RESEARCH PUBLICATIONS

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Longinus and the Theory of Poetic Imitation in Seventeenth and Eighteenth Century England. <i>Elizabeth Nitchie</i> .
Some Notes on the Early Eighteenth Century Pantomime. <i>Mitchell P. Wells</i> .
Berquin's Adaptations from German Dramatic Literature. <i>J. M. Carriere</i> .
Coleridge as a Champion of Liberty. <i>Charles Richard Sanders</i> .
Ibsen's Literary Reputation and Victorian Taste. <i>C. R. Decker</i> .
Announcement—American Council of Learned Societies.

## VOLUME XXXIII, 1—JANUARY, 1936

A Latin and English Passage on Dreams. <i>Marie Padgett Hamilton</i> .
French <i>Bouse</i> 'Fiente de Vache'. <i>A. H. Schutz</i> .
The Language of the Wakefield Playwright. <i>Margaret Trusler</i> .
The Summoner's Malady. <i>Pauline Aiken</i> .
Antoine de Balf and the Ovidian Love-Tale. <i>W. L. Wiley</i> .
"Wordsworth's 'Hermitage,'" Some Considerations. <i>Raymond D. Havens</i> .
Carlyle's Views on the Relation between Religion and Poetry up to 1832. <i>Hill Shine</i> .
Carlyle and the Saint-Simonians. <i>Ella M. Murphy</i> .

## VOLUME XXXIII, 2—APRIL, 1936

- Nicholas Breton's *The Works of a Young Wit* (1577). *Hyder E. Rollins.*  
 Du Bartas' Use of Lucretius. *Virgil K. Whitaker.*  
 Spenser's Reading: The *De Claris Mulieribus*. *Rosemond Tuwe.*  
 A New Source for Spenser's *Faerie Queene*, Book I. *Isabel E. Rathborne.*  
 Sir Walter Raleigh's Marriage. *Fred Sorensen.*  
 Who and What Were the Cathayans? *Y. Z. Chang.*  
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 Woodward's Debt to Milton in 1644. *George W. Whiting.*  
 Milton, Needham, and *Mercurius Politicus*. *J. Milton French.*  
 Milton's Conception of the Ruler. *Don M. Wolfe.*  
 Dryden's Criticism of Shakespeare. *John Olin Eidson.*  
 Announcement Concerning Italian Renaissance Bibliography.  
 Recent Literature of the English Renaissance. *Hardin Craig.*

## VOLUME XXXIII, 3—JULY, 1936

- Criticism of English Literature in Grimm's *Correspondence Littéraire*.  
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 The Pessimism and Optimism of Alfred de Vigny. *William Morton Dey.*  
 Florencio Sánchez's Debt to Eugène Brieux. *Karl Eastman Shedd.*  
 Ben Jonson's Masques in the Eighteenth Century. *Robert Gale Noyes.*  
 Coleridge's Plan for Completing *Christabel*. *B. R. McElderry, Jr.*  
 James Hogg's *Familiar Anecdotes of Sir Walter Scott*. *Alan Lang Strout.*  
 The Nature of Carlyle's Calvinism. *Charles Frederick Harrold.*  
 Carlyle's Views on the Relation between Poetry and History up to Early  
 1832. *Hill Shine.*  
 Tennyson's "Palace of Art"—An Interpretation. *A. C. Howell.*  
 Some Critical Opinions on Milton. *Allan H. Gilbert.*  
 Recent Additions to American Literary History: A Collective Estimate.  
*Killis Campbell.*

## THE NORTH CAROLINA LAW REVIEW

## VOLUME XIV, 1—DECEMBER, 1935

- The Constitutionality of the A. A. A. Processing Tax. *Thos. F. Green, Jr.*  
 The Influence of State Competition in the Adoption of Regressive Taxes:  
 The North Carolina Sales Tax. *E. M. Perkins.*  
 Some Aspects of Constitutionalism and Federalism. *Thomas Reed Powell.*

## VOLUME XIV, 2—FEBRUARY, 1936

- Gifts of Bank Deposits. *Harold C. Havighurst.*  
 Trust Investments in North Carolina. *D. W. Markham.*

## VOLUME XIV, 3—APRIL, 1936

- Federally Owned Corporations and Their Legal Problems, I-III. *Robert H. Schnell.*  
 A Summary Judgment Procedure for North Carolina. *James H. Chadbourn.*

## VOLUME XIV, 4—JUNE, 1936

"Crime is Local." *Albert Coates.*

Federally Owned Corporations and Their Legal Problems, IV-VII. *Robert H. Schnell.*

## SOCIAL FORCES

## VOLUME 14, 1—OCTOBER, 1935

National Significance of Recent Trends in Farm Population. *Rexford G. Tugwell.*

Rural Education Problems in Relation to New Trends in Population Distribution. *F. W. Reeves.*

Southern Population and Social Planning. *T. J. Woofter, Jr.*

Significance of Differential Reproduction for American Educational Policy. *Frederick Osborn.*

Factors Affecting Variations in Human Fertility. *Frank W. Notestein* and *Clyde V. Kiser.*

Economics and Politics. *Herbert von Beckerath.*

Church Sects and Parties. *Gaetano Mosca.*

Ten other articles in the departments of Teaching and Research in the Social Sciences; Public Welfare and Social Work; Marriage and the Family; Race, Cultural Groups, Social Differentiation; Government, Politics, Citizenship; Social Industrial Relationships.

## VOLUME 14, 2—DECEMBER, 1935

Crisis and Reform of the Western World. *Herbert von Beckerath.*

Sociological Fashions and Societal Planning. *James H. S. Bossard.*

Socio-Economic Aspects of Territorial Planning with Special Reference to the Mississippi Valley Plan. *W. Russell Tylor.*

Regional Authorities Through Interstate Compacts. *C. Herman Pritchett.*

Eleven other articles in the departments of Teaching and Research in the Social Sciences; Public Welfare and Social Work; Community and Neighborhood; Marriage and the Family; Race, Cultural Groups, Social Differentiation; Government, Politics, Citizenship; Social Industrial Relationships.

## VOLUME 14, 3—MARCH, 1936

The Emergence of the Metropolitan Community in the South. *Walter J. Matherly.*

The Functions of Social Insurance in Relation to Economic Security. *R. Clyde White.*

Regionalism and Fiction. *Melvin J. Vincent.*

The Socio-Economic Background of Nazi Antisemitism. *Herman Hausheer.*

Fame and Social Origin. *Joseph Schneider.*

Twelve other articles in the departments of Teaching and Research in the Social Sciences; Public Welfare and Social Work; Marriage and the Family; Race, Cultural Groups, Social Differentiation; Government, Politics, Citizenship; Social Industrial Relationships.

## VOLUME 14, 4—MAY, 1936

Social Security and American Traditions. *Jesse F. Steiner.*

The Swing of Social Change. *Newell L. Sims.*

Social Mutation in Turkey. *Samuel Haig Jameson.*

Culture Patterning in Secret Society Ceremonials. *Noel P. Gist.*

Patterns of Industrial Progress: An Historical Analysis of Recent Trends in Technology. *I. N. Liphshitz.*

Thirteen other articles in the departments of Teaching and Research in the Social Sciences; Public Welfare and Social Work; Community and Neighborhood; Marriage and the Family; Race, Cultural Groups, Social Differentiation; Government, Politics, Citizenship; Social Industrial Relationships.

## THE SOUTHERN ECONOMIC JOURNAL

## VOLUME II, 3—JANUARY, 1936

Are Government and Business Separate Entities? *Albert S. Keister.*

Public Debts in the South. *B. U. Ratchford.*

The Negro in Southern Trade Unionism. *George Sinclair Mitchell.*

Public Expenditure, Prices, and the National Income. *E. M. Bernstein.*

Resources and Distribution of Income in the South. *Edgar Z. Palmer.*

The Effect of International Trade Conditions and Foreign Agricultural Developments on Southern Agriculture. *Abraham Berglund.*

## VOLUME II, 4—APRIL, 1936

Reversing the Tide Toward Tenancy. *Wilson Gee.*

The Status of the Consumer During the Life of the Agricultural Adjustment Act. *Calvin B. Hoover.*

The Permanent Plan for the Insurance of Bank Deposits. *John B. Woosley.*

Some Basic Factors Affecting Southern Labor Standards. *Robin Hood.*

Personnel Administration in the Tennessee Valley Authority. *Floyd W. Reeves.*

## VOLUME III, 1—JULY, 1936

History and Economics. *Charles A. Beard.*

Economic Opinion and the Future of the Interest Rate. *Joseph J. Spengler.*

The Rate of Return on Utility Property. *E. M. Bernstein.*

State Regulation of Securities. *S. M. Wedeberg.*

Regional Planning with Reference to the Southeast. *Rupert B. Vance.*

Trends in Federal-State Taxation Relationships. *James W. Martin.*

## THE UNIVERSITY NEWS LETTER

## FEATURE ARTICLES

Value of Farm Lands and Buildings, 1935.

Farm Tenure in North Carolina, 1935.

Increase in Farm Owners and Part Owners in North Carolina, 1930-1935.

Increase in Farm Tenants in North Carolina, 1930-1935.

- Increase and Decrease in White and Negro Farmers in North Carolina, 1930-1935.
- White and Negro Farm Operators in North Carolina.
- Negro Population in the United States, 1930.
- Farm Area and Land Values in North Carolina, 1930.
- Farm Area and Land Values in the United States, 1935.
- High Spots in The History of Education in North Carolina.
- State Revenues and Expenditures, An Analysis.
- The Great Bond Age: A Review of the Rise of Public Debt in North Carolina.
- Laws Under Which We Live in North Carolina.
- City and County Surveys: History and Method.
- A Century of Public Education in North Carolina.
- North Carolina Public Education Since 1865.
- Revision of North Carolina Estate Laws.
- Farm Tenure in the United States, 1935.
- Farm Tenure in the United States, 1930 and 1935.
- Hospitals for Mental Disease in the United States, 1933.
- Manager Plan of City Government.
- Social Security in North Carolina.
- Public Libraries in North Carolina.
- Farm Income in the United States, 1935.
- Lynchings in the United States, 1889-1933.

## PART II

### FACULTY PUBLICATIONS

N. B. ADAMS. *Brief French Review Grammar and Composition*. New York: Henry Holt and Company. 1936. (In collaboration with J. C. LYONS.)

SUSAN G. AKERS. Book Review: *A System of Bibliographic Classification*, by Henry Evelyn Bliss. *Library Quarterly*, January, 1936.

R. S. BOGGS. *Three Golden Oranges and Other Spanish Folktales*. New York: Longmans, Green. 1936. (With M. G. DAVIS.)

R. P. BOND. Library Coöperation in North Carolina. *South Atlantic Bulletin*, II: 7. 1936. Book Review, Greek and Roman Criticism, of *Literary Criticism in Antiquity* by J. W. H. Apkins. *South Atlantic Quarterly*, XXXV: 230-232. 1936.

ROY M. BROWN. Public Welfare. *Social Forces*, 14: 609-612. May, 1936.

HENRY M. BURLAGE. Laboratory Manual for Inorganic Pharmacy. (Revised.) Chapel Hill. 1936. Some Observations on the Preparation of Intravenous Solutions in the Hospital Pharmacy. *Journal of the American Pharmaceutical Association*, XXV: 756-759. 1936. (In collaboration with H. C. McALLISTER.)

R. E. COKER. Alleghany School of Natural History: Eighth Annual Report. *The Buffalo Society of Natural Sciences, Seventy-fourth Annual Report*. October, 1935, pp. 19-20.

E. E. ERICSON. *Notes and Queries*: Schoolboy Rhymes and Acrostic Verses, 171: 160, August 29, 1936; American Mnemonic Jingles, 171: 172, September 5, 1936; Butter in the Dish, 171: 268, October 10, 1936; The Queen's Shilling, 171: 244, October 3, 1936; Blessing of Sea Fishing, 171: 248-249, October 3, 1936; Dogs and the Supernatural, 171: 249, October 3, 1936; American Verse, 171: 250, October 3, 1936; A Jest of Lamb's, 171: 225, September 26, 1936.

WERNER P. FRIEDERICH. Über das amerikanische Universitätswesen. *Bernische Hochschulzeitung*. October, 1935.

ERNEST R. GROVES. *Our Homes*—Chapter I. A Symposium published by the National Congress of Parents and Teachers, Washington, D. C., 1936. The Marriage Course at the University of North Caro-

lina. *Parent Education*, II: 2. May 15, 1935. Mental Hygiene. *Social Forces*, 14: 147-149. October, 1935. Love and Marriage. *Child Study*, XIII: 2. November, 1935. Consultation Service in Connection with Instruction in Preparation for Marriage at the University of North Carolina. *Parent Education*, III: 1 and 2. May, 1936. Mother and Child. *Social Forces*, 14: 616-617. May, 1936. Education for Marriage. *The Parents' Magazine*, XI: 7. July, 1936. Hard Going for the Family. *The Saturday Review of Literature*, XIV: 17. August 22, 1936. Let's Face the Problem of Cheating. *Parent-Teacher Magazine*, XXXI: 2. October, 1936.

G. A. HARRER. Review of Tenney Frank: *An Economic Survey of Ancient Rome*, Vol. I. *The Classical Journal*, XXX: 495-497. 1935.

M. A. HILL, JR. *First Year College Mathematics*. New York: Henry Holt and Company. 1936. (In collaboration with J. BURTON LINKER.)

A. C. HOWELL. Report Writing. A review of *The Preparation of Engineering Reports* by Thomas R. Agg and Walter L. Foster. *Mechanical Engineering*, LVIII: 264. April, 1936. In collaboration with RAY PALMER BAKER of Rensselaer Polytechnic Institute a revision of PROFESSOR BAKER's *The Preparation of Reports*. New York: The Ronald Press. 1923.

ARTHUR PALMER HUDSON. Rats That Spoil the Corn. *The High School Journal*, XVIII: 273-277. December, 1935. Chapel Hill: The University of North Carolina Press. *Functional College Composition*, Vol. I. New York: Thomas Y. Crowell Company, 1936. (In collaboration with E. H. HARTSELL and W. L. WILSON.) Editor, *Nelson's College Caravan*, Vols. I and II, New York: Thomas Nelson and Sons, 1936. (In collaboration with L. B. HURLEY, Woman's College of the University of North Carolina, and J. D. CLARK, North Carolina State College.)

GUY B. JOHNSON. A review of *White Spirituals in the Southern Uplands* by George Pullen Jackson. *Social Forces*, 14: 157-158. October, 1935.

FREDERICK H. KOCH. Editor of *The Carolina Play-Book*, quarterly journal published by The Carolina Playmakers. Articles in *The Carolina Play-Book*: American Drama in the Making, A Commencement Address Delivered at the University of North Dakota on June 11, 1935, VIII: 3. 1935; Federal Theatre, VIII: 4. 1935; The Seven-

teenth Season, 1918-1935, VIII: 4. 1935; Paul Green's New Play, VIII: 4. 1935; Playwright of Mexico, IX: 1. 1936; The Dramatic Instrument, IX: 2. 1936. Federal Theatre, *Backstage*, II: 3. 1935. A New People's Theatre, *Backstage*, X. 1936. Introducing "The Carolina Stage," *The Carolina Stage*, I: 1. 1936. Federal Theatre, *Federal Theatre in the South*, I: 1. 1936. Editor of *Play Producing for School and Little Theatre Stages*, a bulletin published by the University Extension Division, XV: 1. 1935. Articles in *Play Producing for School and Little Theatre Stages*: Organizing the Dramatic Group, Producing the Play, Dramatics in the Small Town, and A Carolina People's Theatre. Communal Pageantry, *The Carolina Stage*, II: 1. 1936.

A. M. JORDAN. *How to Study*. Boston: Christopher Publishing Company, 1936.

EDGAR W. KNIGHT. Some Weaknesses in Educational Administration. *School Management*, V: 8. April, 1936. Academic Freedom and *Noblesse Oblige*. *Teachers College Record*, XXXVII: 2. December, 1936. Faith in Education. *Education Bulletin* of the Pennsylvania State Education Association, IV: 32. June, 1936.

R. W. LINKER. Richard Wagner, Tannhäuser (text edition, mimeographed.) Chapel Hill: 1936. André Maurois, *Climats*. New York: Henry Holt and Company. 1936. (With W. L. WILEY.)

WM. DEB. MACNIDER. Individualism and Freedom. *Southern Medicine and Surgery*, XCVII: 618. 1935. The Two Year Medical School and University Education. *Journal of the Association of American Medical Colleges*, XI: 42. 1936. The Teaching of Pharmacology from the Standpoint of the Examiner. *Journal of the Association of American Medical Colleges*, XI: 132. 1936.

H. D. MEYER. The 1936-1937 Parent-Teacher Congress Program for the State of North Carolina. Program Notes, appearing in six issues of the State Parent-Teacher *Bulletin*. Revision of book, *The Theory of Play and Recreation*, by Mason and Mitchell, A. S. Barnes and Company, 1936.

HARRY E. MOORE. A review of *Natural Law and the Theory of Society, 1500-1800*, by Otto Gierke, *Social Forces*, 14: 435-436. March, 1936.

HOWARD W. ODUM. Despite Potentialities the South Is an Area of Scarcity Instead of a Land of Abundance. In the series, *The South*

*Today*. Published in 12 southern newspapers through the Southern Newspaper Syndicate, August, 1936.

W. W. PIERSON. Organization of Graduate Work in the University. *Journal of Proceedings and Addresses* of the Thirty-seventh Annual Conference of the Association of American Universities, 1935.

CARLETON E. PRESTON. *High School Journal* (Science Column): State-Adopted Textbooks—Physics, October, 1935; Beginning Bird Study, November, 1935; A Rough Test of Science Reading Skills, December, 1935; "If we know the Answer in Advance, Why Experiment?," January, 1936; A New Departure in Curriculum-making, February, 1936; The Science Vocabulary, April, 1936.

The High School Science Teacher and His Work. New York: McGraw-Hill Book Company. 1936.

SAMUEL SELDEN. Stage Scenery and Lighting. A Handbook for Non-Professionals. Revised Edition. (In collaboration with HUNTON D. SELLMAN.) New York: F. S. Crofts and Company. 1936.

The Construction and Painting of Scenery, a chapter in *Play Producing for School and Little Theatre Stages*, prepared by FREDERICK H. KOCH and Staff Members of The Carolina Playmakers. University of North Carolina Extension Bulletin, Vol. XV, No. 1, July, 1936.

*The Basic Planning of a Stage for a Schoolhouse Auditorium*. A mimeographed bulletin prepared for and distributed by the State of North Carolina Superintendent of Public Instruction, October, 1935.

The editing of the special feature issue of *The Carolina Play-Book* entitled "Thirtieth Anniversary of Playmaking" (Vol. VIII, No. 3, Sept., 1935). Articles in this issue: "The Inky Cloak is Touched with Crimson" and "The Staging of Hamlet."

"Theatre Books for the School Library," *The Carolina Stage* (mimeographed supplement to *The Carolina Play-Book*). Vol. I, No. 1, March, 1936.

"Materials for Stage Scenery," *Backstage*, A Division of Federal Theatre (Vol. II, No. 4, Summer, 1936). Mimeographed.

STERLING A. STOUDEMIRE. *Vamos a ver, a Workbook in Spanish*, New York: Henry Holt, 1936. (In collaboration with S. E. LEAVITT.)

G. C. TAYLOR. *The Interlinear Shakespeare (Hamlet, Macbeth, Julius Caesar, and The Merchant of Venice)*. New York: Ginn and Co. 1936.

RUPERT B. VANCE. "Little Man, What Now?" *Southern Review*, I: 560-567. 1936. The TVA and the Southern Utilities. In the series, *The South Today*. Released by Southern Newspaper Syndicate to press, January 12, 1936. Changing Economy of the Southeast. *Occupations*, XIV: 309-314. March, 1936. The Cotton Belt on the Move. *The South Today*, Southern Newspaper Syndicate release to the press, 1936. *How the Other Half Is Housed*. A Pictorial Record of Sub-Minimum Farm Housing in the South. Chapel Hill: The University of North Carolina Press. 1936. 16 pp. (Southern Policy Papers No. 4.)

W. F. THRALL. *A Handbook to Literature*. New York: Doubleday, Doran and Company. 1936. (With ADDISON HIBBARD.)

W. L. WILEY. André Maurois, *Climats*. New York: Henry Holt and Company. 1936. (With R. W. LINKER.)

JOHN B. WOOSLEY. The Banker's Qualifications. *The Tar Heel Banker*, XIV: 5: 11-14. 1935. The Banks and Inflation. *The Tar Heel Banker*, XV: 2: 13-18. 1936.

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