

SPECIAL ISSUE CONTAINING REPORTS OF THE SECOND ATLANTIC CITY MEETING OF
THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
AND ASSOCIATED SOCIETIES

SCIENCE

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THE ATLANTIC CITY MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES

Edited by Dr. HENRY B. WARD

PERMANENT SECRETARY

GENERAL FEATURES

THE ninety-ninth meeting in the series of the association was held in Atlantic City from December 28, 1936, to January 2, 1937. Once before this city had been host to the association, namely, in 1932 for the ninety-first meeting. In a way conditions in Atlantic City differ markedly from those under which meetings are usually held. The community can boast of no university, no research laboratories, no great museum. But it does offer unrivaled opportunities for comfort and convenience in holding a great assemblage of sections and societies, desiring at the same hours some fifty to sixty separate meeting halls adequate in size and convenient in place and equipment for the sessions of these diverse groups. It has also another advantage in that it can furnish these facilities within a distance of only a little more than a mile, eliminating thus the time and expense involved in reaching meet-

ing places often widely separated in a great city. The Municipal Auditorium, admirably planned for convention purposes, and the big hotels close by with capacious and attractive audience rooms housed well all the lectures, conferences, demonstrations and other gatherings held in Atlantic City. One could go in short order from one session to another or to make contact with members in some other society headquarters without spending much time in transit. It is worth while recording the fact that many members and officers, especially secretaries, expressed themselves at the close of the week as highly appreciative of the satisfactory arrangements made for the meeting.

The attendance at Atlantic City was large; room assignments provided on the basis of usual audiences were taxed to the utmost to provide for the numbers present and records of sections and societies indicated a total attendance of well over four thousand. Official

registrations amounted to 2,375. Of these New York contributed 561, Pennsylvania 326, New Jersey 193, Massachusetts 170, District of Columbia 154, Maryland 137, Connecticut 101, Illinois 90, Ohio 84, Virginia 63, North Carolina 46, Michigan 39, Minnesota 31, Maine 29, Iowa 24, California, Missouri and Wisconsin 23 each, New Hampshire 22, Rhode Island 20, Indiana 19, Georgia 18, West Virginia 16, Texas 12, Delaware 11, Louisiana, Tennessee and Vermont 10 each, Kentucky 9, Florida and South Carolina 8 each, Colorado 7, Kansas 6, Alabama, Arizona, Atlantic City, Utah and Wyoming 4 each, Oregon 3, Arkansas, Idaho, Mississippi, Montana, Nebraska and Oklahoma 2 each. Outside the continental United States Canada furnished 23 registrants, Puerto Rico 4, China, Hawaii and India 2 each, and the Canal Zone, England, Ireland and the U. S. S. R. one each.

GENERAL SESSIONS

The opening general session on Monday evening was held in the Ball Room of the Municipal Auditorium. In the chair was the president of the association, Dr. Edwin Grant Conklin, professor emeritus of Princeton University. On the stage sat also the other officers of the association and presidents of 16 prominent affiliated societies. The audience which greeted them filled the room to capacity. After a brief felicitous address of welcome, Dr. Conklin introduced the retiring president of the association, Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, who addressed the assemblage on the subject, "The Electron: Its Intellectual and Social Significance." This address has been printed in full in *SCIENCE* for January 8. Following the address the association adjourned to Haddon Hall, where a reception in the spacious lounge was tendered to officers and members by the Atlantic City Convention Bureau. The attendance was large and the occasion was most enjoyable.

Tuesday evening the general session was devoted to the fifteenth annual lecture of Sigma Xi. Dr. Henry G. Knight, chief of the U. S. Bureau of Chemistry and Soils, was the speaker of the occasion; his subject, "Selenium and Its Relations to Soil, Plants, Animals and Public Health."

On Wednesday evening was given the second annual lecture sponsored by the United Chapters of Phi Beta Kappa. The speaker of the evening was Dr. James R. Angell, president of Yale University, and his subject, "The Scholar and the Scientist." Dr. Angell voiced an earnest plea for broader training. Recognizing that for real genius all rules go by the board, he pointed out the urgent need of a cultural background for others who seek to make their work effective. He deplored current sloppy intellectual habits and the loss of ability to express oneself effec-

tively to the world at large. As intellectual life insurance the scientific worker should plan to devote a definite measure of time to those masterful works which will develop breadth and culture.

Five special afternoon lectures were given on successive days at 4:30. These were the following: "The Optics of the Surface of the Sea," by Dr. E. O. Hulburt, of the Naval Research Laboratory of Washington; "Science and the American Press," by David Dietz, science editor of Scripps-Howard Newspapers; "Response of Plants to Hormone-like Growth Substances," by Dr. P. W. Zimmerman, of the Boyce Thompson Institute for Plant Research; "The Social Significance of Cancer," by Dr. C. C. Little, of the Roscoe B. Jackson Memorial Laboratory, and "Changes and Modifications in the Conception of Carcinoma," by Dr. Walter Schiller, of the University of Vienna, Austria. These lectures attracted good audiences and were highly appreciated.

FRIDAY AND SATURDAY PROGRAM

The advance plans made by the Executive Committee for special programs of general interest on Friday and Saturday were carried out with marked success. Friday morning was devoted to meetings of committees and conferences, the most important of which was the Secretaries' Conference. This was well attended and the lively discussion of general association problems prolonged even into the lunch hour. The demonstration symposium on "The Moving Picture in the Service of Science," which was given on Friday afternoon in two large audience rooms at Haddon Hall, presented a wide variety of scientific studies illustrated by unique films made in connection with the work and showing its character and results in vivid fashion. Professor E. M. K. Geiling, of the University of Chicago, demonstrated realistically under the title of "Whaling for Science" work done by L. L. Robbins and himself in pursuit of whales and in securing specimens of the pituitary gland on which he has made important studies. In a color film entitled "A Health Educator with a Ciné-Kodak in the Orient" Dr. C. E. Turner, of the Massachusetts Institute of Technology, reviewed his trip as chairman of the Health Section of the World Federation of Education Associations. Motion pictures in natural color, chiefly from India, Bali and Japan, depicted the scenic marvels of regions visited and through modes of life illustrated the problems of population, sanitation and also the dispersion of disease from the areas studied. Dr. Harold E. Edgerton, of the Massachusetts Institute of Technology, showed a series of "High Speed Motion Pictures of the Flight of Birds and of Bullets." These pictures demonstrated vividly the use of the highly refined technique in making accurate measurements for scientific and engineering

research far beyond limits attained under previous methods.

In the other room Dr. William Beebe's reels were shown with their effective illustration of the life history of stages in the development of the eel and the activities of other deep sea fish. Perry Burgess, president of the Leonard Wood Memorial, in the sound movie entitled "Miracles in the South Sea" furnished a dramatic demonstration of the bright side of life at the great leper colony at Culion, on the shore of the China Sea, and the remarkable results achieved there by the modern methods employed in the treatment of leprosy.

Later on Friday afternoon Dr. Walter Schiller, of the University of Vienna, Austria, gave the final address in the symposium on cancer. His subject was "Changes and Modifications in the Conception of Carcinoma." A large audience listened with deep interest to the address.

The final event of the Atlantic City program was the showing on Friday evening of "The Human Adventure." This eight-reel talking picture was produced under the personal supervision of the late Professor James Henry Breasted and was planned to show the rise of man from savagery to civilization. The sound record in the second reel is in the voice of Dr. Breasted himself, and the entire film was produced at the Oriental Institute of the University of Chicago. The story was written and, except for the second reel, told by Mr. Charles Breasted. A large audience, in which were many former colleagues and old friends of Dr. Breasted, saw the film, which was exhibited through the courtesy of Wendell G. Shields, of New York City.

Early on Saturday morning members and guests of the association took the train for Philadelphia and assembled in the hall of the American Philosophical Society. The meeting was called to order by Roland S. Morris, who, as president of the society, extended a cordial welcome to the guests and then introduced Dr. Conklin, president of the association, to take charge of the program which he had arranged. The first paper, on "Some Biochemical Investigations on Crystalline Tobacco-Mosaic Virus Proteins," by Dr. W. M. Stanley, of the Rockefeller Institute, presented further work on the theme for which the author had been given the Association Prize at Atlantic City. Other papers on the program were the following: "The Ultra-centrifugal Concentration of Viruses and Other Biologically Active Proteins," by Dr. Ralph W. G. Wyckoff, of the Rockefeller Institute; "Labile Bacterial Antigens and Methods of Their Preparation and Preservation," by Dr. Stuart Mudd, of the University of Pennsylvania School of Medicine; "The Rôle of a Filterable Virus in Upper Respiratory Infection," by Dr. Yale Kneeland, of Columbia University; and

"The Transformation of the Virus of Rabbit Fibroma (Shope) into that of Infectious Myxomatosis (Santarelli)," by Dr. George Packer Berry, of the University of Rochester. After the luncheon tendered by the American Philosophical Society, visitors were taken to the Academy of Natural Sciences and to the Franklin Institute, where tea was served. This marked the close of the Philadelphia excursion, which was accounted a new and most agreeable feature of the 1936 meeting.

GEORGE DAVID BIRKHOFF—PRESIDENT-ELECT OF THE ASSOCIATION

(By Lyman T. Briggs)

AGAIN the American Association for the Advancement of Science has chosen a distinguished mathematician as its new president. But physicists as well as mathematicians may feel honored by his selection, because many of Professor Birkhoff's contributions, such as his development of the differential equations of dynamics and electricity, his treatise on relativity and his conceptual theories of matter, have enriched the field of mathematical physics.

George David Birkhoff was born of Dutch ancestry in Overisel, Michigan, on March 21, 1884. Following preparatory studies at Lewis Institute and the University of Chicago, he entered Harvard in 1903 and received his A.B. degree two years later, when he was twenty-one. His ability as a mathematician was early in evidence, for in his junior year he read an important paper before the American Mathematical Society, which was later published in its *Transactions*. Returning to the University of Chicago for post-graduate study under the stimulating guidance of Professor Moore, Birkhoff received his doctorate in 1907.

After teaching two years at the University of Wisconsin, Birkhoff joined the mathematical faculty at Princeton and became the editor of the *Annals of Mathematics*. In 1912 he was invited to return to Harvard, where he has remained and now holds the Perkins research professorship and is also dean of the Faculty of Arts and Sciences. As evidence of his catholicity of interests, which this latter position implies, his latest book, "Aesthetic Measure," reflects the approach of an orderly mind into the domain of the fine arts.

Birkhoff was among the first in America to take up the study of relativity, and the title of his book—"The Origin, Nature and Influence of Relativity"—shows the breadth of view with which he approached the subject. While he was one of the leading exponents of relativity he nevertheless subjected the new theory to rigid entrance requirements: "The usefulness of an abstraction is relative to its inherent simplicity of structure and its agreement with the facts.

For example, the usefulness of the theory of relativity depends on the circumstance that it possesses the same inherent simplicity as the classical theory, while it explains more facts than that theory did."

Birkhoff was elected to membership in the National Academy of Sciences at the age of thirty-four. Only a few men, such as Newcomb, Michelson, Hale and Theodore Richards, have won this distinction at such an early age. He is a past president of the American Mathematical Society, which awarded him the Bôcher prize in 1923 for his researches in dynamics. He has been elected to honorary membership in the French Academy of Sciences, the Göttingen Scientific Society, the Royal Danish Society of Sciences and Letters, the Royal Academy of Sciences (dei Lincei) and the Academy of Sciences at Bologna. The new Pontifical Academy of Science not only included him in its limited list of foreign fellows, but awarded to him its prize for his investigations of systems of differential equations. He has received from Venice the Quirini-Stampalia prize. He is an officer of the French Legion of Honor. Brown, Wisconsin, Harvard and the University of Paris have given him honorary degrees.

Dean Birkhoff's election as president is not the first honor accorded to him by the American Association for the Advancement of Science. In 1926 he was awarded the Association Prize of one thousand dollars for an outstanding paper in the program of the Philadelphia meeting. Schrödinger had announced only a few months previously his discovery of a fundamental wave equation. Birkhoff showed how this equation could be arrived at in an entirely different way, by means of a conceptual theory of matter and electricity. At the Atlantic City meeting he presented the results of his more recent studies in this field, which provide the groundwork for a conceptual theory of atomic structure.

THE ASSOCIATION PRIZE AWARD

The fourteenth annual award of the Association Prize for a noteworthy contribution to the program of the meeting was made at Atlantic City. The committee on award voted unanimously to give the \$1,000 prize to Dr. W. M. Stanley for the paper entitled "Crystalline Tobacco-Mosaic Virus Protein." This paper was read before a joint meeting of the Section on Botanical Sciences and the various botanical societies meeting in Atlantic City, on Tuesday afternoon, December 29. The membership of the Atlantic City committee on award consisted of C. C. Little, *chairman*, Jackson Memorial Laboratory; E. C. Faust, Tulane University School of Medicine; E. R. Hedrick, University of California at Los Angeles; H. T. Stetson, Massachusetts Institute of Technology, and David L. Webster, Stanford University.

THE PRIZE PAPER AND ITS AUTHOR

(By Vincent du Vigneaud)

The committee awarded the prize at the Atlantic City meeting to Dr. Wendell M. Stanley, biochemist of the Rockefeller Institute for Medical Research in Princeton, N. J., for his paper entitled "Chemical Studies on the Virus of Tobacco Mosaic."

The isolation of this typical virus in crystalline form and its recognition as a high molecular weight protein are without question a fundamental discovery, the far-reaching significance of which can probably only be partially grasped at the present time. Infection by the virus may be regarded as due to the introduction of a few molecules of the virus protein into a susceptible host. These few molecules apparently have the ability to so disarrange the normal metabolic reactions as to cause the cell to manufacture more of the virus protein. The work has also indicated that in the production of the virus protein by the host new strains may arise, through perhaps the chance production of one or more molecules of a slightly different structure, thus giving mutation of the virus. As Stanley has pointed out, the virus can not be regarded as simply an autocatalytic agent but must be regarded as a new type of super-catalyst, being able to cause the cell to produce more molecules in its own likeness.

The tobacco-mosaic virus was selected four years ago by Dr. Stanley for his studies, since the tobacco mosaic was one of the longest known of the viruses, was regarded as a typical virus, and the source of material was plentiful. His early work indicated that the compound was a protein, and his researches were therefore directed along this line of approach. The work led to the isolation from mosaic-diseased plants of a crystalline protein, possessing the properties of the virus. It turned out to be a protein of surprisingly high molecular weight, namely, seventeen million. The chemical studies which were particularly reported upon at the Christmas meetings have brought forth almost incontrovertible evidence that this protein is truly the tobacco-mosaic virus. The virus activity, chemical composition and optical rotation of the protein from various sources were the same and furthermore remained constant during ten recrystallizations of the protein. Other criteria have also failed entirely to indicate a separate identity for the virus activity and this crystalline protein. The studies have also brought out the fact that this high molecular weight protein does not exist in normal plants. The same protein or closely related protein has been isolated from mosaic-diseased tomatoes, spinach and phlox plants. The work has also led to the isolation of two crystalline proteins from plants infected with a masked and with a yellow strain of tobacco-mosaic virus, respectively. These proteins, although they are

very much alike and resemble the tobacco-mosaic virus protein, possess certain small chemical and physical differences.

Another observation of far-reaching importance made by Dr. Stanley was in the immunological work with the active and inactivated virus. Methods have been evolved for inactivating the virus so that the inactive virus gives about the same immunological action as that given by the untreated virus. Apparently the virus has been so modified as to interfere with its catalytic action, but yet is sufficiently close in structure to the original protein so that it can give immunological reaction. This observation may be useful in the studies of other virus diseases in inducing immunity with inactive virus.

As Dr. Stanley has stated, "It is now possible to list protein molecules along with living organisms such as bacteria, fungi and protozoa as infectious disease producing agents." Dr. Stanley well recognized, however, that all the disease-producing agents, now classified as viruses, may not all turn out to be high molecular weight proteins but that some might prove to be truly living bodies and that at this early stage of our knowledge different types of filterable disease-transmitting agents may have been classified under the one heading of viruses.

Dr. Stanley was born in Ridgeville, Indiana, on August 16, 1904, and graduated with the degree of bachelor of science from Earlham College in 1926. In 1927 he received his master of science degree from the University of Illinois, where he received his degree of doctor of philosophy two years later under Professor Roger Adams. Dr. Stanley then spent one year as private research assistant to Professor Adams and then the following year became an International Research Council fellow, studying in Munich, Germany, in the laboratory of Professor Wieland. On his return in 1931 he joined the staff of the Rockefeller Institute at New York, working with Dr. W. J. V. Osterhout and then later transferred to the institute's branch at Princeton.

Dr. Stanley's previous work had been concerned with the synthesis of possible anti-leprosy compounds, with the stereochemistry of diphenyl compounds, with the isolation and purification of the sterols of yeast and with synthetic models of plant processes.

IMPORTANT COUNCIL ACTIONS

Several aspects of the general problem of association relations in this period of social change were thoroughly discussed by the council and steps taken to extend the range of association activities, to determine the part to be played in some public problems and to establish relations with similar organizations in other countries. On recommendation of the council, the general session, held on Monday evening, December 28,

adopted an amendment to the constitution changing the name of the Section on Manufactures and Commerce (P), as listed in the constitution but never organized, to Section on Industrial Sciences (P). The council approved the policy of strengthening the ties between the association and the British Association for the Advancement of Science and organizations of similar character in other countries.

The problem of maintaining intellectual freedom and at the same time assuming social responsibility was brought before the council by President Conklin. After prolonged discussion and reference to the executive committee the latter reported to the council the fact that a regularly appointed committee of three, consisting of Dr. Isaiah Bowman, chairman, Dr. Cattell and Dr. Ward, had been cooperating with other scientific and educational groups on the problems of intellectual freedom and social responsibility. After much discussion the council voted to increase the membership of this committee to five, by adding the names of the president and retiring president to the committee, that the committee act as a permanent standing committee of the association, and that it be directed to persist in its efforts to cooperate with other bodies and to report its activities to the council and to the general assembly each year.

President Conklin announced that Newcomb Cleveland has given the association this year \$2,000 for the use of the committee on grants. The council adopted a unanimous vote of thanks and appreciation for this most useful gift.

The council voted to elect the following persons as emeritus life members under the Jane M. Smith Fund: F. P. Dunnington, Professor John Eric Welin, Richard N. Brackett and Dr. Frank Leverett.

The following persons were elected emeritus annual members under the Luella A. Owen Fund: Dr. Beverly T. Galloway, Professor Clarence P. Gillette and Dr. Frederick J. Wulling.

Dr. J. McKeen Cattell, chairman of the executive committee, presented a resolution expressing the appreciation of the association for the long and faithful services of the permanent secretary and a desire on his part to be relieved of the duties of the position. The council adopted unanimously the resolution as follows:

WHEREAS, Dr. Henry B. Ward has served on the council and executive committee of the American Association for the Advancement of Science with loyalty and devotion for many years, and

WHEREAS, Dr. Ward is now completing a term of office as permanent secretary, during which time he has further served the association with loyalty to the interests of the organization, and

WHEREAS, Dr. Ward indicated some time ago that he

would desire in the near future to be relieved of the duties of the office of permanent secretary,

Be it therefore resolved, that the American Association for the Advancement of Science express its deep appreciation to Dr. Ward for his long and faithful services and commend him for his sincere devotion to the office of the permanent secretary in advancing the cause of science.

Officers of the association were elected as given in the list published in *SCIENCE* for January 8, pages 40 and 41.

On recommendation of the executive committee the council appointed Dr. Henry B. Ward acting permanent secretary until May 1, 1937, or until Dr. Moulton could assume the duties of the office.

An invitation to visit the Stanley S. Holmes Village, an Atlantic City slum clearance project of the Public Works Administration, was extended to the association and accepted by the council, which also recorded the thanks of the association and associated societies for the courtesy extended.

The American Science Teachers' Association was on motion accepted as an associated society.

In appreciation of the work done by the local authorities and courtesies extended, the following minute was ordered entered on the minutes of the meeting and communicated to the parties concerned:

The record of the second Atlantic City meeting of the American Association for the Advancement of Science demonstrates clearly the success of the efforts made by the local authorities to provide for the comfort and convenience of a large and varied series of scientific sessions. The fine Municipal Auditorium and the great hotels brought together within easy distance of each other meetings of sixteen sections and more than forty associated societies and conferences in rooms at once commodious and well fitted for the individual purposes involved. The officers and council of the American Association for the Advancement of Science wish to record their appreciation of the work of the Atlantic City Convention Bureau, especially its director, Mr. A. H. Slean, and of the management of the hotels and their efficient officials for the many courtesies extended and the constant care that contributed in so many ways to the success of the meetings.

Before adjournment the following resolution was adopted concerning the summer program and the cooperation of the Ecological Society of America:

The American Association for the Advancement of Science appreciates the excellent and effective efforts of the Ecological Society of America to protect exemplary natural areas in this country from ill-advised encroachment, to the end that remarkable and instructive ecological and scenic features may be preserved in perpetuity. The association is specially appreciative of the fine cooperative work of the society in arranging and conducting

a symposium for the general program at Minneapolis and also at Rochester, and it invites the society to take similar special part at summer meetings in the future, by arranging and conducting a symposium of invited addresses on some timely and locally appropriate subject, which may be announced under joint auspices of the association and the society.

FINANCIAL REPORTS

Audited financial reports of the permanent secretary and the treasurer for the fiscal year 1936, together with proposed budgets for 1937, were presented and approved, and a digest of the same ordered printed. This follows:

OFFICE OF THE TREASURER			
BALANCE SHEET			
September 30, 1936			
		<i>Assets</i>	
<i>Investments</i>			
Securities			\$249,686.36
<i>Cash</i>			
Income account	\$ 1,472.62		
Reserve for current needs	14,051.81		15,524.43
			\$265,210.79
		<i>Liabilities</i>	
<i>Endowment and other Funds</i>			
		<i>Research</i>	<i>General</i>
W. Hudson Stephens ..			\$ 4,381.21
Richard T. Colburn ..	\$ 87,186.45		
Michael P. Rich			10,000.00
Friends of the Association			3,559.00
Hector E. Maiben			31,448.17
Sustaining Membership Fees:			
Living			1,000.00
Deceased	6,000.00		
Life Membership Fees:			
Living			40,050.00
Deceased	15,250.00		
	\$108,436.45	\$90,438.38	\$198,874.83
Jane M. Smith:			
Donation		\$ 5,000.00	
Credited fees of Deceased Emeritus Life Members ..		3,300.00	\$ 8,300.00
Luella A. Owen			500.00
Reserve Fund			32,306.16
Emergency Reserve Fund			11,177.99
Prize Fund			4,000.00
<i>Grants:</i>			
Committee (L. M. Dickerson)		\$ 50.00	
Affiliated state academies		1,300.00	1,350.00
<i>Accumulated Income Unappropriated</i>			
<i>Endowment and other funds:</i>			
Research	\$ 4,407.91		
General	3,787.13	\$ 8,195.04	
Jane M. Smith		471.88	
Luella A. Owen		34.89	8,701.81
			\$265,210.79
CASH STATEMENT			
October 1, 1935 to September 30, 1936			
<i>Receipts</i>			
Balance from last report (September 30, 1935) ..		\$ 17,191.65	
Prize Fund	\$ 1,000.00		
Life Membership	700.00		
Reversion from Grants	39.84		
Bonds redeemed:			
5,000 Cinn. U. Term 5s,			
2020	\$ 5,375.00		

1,000 Am. Tel. and Tel. Co. 5s, 1946	1,050.00			
5,000 Brooklyn Edison Co. 5s, 1952	5,200.00			
5,000 N. Y. Edison Co. 5s, 1951	5,198.00			
10,000 Consl. Gas of N. Y. 5s, 1957	10,298.50			
8,000 Park and Tilford Co. 6s, 1936	8,000.00	35,121.50		
Refund from Collection charges	2.85			
Income:				
Endowment:				
Research.. \$4,407.91				
General .. 3,787.13	\$ 8,195.04			
Reserve Fund	1,206.17			
Special Emergency Re- serve	641.05			
Special Funds:				
Jane M. Smith .. \$ 341.68				
Luella A. Owen .. 20.83	362.51	10,404.77	47,268.96	
			\$ 64,460.61	
<i>Disbursements</i>				
Investments:				
15,000 Consl. Edison 3½s, 1956 ..	\$14,925.00			
5,000 Pac. Tel. and Tel. ref. 3½s, 1966	5,075.00			
10,000 N. Y. Edison 3½s, 1966 ..	10,200.00			
5,000 Ind. Water Co. 3½s, 1966 ..	5,037.50	35,237.50		
Grants for Research	3,000.00			
Academy grants, 1935 and 1936	2,500.00			
Prize Fund, P. W. Zimmerman and A. E. Hitchcock	1,000.00			
Jane M. Smith Fund, three emeritus life memberships	300.00			
Luella A. Owen Fund, three emeritus annual memberships	15.00			
Fifty-year members, Journal subscrip- tions	24.50			
Life membership subscriptions for SCIENCE	1,506.00			
Hector E. Maiben lecture—Charles Camsell	137.63			
From Special Emergency Reserve to Permanent Secretary	5,000.00			
Purchased interest on bonds	152.71			
Safe deposit box and collection charges	62.84			
		\$ 48,936.18		
Cash on hand (September 30, 1936)	15,524.43			
		\$ 64,460.61		

OFFICE OF THE PERMANENT SECRETARY
RECEIPTS AND DISBURSEMENTS FOR THE FISCAL
YEAR 1935-1936

October 1, 1935, to September 30, 1936

Receipts

To balance from last account:				
Cash in banks	\$ 1,230.18			
Reserve in Treasurer's hands	15,536.94	\$ 16,767.12		
Membership dues and fees:				
Annual dues previous to 1935	140.00			
Annual dues for 1935	1,066.00			
Annual dues for 1936	81,788.42			
Advance payments for dues, etc. ..	885.50			
Entrance fees	170.00			
Life-membership fees	700.00	84,749.92		
Other general receipts:				
Life-membership journal subscrip- tions (from Treasurer)	1,521.00			
Interest on bank accounts, etc.	745.91			
Sales of Summarized Proceedings ..	57.50			
Sales of "Nationalism"	5.00			
Sales of booklists	2.50			
Overpayments	54.25			
Miscellaneous receipts	18.00	2,404.16		
Special journal subscriptions:				
SCIENCE and <i>Scientific Monthly</i> ...	2,346.00			
<i>Science News Letter</i>	321.00	2,667.00		

Saint Louis Meeting:			
Registration fees	2,188.00		
Exhibition—Receipts from exhibi- tors	4,749.00	6,937.00	
Rochester Meeting:			
Registration fees		514.00	
Atlantic City Meeting:			
Exhibition—Initial payments from exhibitors		1,050.00	
		\$115,089.20	

Disbursements

Subscriptions to official journals, including for- eign postage		\$ 51,775.50	
Allowances to Divisions and Academies:			
Divisions	\$ 2,275.00		
Affiliated academies	410.50	2,685.50	
Expenses of Washington Office:			
Salaries	17,163.78		
Office and addressograph supplies ..	365.87		
Printing and stationery	1,636.19		
Telephone and telegraph	190.79		
Postage	1,422.57		
Exchange	37.32		
Express, freight, and drayage	20.59		
Office equipment	215.10		
Binding SCIENCE	317.95		
Miscellaneous expenses	538.43	21,908.59	

Expenses, General Secretary's Office	577.62		
Expenses, Treasurer's Office	200.00		
Circularization, inviting new members	6,251.68		

Miscellaneous expenditures:			
Life-membership fees to Treasurer ..	700.00		
Refunds of overpayments	54.25		
Minneapolis Meeting:			
Travel expenses, Execu- tive Committee \$ 125.70			
Travel expenses, Section Secretaries	131.80	257.50	

Saint Louis Meeting:			
General expenses	2,745.54		
Travel expenses, Execu- tive Committee	787.52		
Travel expenses, Section Secretaries	1,377.87		
Miscellaneous section expenses	1,042.45		
Exhibition	3,086.13		
Press Service	648.90	9,688.41	

Rochester Meeting			
General expenses	1,380.10		
Travel expenses, Execu- tive Committee	691.38		
Travel expenses, Section Secretaries	73.43		
Miscellaneous section expense	153.79		
Press Service	268.11	2,566.81	

Atlantic City Meeting:			
General expenses	93.12		
Exhibition	1,640.77	1,733.89	

Denver Meeting:			
General expenses	103.83	15,104.69	

Miscellaneous travel expenses	843.51		
Expenses of Committee on Place of Science in Education	361.18		
Expenses of Committee on Popular Science Read- ing Lists	1,442.76		

Special journal subscriptions:			
SCIENCE and <i>Scientific Monthly</i> ..	\$ 2,364.00		
<i>Science News Letter</i>	327.00	\$ 2,691.00	
		\$103,842.03	

By new cash balances:			
Cash in banks	68.73		
Reserve in Treasurer's hands	11,178.44	11,247.17	
		\$115,089.20	

STATUS OF FUNDS

	September 30, 1936	September 30, 1935	
Publication Fund	\$ 1,695.34	\$ 637.84	
Emergency Fund	5,000.00	5,000.00	
Unallocated Funds	3,436.22	8,212.34	

Special fund for Committee on the Place of Science in Education ..	912.28	1,274.46
Special fund for Committee on Popular Science Reading Lists ..	203.33	1,643.59
	<u>\$11,247.17</u>	<u>\$16,767.12</u>

The accounts of the treasurer and permanent secretary were audited under the direction of Dr. W. J. Humphreys, official auditor of the association. Complete financial reports and accompanying papers are on file and copies are available if desired.

MEMBERSHIP REPORT

The following summary is taken from the membership report as submitted to the council:

	September 30, 1935	September 30, 1936
Sustaining members	1	1
Life memberships	506	496
Annual members, paid-up	15,966	16,511
Total	<u>16,473</u>	<u>17,008</u>
Arrearages, one years' dues	803	706
Arrearages, two years' dues	661	528
Total	<u>17,937</u>	<u>18,242</u>

A slight increase in paid-up membership will be noted: 93.2 per cent. for 1936 against 91.8 per cent. for 1935. During the year 1,477 names were added to the rolls and 36 were reinstated. On January 15, 1937, the total membership enrolment was 18,381.

THE TWO CONFERENCES

The Academy Conference was called to order at 4 p. m. on Monday, December 28, 1936, by Chairman W. H. Alexander, of the Ohio Academy. Howard E. Enders, of the Indiana Academy, presented a report dealing with the types of research projects to which the research grants have been applied. These projects include purchase of needed research apparatus, expenses of field work in collecting data, employment of research assistance, tabulation of data and indeed they include a wide range of activities classified under the name of research. Discussion developed the conclusion that it is not now desirable to have any rules regarding the types of research to which the various academies devote these funds. It was reported that several academies have been able to supplement the research grants from the association through funds secured within the states concerned.

The methods used by different academies in allocating the research grants was discussed. It was decided that this should be a topic for careful consideration at the next annual meeting. Then followed the dinner given by the association as host to the academy delegates. Throughout the dinner there was continuous discussion of academy interests, this discussion being engaged in by the delegates and members of

the executive committee of the association. E. C. Faust, of the New Orleans Academy, was elected chairman for next year and S. W. Bilsing, of the Texas Academy, was reelected as secretary.

The Secretaries' Conference was held on Friday morning with General Secretary Otis W. Caldwell in the chair. Vigorous discussion was devoted to consideration of detailed problems in arranging and conducting the meetings of sections and affiliated societies and in establishing closer and more effective relations between the association and its associated organizations. The function of this conference is advisory rather than legislative, and its general conclusions are made the subject of a report by the secretary of the conference, M. H. Ingraham, to the executive committee and council. Its work has been most helpful in perfecting the organization of the association and the work of its meetings. The session was terminated by a complimentary luncheon.

THE ANNUAL SCIENCE EXHIBITION

(By F. C. Brown)

The Annual Science Exhibition in Atlantic City was distinctly the best yet held. In the first place the exhibits were more numerous and more varied than heretofore. They were more harmonious and better decorated. The facilities and the management of the Auditorium, together with its short distance from all the meeting places, played an important rôle in the success of the exhibition.

The astronomy exhibition, under the chairmanship of Dr. Harlan T. Stetson, was distinctive. The generous cooperation of the American Museum of Natural History and the personal attention of Dr. Barton added materially. The cooperation of others was noteworthy.

The meteorological exhibition, under the chairmanship of S. P. Fergusson, had the cooperation of all the leading research institutions and commercial firms in this field. According to Dr. Charles F. Brooks, director of the Blue Hill Observatory, it was the most extensive exhibition held since 1889. It is gratifying that some firms, such as the Taylor Instrument Companies, Inc.; Julien P. Friez and Sons, Inc., and R. Fuess, Inc., not only assisted in the general set-up but also had distinctive booth displays.

Aside from the colorful atmosphere of the exhibition generally, the most noteworthy advance was in the increased demonstrations by commercial institutions, such as the Aetna Casualty and Surety Company, the Ajax Electrothermic Corporation, the Hanovia Chemical and Manufacturing Company, Fred S. Carver, the Radio Corporation of America, Erpi Picture Consultants and others.

PRESS SERVICE

(Report by Austin H. Clark)

Out of about 1,500 papers listed in the program this year only 257 were received by the Press Service in advance of the meeting. An additional 79, including many of much importance, arrived too late for use.

Manuscripts of all papers and addresses given should be sent to the Press Service at least two weeks in advance of the meetings. This is essential if they are to receive adequate preliminary study by the press representatives. It is also essential if they are to be mimeographed and distributed.

From the press view-point it is highly desirable that the important addresses be more or less evenly distributed between morning and afternoon and evening. If they are all in the afternoon or evening the afternoon papers are at a great disadvantage—the morning papers get all the good things. Why not begin the day with good breakfast addresses as well as end it with good dinner addresses?

Let us bear these things in mind and endeavor to make the Indianapolis meeting an outstanding success from the press view-point, as it is sure to be from the scientific view-point. We can do it. And I am enough of an optimist to feel sure we will.

RADIO PROGRAMS AT THE MEETING

The following broadcasts were made during the meeting of the association from Atlantic City and Philadelphia. They were carried out through the courtesy of the companies indicated. Other data appear in the following summary:

National Broadcasting Company (WEAF Red Network)

December 28, 1936, Monday, 7:30 to 7:45 P. M.

E. G. Conklin, Princeton University, president of the American Association for the Advancement of Science.

Topic: "Science and Human Welfare."

December 29, 1936, Tuesday, 6:00 to 6:15 P. M.

A. H. Compton, University of Chicago, sponsor, and R. C. Buffum.

Topic: "Science in the News."

December 30, 1936, Wednesday, 5:00 to 5:15 P. M.

Wm. Crocker and Otis W. Caldwell, Boyce Thompson Institute.

Topic: "How do Plant Hormones Act?"

December 31, 1936, Thursday, 6:00 to 6:15 P. M.

Howard Blakeslee, Associated Press; David Dietz, Scripps-Howard Newspapers; John O'Neill, *New York Herald-Tribune*, and Otis W. Caldwell, general secretary, the American Association for the Advancement of Science.

Topic: "Science and the Press."

January 2, 1937, Saturday, 6:00 to 6:15 P. M., Philadelphia. (KYW, NBC Red Network.)

Otis W. Caldwell, Boyce Thompson Institute; Watson Davis, Science Service, and Franklin Dunham, National Broadcasting Company.

Topic: "The Week of Science Meetings."

Columbia Broadcasting Company (Atlantic City Station WPG)

December 28, 1936, Monday, 2:30 to 2:45 P. M.

Howard E. Enders, Purdue University; Otis W. Caldwell, Boyce Thompson Institute; C. L. Mellinger, Science Department, High School, Atlantic City; Evelyn M. Fansler, Atlantic City High School Science Club, and Alton Meister, New York City High School Science Clubs.

Topic: "The Science Youth Movement."

December 29, 1936, Tuesday, 2:30 to 2:45 P. M.

Watson Davis, Science Service.

Topic: "The Year in Science."

December 30, 1936, Wednesday, 2:30 to 2:45 P. M.

F. B. Knight, University of Iowa.

Topic: "Is Education a Science?"

The general program made a book of 200 pages; copy was prepared and printing supervised by Sam Woodley, executive assistant of the association. In the program was included the record of sixteen sections and more than forty associated societies with numerous extra lectures, conferences and other meetings making in all over 180 separate sessions. The book lists 1,450 papers in different programs. This brief statement gives abundant evidence of the complexity of the plans to be worked out by the officers of the association and of societies cooperating in the meeting. As far as the surplus of copies of the printed program on hand will suffice, members may secure one on application by mail to the office of the permanent secretary.

SCIENTIFIC SESSIONS

SECTION ON MATHEMATICS (A)

(Report from E. R. Hedrick)

The meetings of the Section on Mathematics were held on Monday and Tuesday afternoons and in conjunction with the Section on Astronomy on Thursday afternoon.

On Monday afternoon W. J. Trjitzinsky read a paper on "Analytic Theory of Non-Linear Singular Differential Equations," Marston Morse a paper on "Homotopic Extremals," C. N. Moore a paper "On the Regularity of Methods of Summation of Multiple Series," and G. C. Evans a paper on "Equilibrium Problems for Potentials of Positive and Negative Mass."

On Tuesday afternoon T. H. Hildebrandt delivered his retiring address as vice-president of the association and chairman of the Section on Mathematics, on "Recent Developments in the Theory of Integration." After a recess, J. A. Shohat read a paper on "Appli-

cation of Laguerre Polynomials," M. H. Ingraham a paper on "Certain Aspects of the Mathematical Theory of Genetics," and A. L. Whiteman a paper "On a Set of Postulates for Boolean Algebras by Terms of Triadic Rejection."

On Thursday afternoon, at a joint session with the Section on Astronomy, J. B. Wilbur read a paper on "The Mechanical Solution of Simultaneous Algebraic Equations," G. D. Birkhoff a paper on "A Conceptual Theory of Atomic Structure," and H. R. Morgan a paper on "Some Problems in Fundamental Astronomy."

For the Section on Mathematics the following officers were elected: *Vice-president of the American Association and chairman of the section*, W. D. Cairns; *members of the committee of the section*, M. H. Stone (elective, retiring in December, 1940), two members of the American Mathematical Society to be announced later (representing the society), C. S. Atchison and H. L. Rietz (representing the Mathematical Association of America).

SECTION ON PHYSICS (B)

(*Reports from Henry A. Barton, Duane Roller, C. F. Brooks, Marsh W. White*)

The meeting of the Section on Physics, presided over by George B. Pegram, vice-president and chairman, was held as usual jointly with the American Physical Society. This year the American Association of Physics Teachers also joined in this session. The meeting program was composed entirely of two invited papers. In the first of these, "Electron Impacts in Gases," John T. Tate, retiring vice-president of the section, reviewed recent results yielded by the general experimental method in which ions produced by controlled electron impacts are identified and studied in a mass spectrograph arrangement. The second paper, presented by F. K. Richtmyer as retiring president of the American Physical Society, was on the subject, "Multiple Ionization of Atoms." He approached the subject from the point of view of x-rays. That is, x-ray spectra of excellent resolution were used to indicate the state of multiple ionization produced in atoms, particularly by electron impact. A very large amount of data accumulated by Professor Richtmyer, his co-workers and others throughout the world was presented, together with a critical summary of conclusions which may now be drawn. This joint session was well attended and unusually interesting.

The American Physical Society's sessions commenced with an innovation, namely, a symposium on "Some Problems in Radiological Physics." This symposium consisted of fifteen invited and contributed papers running through Monday morning and after-

noon. These were arranged by Lauriston S. Taylor, of the National Bureau of Standards. The papers dealt in part with radiological technique, emphasizing the difficulty of measuring x-ray and neutron dosage. Various methods of measuring were discussed and one paper gave the results of measurements on the x-ray output of ten high voltage x-ray generators. Some attention was devoted to backward scattered x-rays and also to secondary radiations emitted by filters used in Roentgen therapy. Other papers dealt more particularly with composite radioactive sources of neutrons, and finally there was considerable discussion of the biological effects of radiations of different types and energies.

Owing to the large number of general papers contributed at this meeting it was necessary to hold parallel sessions. While the radiological symposium was going on, eighteen papers on a wide variety of subjects were presented in another room. These dealt with explosions, mammalian body temperatures, electronic phenomena, the charge on the electron, quantum theory, intermolecular forces, nuclear magnetic moments, etc.

On Tuesday afternoon two sessions were again held. One of these was devoted to x-ray and optical spectra, their measurement and their use in the study of matter. The other session was devoted to the atomic nucleus and was made up of papers on neutrons, electron pairs, the interaction between nuclear particles, deuteron bombardment and induced radioactivity.

On Wednesday morning a very interesting session was held in which most of the papers dealt with the theory of magnetism. One paper reported experimental measurements in this field. Another paper on a different subject had to do with energy levels in heavy nuclei. On Wednesday afternoon a number of papers were presented on the subject of atomic masses. These included two outstanding papers by Kenneth T. Bainbridge and Edward B. Jordan which gave the results of very accurate mass spectrographic determinations. Another paper reported an experimental method for separating isotopes by high-speed centrifuging. Finally several important papers dealt with the subject of cosmic rays and their laboratory effects.

At a business meeting held early on Tuesday morning the following officers of the society were elected: R. M. Randall, *president*; Lyman J. Briggs, *vice-president*; W. L. Severinghaus, *secretary*; George B. Pegram, *treasurer*; all the foregoing for the calendar year 1937. For longer terms the following were elected: M. J. Kelly, John C. Slater and Henry A. Erikson, *members of the council*; Kenneth T. Bainbridge, H. P. Robertson and E. O. Wahlen, *members*

of the board of associate editors of *The Physical Review*.

The American Association of Physics Teachers held its sixth annual meeting from Tuesday through Thursday. One session of invited papers was conducted jointly with the Section on Physics and the American Physical Society. Two sessions were devoted to 27 contributed papers, a number of which were illustrated with actual experimental demonstrations. At a fourth session, chairmen of various committees of the association presented reports as follows: C. J. Lapp, "Examination for Profession of Physicist"; A. A. Knowlton, "Ideal Undergraduate Curriculum"; H. L. Dodge, "Membership"; W. E. Chamberlain, "Physics for Premedical Students"; T. D. Cope, "Preparation in Mathematics"; R. M. Sutton, "Publication of Demonstration Experiments"; P. I. Wold, "Training of Physicists for Industry"; W. H. Michener, "Electric and Magnetic Units and Dimensions."

On Thursday evening a joint dinner was held with the American Physical Society. D. L. Webster, president of the association, and Frederic Palmer, Jr., chairman of the committee on awards, participated in a ceremony in which the association made the first of its annual awards for notable contributions to the teaching of physics to William Suddards Franklin, posthumously. A certificate of award was presented to the family of Professor Franklin and bronze memorial tablets were presented to Lehigh University and to Massachusetts Institute of Technology, the institutions with which Professor Franklin was associated during his most active years.

At the business meeting held on Thursday morning, officers elected for 1937 were announced as follows: *President*, F. K. Richtmyer; *vice-president*, H. B. Lemon; *secretary*, T. D. Cope; *treasurer*, P. E. Klopsteg; *members of the executive committee*, F. A. Saunders and Alpheus W. Smith. A committee was appointed to investigate the proposal that the association sponsor an annual, national examination in physics at the baccalaureate level. Another new committee will study physical terminology, symbols and abbreviations. Other business included the report of the treasurer and the announcement that the official journal, *The American Physics Teacher*, will henceforth appear bi-monthly instead of quarterly.

The American Meteorological Society held five sessions from Monday to Wednesday. The first session included a discussion by A. F. Spilhaus of experimental results on the kinematics of jet streams in a rotating system, a description of detailed variations of frosts by Benjamin Holzman as revealed by quarter-hourly observations in two counties of Oklahoma, a discussion of "The International Classification of Clouds and States of the Sky," by C. F.

Brooks, and how hourly weather maps can be made from teletype reports for use in local forecasting and teaching by W. O. J. Roberts.

Tuesday morning and the first part of the afternoon were devoted to radio-meteorographs and other meteorological apparatus. A feature of the annual science exhibition was the largest exhibit of meteorological equipment assembled anywhere in the United States since 1889. This exhibit was described by S. P. Fergusson, chairman, and various portions of it by other speakers, notably Lyman J. Briggs, who presented the details of the meteorological equipment used on the stratosphere flight of *Explorer II*. A. H. Thiessen outlined a proposal for a permanent exhibit of meteorological instruments. Most of the time in this instrument portion of the program was devoted to descriptions of the five types of American radio-meteorographs on display and a demonstration of two of them in actual ascent. These two were released almost simultaneously and as they rose reported the pressure, temperature and humidity every half minute or oftener. The radio transmitters worked on 68 and 55 megacycles and so could be received simultaneously by the two recorders. Both meteorographs were heard for more than an hour and reached a height of 18 km. The base of the stratosphere was found at 14 km at a temperature of -70° C. Only a sampling of the record made by the National Bureau of Standards-Weather Bureau instrument was evaluated during the ascent, for the record was fed out very rapidly on a tape. The significant points of the entire ascent by the Harvard Blue Hill instrument were evaluated during the ascent, since the record was fed out by the recorder in graphical form. This record was plotted on an adiabatic chart and shown to the meeting early in the afternoon only three hours after the ascent, and compared with the results obtained by aerometeorograph on an airplane which rose from the U. S. Naval Air Station at Lakehurst, N. J., at about the time the balloons were released from Atlantic City. Up to 5 km, the height reached by the airplane, the temperatures indicated by both means were the same within one Centigrade degree. The humidities in the lower levels over Atlantic City were appreciably higher than those at Lakehurst, owing to a damp wind from the sea and a thick layer of clouds at the coastal station.

In the afternoon session J. B. Kincer presented an extraordinary summary of the national loss from hail, windstorms, drought and other weather vagaries. W. H. Alexander described what was being done to prevent floods in Ohio, especially the new Muskingum Valley project. The climatic belts of Georgia were described by G. W. Mindling, who corrected a long-standing error giving northern Georgia temperatures belonging to high latitudes in the United States. H.

Landsberg summarized nuclear climatology, showing the variations in condensation nuclei in the atmosphere over the earth's surface and at different heights.

Wednesday morning was devoted largely to the annual business meeting, but two sound motion pictures, recently released by the Department of Agriculture, brought out the Weather Bureau's fire-weather work and its flood-warning system. The Potomac flood of March, 1936, provided most of the illustrative material for the latter. F. Graham Millar showed how the complexities of evaporation could be expressed adequately in a theoretical formula.

The Wednesday afternoon session, which was joint with the Section on Astronomy, was chiefly on weather variations and long-range forecasting. H. H. Clayton indicated that on account of slowly moving centers of weather departure one could not expect to find continuing periodicity in the weather at a single station. But Dinsmore Alter, in presenting a new and very rapid form of periodogram analysis, showed that definite periods did exist in the rainfall of certain climatically homogeneous districts. Warren M. Persons, employing rigorous statistical analysis upon the correlation between seasonal weather in widely separated parts of the earth, showed that the correlation coefficients of various sizes which have been found were almost exactly equal in their frequency distribution according to size to what should be expected purely on the basis of chance. Measurements of ultraviolet radiation on Blue Hill were summarized by R. Wexler, and certain phases of variation of ions in the atmosphere were compared with solar phenomena by H. T. Stetson, which were illustrated by motion pictures of solar meteorology by the McMath-Hulbert Observatory of the University of Michigan.

In the annual meeting the secretary and treasurer reported satisfactory growth of membership and resources. The annual election continued in office C. F. Brooks as *secretary* and L. T. Samuels as *treasurer*, and put the following as *councilors* for the next three years: J. A. Fleming, W. J. Humphreys, J. B. Leighly, G. R. Parkinson, Andrew Thomson. W. R. Gregg was named to complete the unexpired term of Montrose W. Hayes, deceased.

Sigma Pi Sigma, physics honor society, held its annual luncheon on Wednesday. Thirty members and guests attended, with F. K. Richtmyer, retiring president of the American Physical Society and an honorary member of Sigma Pi Sigma, as guest of honor. The executive council of the society held its sessions on the afternoon and evening of Tuesday.

SECTION ON CHEMISTRY (C)

(Report from J. H. Simons)

The meeting of the Section on Chemistry began with a joint session on Tuesday afternoon with the Section

on Education and the Division of Chemical Education of the American Chemical Society for a symposium on "The Preparation of Teachers of Chemistry." Two papers were given, one by J. H. Simons, who expounded the chemist's point of view on this topic, and the other by William S. Gray, of the Department of Education of the University of Chicago, who expressed the educator's point of view. These papers were then discussed by Ross A. Baker for the scientific view-point and S. Ralph Powers for the educational.

Irving Langmuir presided at the Wednesday session of the section. The first paper was by C. H. Kunsman, who discussed "Recent Chemical and Technological Developments in Fertilizers." He showed that chemical research had made available to the farmer continually less costly plant foods and ones more adaptable to field use. He also indicated the direction that present research is taking both to reduce the cost of fertilizers and to improve their utilization.

Under the title "Entropy and Other Physical Properties of Isoprene," Norman Bekkedahl and Lawrence A. Wood described the results of very precise measurements on extremely pure isoprene. These included not only thermodynamic but also other physical properties. As this substance is related to natural rubber and as the same workers have made precise thermodynamic measurements on the latter, including its heat capacity to lower than 20 K., application of thermodynamic laws enable the properties of the polymerization reaction to be calculated. "Hydrogen and Oxygen Isotopic Abundance Ratios in Natural Compounds" was the title of a paper by Malcolm Dole, R. B. Gibney, J. L. Gabbard and R. L. Slobod. Dr. Dole stated that his work showed that the isotopic composition of hydrogen in natural compounds such as benzene and cholesterol are the same as in Lake Michigan water. The isotopic composition of oxygen, however, was found to vary from Lake Michigan water for ocean water, spring water and water condensed from the atmosphere.

The first afternoon paper was the address of the retiring vice-president of the section, Moses Gomberg. Under the title of "Free Radicals" he first traced the history of these active substances which vary all the way from those that are relatively stable, like the triphenylmethyl compounds, to compounds like free gaseous methyl which has a relatively short half life period. He stated that he had recently made free radicals of intermediate half life periods of about two minutes. He explained how recent work on magnetic susceptibility had confirmed older measurements of the equilibrium between the monomer and dimer in the triphenylmethyl type of free radicals in solution, given a check on the heat of dissociation of about 12,000 calories, shown the existence of free radicals in the

crystalline state, and shown in some compounds the existence of a free radical with two unpaired electrons. He also spoke of the quantum mechanical explanation of free radicals and compared this method of correlation with an older picture of organic chemistry to explain the properties of the triphenylmethyl radical having bromine atoms in the para position.

Theodore F. Zucker gave a paper on the "Purification of Vitamin D from Natural Sources" by T. F. Zucker and E. G. H. Simons. He explained his method and the properties of the substance obtained. "The Value of the Acid Silver Nitrate Reaction as a Test of Ascorbic Acid Results" was the title of a paper by A. Giroud and C. P. Leblond. Extensive work, which showed the very considerable value of this test, was described; and its limitations were also explained.

SECTION ON ASTRONOMY (D)

(Report from Harlan T. Stetson)

Three sessions of the Section on Astronomy were held. On Wednesday afternoon there was a joint session with the American Meteorological Society, at which papers on the borderline field between meteorology and astronomy were presented. The question of weather cycles of long period in connection with solar radiation and sun-spots was discussed from the point of view of a world analysis of the distribution of "highs" and "lows" by H. H. Clayton. Dinsmore Alter informed the group of a new form of periodogram analysis recently perfected at the Griffith Observatory, and Warren M. Persons stressed the dangers of faulty interpretation of correlation coefficients in any statistical analysis. Among other papers presented of interest to astronomers and meteorologists was the record of measurements of ultra-violet radiation at the Blue Hill Observatory by R. Wexler and C. F. Brooks, director of the observatory. The session was closed with a showing of a motion picture film of solar prominences, illustrating remarkable circulations in the atmosphere of the sun, that was taken by R. R. McMath, of the McMath-Hulbert Observatory, attached to the University of Michigan.

The Thursday morning session was the occasion for the presentation of a significant paper by Charles Hetzler, of the Yerkes Observatory, on "An Infra-Red Stellar Survey," portraying the remarkable findings of invisible or "ghost" stars through infra-red photography. The new interests in the study of solar activity and radio conditions brought a paper from R. S. Richardson, of the Mount Wilson Observatory. Dr. Richardson gave a comprehensive account of the relation between fade-outs and solar eruptions that had been observed at Mount Wilson during the last year. Discovery by Dr. Dellinger, of the Bureau of Standards, of an apparent 54-day interval between such

phenomena has led to a systematic observation of the sun at the time of expected reoccurrences. Dr. Richardson finds that while many of the fade-outs have been accompanied by simultaneous outbursts in the solar chromosphere, there are occasions when such outbursts have apparently no identifiable counterpart in ionospheric disturbances.

The Thursday afternoon session closed the astronomical program with three invited papers, the Section on Mathematics joining with the Section on Astronomy in this program. J. B. Wilbur, of the Massachusetts Institute of Technology, informed the group of the perfection of a device for the mechanical solution of simultaneous algebraic equations. The machine thus far constructed is capable of solving nine equations with nine unknowns.

George D. Birkhoff, of Harvard University, presented to the astronomers and the mathematicians in attendance a new conceptual theory of atomic structure. With the success of its application to the hydrogen atom already achieved, Professor Birkhoff gave hope for a new picture of the universe with remarkable philosophical implications. His theory would avoid some of the difficulties of current atomic theories, and the vague and somewhat unsatisfactory picture that wave-mechanics have to offer.

The address of the retiring vice-president of the Section on Astronomy with the title, "Some Problems in Fundamental Astronomy," by H. R. Morgan, closed the session. Dr. Morgan gave a lucid and comprehensive summary of the many unsolved problems in this branch of astronomy, somewhat subordinated to-day to astrophysical questions. It is anticipated that this address will be printed in full.

The astronomy exhibit sponsored by the section was made particularly effective this year through the cooperation of the Carnegie Institution of Washington and the Hayden Planetarium of the American Museum of Natural History. The centerpiece of the exhibit was the model of the 200-inch telescope of the California Institute of Technology, which was loaned through the courtesy of the Westinghouse Company of Pittsburgh. Three-dimensional stellar models loaned by the Buffalo Museum of Science contributed much to popular interest in the astronomical display, as did also the grinding of telescopic mirrors by two representatives of amateur interests in astronomy in the New York section.

SECTION ON GEOLOGY AND GEOGRAPHY (E)

(Report from Kirtley F. Mather)

The section held one session on Thursday morning. Inasmuch as none of the affiliated organizations were in session in Atlantic City, the attendance was small. Moreover, the retiring vice-president, Walter E. Me-

Court, had unfortunately been prevented by ill health from preparing the customary address. Nevertheless, the meeting proved to be of considerable significance, and much interest was manifested in the extended discussions of the papers presented. Among them, the ideas concerning flood control in the Connecticut Valley suggested by Edward L. Troxell, of Trinity College, were considered extensively, although there was no general agreement as to the effectiveness of the proposed canals and dikes. William C. Darrah's announcement of the success which he has achieved in his laboratory studies at Harvard University concerning fossilized spores in coal by means of nitrocellulose peels apparently opens a broad field for paleobotanical research. The physiographic study of Blackfoot Valley presented by George R. Mansfield, of the U. S. Geological Survey, stimulated an extended discussion.

SECTION ON ZOOLOGICAL SCIENCES (F)

(Reports from George R. La Rue, H. B. Goodrich,
Clarence E. Mickel, Ernest N. Cory,
Horace W. Stunkard)

The Section on Zoological Sciences met in joint sessions with the American Society of Zoologists on Tuesday, Wednesday and Thursday. The annual dinner for the Zoologists was held on Wednesday night. Following the dinner Ross G. Harrison gave the vice-presidential address on the subject, "Embryology and Its Relations." Dr. Harrison touched upon recent developments in embryology, particularly those that have occurred since the discovery of the organizer. The relations of embryology to genetics and to physiology were discussed, and some of the difficulties and shortcomings of embryological methods noted. The great success of genetics, while in one sense an aid to the understanding of development, may on the other hand become a danger, in that it may direct attention away from the purely ontogenetic processes which genetics can in no wise wholly explain. There is need for a real physiology of development which will study the actual physical and chemical changes that take place in the differentiating cytoplasm and will explain their localization. This will have to take into account the properties of protein molecules, their diversified chemical activities, their specific configuration and their tendency to assume a para-crystalline arrangement in the aqueous systems in which they occur. The possibility of x-ray analysis of the changes taking place during development was pointed out.

The American Society of Zoologists held its thirty-fourth annual meeting jointly with the section from December 29 to 31. The symposium on "Experimental Populations," held jointly with the Ecological Society of America and arranged by W. C. Allee, was held on Tuesday afternoon. Papers were given by

Willis H. Johnson, Thomas Park, A. M. Banta and Raymond Pearl. There was also a joint session with the Genetics Society of America on "Genetics and Development" at which papers were given by E. E. Just, Edmund W. Sinnott, G. W. Beadle and Victor C. Twitty. The special session on "Biological Effects of Radiation," arranged by W. C. Curtis, elicited much discussion. An important joint session with the Society of Cell Physiologists, arranged by Robert Chambers, was held on Wednesday afternoon. Among the regular sessions that on embryology was especially notable for the important papers presented.

The annual Biologists' Smoker was held on Tuesday evening with an estimated attendance of 800. The Zoologists' dinner on Wednesday evening, with 270 in attendance, was addressed by Ross G. Harrison, vice-president of the Section on Zoological Sciences, who gave an interesting informal survey of recent progress and future prospects of the science of embryology. At the annual business meeting held on Wednesday at noon the following officers were elected: *President*, F. L. Hisaw; *vice-president*, Helen D. King; and *secretary*, Elmer G. Butler. The sessions of the society concluded on Thursday at noon, there having been presented 120 papers exclusive of those read by title.

The Entomological Society of America held its thirty-first annual meeting from Monday through Wednesday. During the regular sessions there were presented 36 papers. A joint symposium was held on Monday afternoon with the American Association of Economic Entomologists on "Insects Affecting Man." L. O. Howard, pioneer in medical entomology and formerly chief of the Bureau of Entomology, presided at the symposium. The annual address was given by Edith M. Patch, of the University of Maine. Dr. Patch, who has been in charge of entomological work at the Maine Agricultural Experiment Station for many years, spoke on "Without Benefit of Insects." She said that too much emphasis has been directed to the fact that certain insects are injurious to man, his crops and domestic animals and too little to the fact that man is dependent on the insects for the pollination of plants which produce fruit, seeds, flowers and other commodities which are useful to him. The wholesale killing of insect life resulting from control campaigns in which large areas are dusted or sprayed with toxic materials by means of airplanes and other mechanical equipment has already exterminated such a large proportion of the beneficial native insect life that it is necessary to introduce honey bees for the purpose of pollinating the flowers of fruit trees. In certain localities some other plants have already become rare because their insect pollinators have been

eliminated from the native fauna. The time may not be far distant when it will be necessary to inaugurate conservation projects for the preservation and cultivation of insects necessary for the pollination of plants in order to insure the production of fruit crops and other products of the vegetable world useful to man. It may even come about that in the future more entomologists will be concerned with the preservation and cultivation of beneficial insects than are now engaged in studies and projects designed to destroy the injurious insects.

The presiding officer at the meeting was H. B. Hungerford. Officers for 1937 are: *President*, O. A. Johannsen; *first vice-president*, A. G. Ruggles; *second vice-president*, Alfred C. Kinsey; *secretary-treasurer*, Clarence E. Mickel.

The feature of the forty-ninth annual meeting of the American Association of Economic Entomologists was the joint symposium of the Economic Entomologists and the Entomological Society of America on "Insects Affecting Man and Animals," presided over by L. O. Howard. The principal speakers were T. J. Headlee, "Mosquitoes and Their Control"; L. L. Williams, "Mosquitoes and Malaria"; W. E. Dove, "Myiasis of Man"; William Robinson, "Some Therapeutic Uses of Insects and Their Products"; and R. R. Parker, "Ticks in Relation to Man." These papers were discussed by Robert Glasgow, F. C. Bishopp, O. R. Causey, W. A. Riley and Robert Matheson.

A program of 99 papers was distributed over three sections and the general meetings. Approximately three hundred members of the American Association of Economic Entomologists and of the Entomological Society of America attended the annual Entomologists' dinner, which was addressed by Edith M. Patch, E. A. Meehling and L. O. Howard. Two hundred and fifty members of the association registered for the meetings. Fifty-three new members were elected, and Hachiro Yuasa, president of Doshisha University, Kyoto, Japan, was elected a foreign member.

F. C. Bishopp, of the Bureau of Entomology and Plant Quarantine, was elected president and S. W. Bilsing, College Station, Texas, first vice-president. Additional vice-presidents are: E. J. Newcomber, Pacific Slope branch; W. E. Anderson, Cotton States branch; H. N. Worthley, Eastern branch; L. H. Worthley, section of plant quarantine and inspection; E. J. Anderson, section on apiculture; and T. H. Parks, section on extension.

The American Society of Parasitologists held its twelfth annual meeting from December 29 to 31 inclusive under the presidency of Robert Hegner. The program contained 63 titles, the same number as that

of the previous year, and consisted of papers on various aspects of parasitology, tropical medicine and public health. The program of the first day was made up of papers which dealt with nematode parasites, and information on morphology, distribution and life history of various species was presented. Noteworthy observations were made concerning the physiology and nutrition of these worms. Probably the outstanding contribution was reported by Maurice C. Hall and B. F. Collins, of the U. S. Public Health Service, tracing the incidence and etiology of trichinosis in the United States.

The demonstration session, which has become a special feature of the annual meeting, was held on Wednesday morning. The papers presented dealt with various phases of parasitology, especially the distribution, life history, pathology and control of helminth parasites from various parts of the world. The Wednesday morning session was concluded by the presidential address. President Hegner spoke on the subject, "Parasite Reactions to Host Modifications," and the address will be published in the next number of the *Journal of Parasitology*. The Parasitologists' luncheon was held on Wednesday and 99 members of the society were present. It was followed by the annual business meeting of the society. The Wednesday afternoon program was devoted to papers on protozoology and the Thursday morning session to contributions on medical entomology and parasitic flatworms.

At the annual business meeting the following officers were elected for 1937: *President*, George R. La Rue; *vice-president*, David H. Wenrich; *secretary* (to serve for two years), Horace W. Stunkard; *treasurer* (to serve for two years), Gilbert F. Otto; *members of the council* (to serve for four years), Justin Andrews and Norman R. Stoll.

SECTION ON BOTANICAL SCIENCES (G)

(*Reports from S. F. Trelease, L. C. Petry, Paul Weatherwax, Jason R. Swallen, H. P. Barss, Walter F. Loehwing, David H. Linder, Edgar T. Wherry, R. A. Studhalter*)

The Section on Botanical Sciences met in joint session with associated societies on Tuesday afternoon. More than four hundred and fifty botanists attended this unusually interesting session. E. W. Sinnott delivered the retiring vice-presidential address for the section on the subject "Morphology as a Dynamic Science." This address was followed by a symposium on "Recent Developments in Plant Sciences." W. M. Stanley discussed his biochemical studies on the virus of tobacco mosaic, for which he was awarded the annual thousand-dollar prize of the American Association for the Advancement of Science. E. J. Lund

summarized ten years' research on electric polarity in plants. Annie M. Hurd-Karrer described new and interesting phases of her research on the selenium problem.

The Botanical Society of America held its thirty-first annual meeting from December 29 to 31. The forenoons were mainly occupied by the reading of contributed papers at meetings of the three sections, and various joint sessions were held in the afternoons. The annual dinner for all botanists was held on Wednesday evening with an attendance of 301. C. Stuart Gager, president of the Botanical Society of America, presided at the dinner and introduced Aven Nelson, retiring president, who spoke on "Discipleship." At this meeting it was announced that Marshall A. Howe, acting director of the New York Botanical Garden, who died on December 24, was president-elect of the society and that the council had filled the vacancy caused by his death by the election of E. W. Sinnott. Other officers of the society for 1937 are: *Vice-president*, Loren C. Petry; *secretary*, George S. Avery, Jr.

At a meeting held on Wednesday evening a paleobotanical section of the society was organized by the election of the following officers: *Chairman*, A. C. Noé; *secretary*, W. C. Darrah; *representative on the editorial board of the American Journal of Botany*, C. A. Arnold.

The general section met in three sessions. The papers presented at the session on Tuesday forenoon were mostly physiological. Six of these dealt with problems of growth and differentiation, particularly as affected by auxins. Harry N. Stoudt summarized the problem of the production of plantlets from the leaves in the Crassulaceae. His study showed that the various species may be arranged in a graded series, depending upon the degree of development attained by the young plantlets while the leaf is still attached to the parent plant. Mel T. Cook reported that, because of a fungous disease of the immature seeds, the two timber species of *Magnolia* in Puerto Rico have practically ceased to reproduce. Michael Levine reported further work on the nature and causes of plant tumors. The tumor-producing effects of various extracts of cultures of *Bacterium tumefaciens* were tested on a number of plants, and, although abnormal growth resulted, none of these were comparable with those produced directly by the organism itself. It was pointed out that the results fell short of the effects produced in a similar way with animal tumors.

Papers dealing with morphological problems constituted the program of Wednesday forenoon. Kenneth W. Hunt discussed the homology between carpel and foliage leaf as illustrated by *Drosera* and *Reseda*, citing evidence to show that the carpel has been derived from parts of a dichotomous branch system

through a stage represented by a three-lobed, open megasporophyll. C. C. Doak showed that in the cotton plant each pollen tube is usually confined to a single carpel, but that a considerable number cross over to adjacent carpels in the pistil. J. T. Buchholz added one more chapter to his long series of studies on the embryos of the two species of *Sequoia*. He showed that in *S. sempervirens* the seeds mature and are shed the first season, while in the Big Tree, *S. gigantea*, the cone requires at least three years for complete development and may continue to live several years longer. This species was also shown to have a complicated system of multiple embryos. It was suggested that the large number of constant differences between the two species would amply justify their being placed in separate genera. Phyllis L. Cook contributed a short paper filling in what was not already known of the latter part of the development of the female gametophyte in *Thuja occidentalis*. LaDema M. Langdon discussed the fruits and carpelate flowers of the Amentiferae and concluded that two possible explanations of the origin of the group, one from a pomaceous Rosalean stock and one from the Pteridosperms, had about equal merit. Wayne E. Manning showed an arrangement of the genera of the Juglandaceae which suggests the evolution of their inflorescences from a panicle like that of the Anacardiaceae. Three papers dealt with morphological features of the Pteridophytes. One of these, by A. G. Lang, gave interesting new details of the structure of the sperm of *Marsilea*. By disintegrating sperms with hot water, the relations of the various parts are shown more clearly than when seen in ordinary microscopic preparations. The flagella were described as arising not from the externally visible blepharoplast, but from one of two parallel strands of specialized substance located in a band which extends the full length of the sperm.

The program of the final session consisted of two groups of papers, one dealing with cytology and the other with paleobotany. Papers by Florence L. Barrows and Wanda K. Farr made further contribution to what is known of the nature of the particles which make up the cell wall. The first of these papers showed that the cellulose particles which they have had under observation occur in representatives of all the four great divisions of the plant kingdom. The second, by taking advantage of the unusual size and form of the cells of *Valonia*, showed that the cellulose particles are arranged in two series of fibrils crossing at a characteristic angle to form a lattice and adhering to the cell wall by means of a colloidal cementing material. A paper by Harold A. Senn gave a classification of the Leguminosae based upon chromosome numbers. The evidence from the chromosomes indicates that the woody and perennial forms are of more

recent origin than the annual forms. Mark W. Woods and Ronald Bamford demonstrated use of the form of the chromosomes as an aid to classification in the genus *Tulipa*. Using examples from Cretaceous and Tertiary plant remains, C. A. Arnold pointed out a number of errors of identification due to the failure of investigators to correlate their work with modern work on the taxonomy of living plants. W. C. Darrah explained the use of the celloidin peel technique in the study of various kinds of plant fossils, including impressions, and illustrated his paper with some striking preparations made by this method.

Officers of the section for the coming year are: *Chairman*, E. N. Transeau; *secretary*, Paul Weatherwax; *representative on the editorial board of the American Journal of Botany*, Charles Thom.

The physiological section met in three sessions for the reading of contributed papers and in a joint session with the American Society for Horticultural Science and the American Society of Plant Physiologists at which four invited papers were offered. At the Tuesday morning session various aspects of the relatively new subject of plant growth regulators occupied most of the program. K. V. Thimann offered evidence that the inhibitory effects of auxins upon roots are not accompanied by thickening of the roots, and that inhibition of growth of buds is not necessarily accompanied by increased growth of other organs of the plant. A. E. Hitchcock and P. W. Zimmerman reported that the use of various indole and naphthalene derivatives in water solution induced root formation in a wide variety of plants, including many of commercial importance that have been regarded as difficult to root. The same authors also reported evidence that the growing stem tip has a regulatory influence on the development of underground stems and tubers. A paper by F. G. Gustafson reported that in five species of plants pollen extracts applied to the ovaries of unpollinated flowers resulted in enlargement of the ovaries and, in some cases, in the formation of normal but seedless fruits.

At the Wednesday afternoon session two papers dealing with the effects of freezing upon plant cells were read. B. J. Luyet and S. M. Grell described the effects of freezing upon the various protoplasmic constituents of the cell when subsequently treated in an ultra centrifuge. Irene Stuckey correlated the susceptibility to freezing with the presence of free water. P. J. Kramer and J. R. Jester gave data indicating that the length of the growing season in woody plants is influenced more by length of day than by seasonal variations in temperature. Lewis Knudson demonstrated the results of experiments on the chloroplasts, indicating that they exhibit definite osmotic properties and evidently possess a semi-permeable membrane. E. M. Palmquist reported evidence that carbohydrates

and an introduced dye (fluorescein) can move simultaneously in opposite directions in the same phloem tissue.

At the Thursday morning session two papers dealt with the effects of environmental conditions upon cell wall structure. Thomas Kerr showed a correlation between the lamellar structure of the cotton hair wall and the diurnal variation in temperature. This conclusion was supported by D. B. Anderson and J. H. Moore, who reported the absence of such lamellation in cotton hairs grown under constant illumination and temperature. Other speakers at these three sessions discussed seed dormancy and germination, the effects of ultra-violet radiation upon bacteria, some properties of a growth substance affecting *Rhizobium*, the effects of various environmental factors upon the structure and composition of green plants, and other subjects.

On Wednesday forenoon the physiological section met in joint session with the American Society for Horticultural Science and the American Society of Plant Physiologists. The program consisted of a symposium on the general subject of "Mineral Nutrition of Plants." G. T. Nightingale discussed the relation of potassium and calcium supply and availability to nitrogen metabolism. J. E. McMurtrey, Jr., described the distinctive effects in tobacco culture of a deficiency of various mineral nutrients. W. H. Chandler discussed the importance of zinc as a plant nutrient. O. F. Curtis dealt with the general question of the translocation of nitrogen and mineral elements in plants.

Officers of the physiological section for 1937 were announced as follows: *Chairman*, E. F. Hopkins; *vice-chairman and representative on the editorial board of the American Journal of Botany*, H. S. Reed; *secretary-treasurer*, Paul R. Burkholder.

The systematic section held three morning sessions at which 19 papers were presented. On Tuesday morning there was an interesting discussion of the present tendency to give Latin names to small variations of a species with resultant quadrinomials, quintinomials, etc. The Wednesday morning session was devoted to reports on certain local floras and included an invitation paper on a method of composite range-mapping as applied to the pine barren region of southern New Jersey. On Thursday technical papers on various groups of plants were presented. The interrelations of taxonomy and other branches of botany were discussed at the symposium on Wednesday afternoon. The invitation papers constituting this program were given by Edgar Anderson, representing cytology; Ralph W. Chaney, paleobotany; and E. D. Merrill, ethnology. Officers of the systematic section for 1937 are: *Chairman*, T. G. Yuncker; *secretary*, Winona H. Welch.

The twenty-eighth annual meeting of the American Phytopathological Society, held from Monday through Thursday, was outstanding. More than two hundred members registered. With the election of 139 new members at the meeting the active membership roll reached 965. G. W. Keitt, of the University of Wisconsin, was elected *president*; H. W. Anderson, of the University of Illinois, *vice-president*; and Charles Chupp, of Cornell University, *councilor*.

The scientific program of 99 prepared papers was less congested than in previous years and of high quality. W. M. Stanley, of the Rockefeller Institute, presented at the joint session with the Section on Botanical Sciences "Chemical Studies on the Virus of Tobacco Mosaic." The paper by Helen Purdy Beale, Boyce Thompson Institute, on "The Relationship of Intracellular Inclusions to Crystalline Tobacco Mosaic Virus Material," awakened great interest. Both these and other virus papers indicated that recent work in the plant virus field is rapidly opening hopeful avenues of approach to some of nature's most perplexing problems.

R. S. Kirby gave an effective demonstration of what good natural color motion pictures can do to carry needed facts about plant diseases and practical control convincingly to the grower. A paper by John Monteith on "The Use of Aniline Dyes in the Control of Rhizoctonia" as well as a number of other papers opened up a range of new possibilities in chemical control of diseases. W. M. Banfield presented convincing new evidence of the spread of the spores of the hard-fought Dutch elm disease within the tree through the sap stream.

Most stimulating was the joint symposium with the Genetics Society of America on Thursday morning on "Breeding for Disease Resistance in Plants and Animals." Joint sessions of interest and value were also held with the Mycological Society of America and with the Potato Association of America.

The necessity that adequate provision be made by this and other nations for biologically sound, effectively conducted measures to hold in check the destructive spread of plant diseases was brought out in papers by Lee A. Strong, chief of the U. S. Bureau of Entomology, and J. F. Adams, of the National Plant Board, at a conference held on Monday evening under the auspices of the committee on foreign plant diseases and quarantines. The problem of stopping the world-wide dissemination of all kinds of crop diseases was opened up in a paper by M. T. Mann, New York (Geneva) Experiment Station, and a subcommittee was appointed to work on this problem. The society endorsed as sound the recent resolution of the National Plant Board calling for the establishment by the 1937 Congress of a continuing plant pest fund to be used only to meet unforeseen needs in dealing with crop

pest and disease emergencies. The society went on record as urging that funds also be made available to begin complete eradication of the potato wart disease from the relatively few localities where it has become established in the United States.

At a round table conducted by the committee on coordination of research and extension work, the complexities of the spray and dust injury problem were discussed. The executive committees of the Tobacco Disease Council and the Cotton Disease Council met on Tuesday and Wednesday evening, respectively, and planned further coordinated activities. The former group decided to arrange, if possible, within a short time to call a general conference of state and federal workers on the root knot nematode with a view to reviewing the situation and planning for mutual assistance in a more intensive attack on the problems created by this eelworm, which is considered the most persistent, widespread and costly destroyer of all kinds of crops throughout the southern half of the United States. The subcommittee on tobacco virus diseases presented for review by the group and eventual release to all interested states a carefully prepared, concise, authoritative statement of the tobacco mosaic situation and of the measures demonstrated as effective in practical planted and field control.

Important legislation by the society repealed the life membership provision of the constitution; removed, effective on December 31, 1936, the \$1 per page levy on contributors for articles published in the official journal *Phytopathology*; pledged the membership to support a rigid editorial policy looking to conciseness and authorized the editor-in-chief and business manager to institute, if necessary, other measures in the interest of the economy in publication; ordered the future printing in the journal at the expense of the society of abstracts of all papers presented at the annual meeting; established a committee on memberships and subscriptions and a committee on donations and legacies, replacing and enlarging the powers of the committee on permanent endowment. The society voted to support, as a donor, the International Centraalbureau voor Schimmelcultuur at Baarn, Holland.

The Pacific Division was instructed to take charge of the summer meeting to be held in connection with the American Association for the Advancement of Science meeting in Denver. The Canadian invitation for the society to meet in Ottawa in the summer of 1938 was enthusiastically accepted.

The Phytopathologists' dinner, attended by 312, will be remembered for the cleverly worded presentation to the society by F. A. Wolf, Duke University, of a curiously wrought gavel and for the original and highly entertaining program conducted by a group of members headed by Wm. H. Martin, R. P. White and W. H. Weston.

The American Society of Plant Physiologists held its thirteenth annual meeting from Tuesday to Thursday. The society participated in joint sessions with the Section on Botanical Sciences, the American Society for Horticultural Science and the Physiological Section in a program on mineral nutrition, including minor elements, and with the Ecological Society of America in a discussion of light and techniques for quantitative measurement.

On Tuesday evening the society held its annual banquet, with R. B. Harvey acting as toastmaster, at which A. E. Murneek's retiring president's address, "Recent Advances in Physiology of Reproduction of Plants," was read by the vice-president, O. F. Curtis, in Dr. Murneek's enforced absence. The election of D. T. MacDougal, of the Carnegie Institution, as an honorary Barnes life member of the society was made in recognition of his services to American plant physiology dating from the very beginning of the present century with the following citation:

D. T. MacDougal was chosen the recipient of the Charles Reid Barnes life membership award because on every ground he is, at the present time, the most obvious nominee for this honor. Only a few of his many qualifications can here be enumerated. For a number of years during the early history of plant physiology in America, Dr. MacDougal was one of not more than four or five plant physiologists in this country, contemporary with Dr. Barnes, and they were good friends. He deserves the credit along with Dr. Barnes for having initiated that early work in plant physiology in the United States. His text-book published in 1901 was the first text-book of plant physiology published in America, and this book did much excellent service for almost a decade before the advent of another book on this subject by an American author.

C. A. Shull announced the selection of Kenneth V. Thimann as the recipient of the Stephen Hales prize in recognition of his contributions in the field of protein chemistry and hormone physiology. He was tendered the diploma and the following citation:

In recognition of his service to the science of plant physiology the American Society of Plant Physiologists now confers the Stephen Hales prize for 1936 on Kenneth V. Thimann; contributor to fundamental knowledge in the complex and difficult subject of the chemistry of proteins; brilliant investigator in the comparatively new but rapidly expanding field of plant hormones, their chemical identity, formation and distribution within the plant, and their function and mode of action in the control of growth and development; a scientist whose achievement is representative of the highest type of endeavor in his sphere of activity.

Dr. Shull, as editor of *Plant Physiology*, announced plans for the publication during 1937 of "festschrift" issues of the journal in recognition of the contribu-

tions by certain of its corresponding members. The banquet concluded with moving pictures of the International Botanical Congress held at Amsterdam in 1936 shown by the society's official delegate, Walter F. Loehwing.

The general program on "Morphology as a Dynamic Science" with the Section on Botanical Sciences was of particular interest to the physiologists because of the excellent way in which structure was interpreted in terms of function. The symposium on "Carbon-dioxide Assimilation" included the description of a technique employed by Dr. Heinicke, of Cornell University, for enclosing entire apple trees in air-tight cages for the quantitative study of their photosynthesis and respiration. After describing the novel techniques employed for his studies he reviewed the course of photosynthesis and respiration continuously over a period of an entire year, bringing out the relationship of foliage development and abscission to the processes of growth and fruit formation. On this same program E. D. McAlister and W. H. Hoover, of the Smithsonian Institution, described an important technique for the quantitative measure of carbon dioxide in the presence of other gases. The procedure is unique both in reference to speed and sensitivity and the fact that analysis can be made in complex mixtures of gases which do not show an absorption band in the infra-red. The results included the first quantitative measure of photosynthesis within a few seconds after illumination of higher plants as well as the independence of respiration and illumination indicating that light has no immediate direct effect upon respiration. The findings of these authors also correlate much of the previous work on fluorescence of chlorophyll with the results reported by Franck and Kautsky on higher plants.

The growth-retarding and strong tropic effect of neon light was described by G. O. Burr. The program concluded with a description of the ratio of chlorophyll *a* to chlorophyll *b* and the relation thereof to the mechanism of photosynthesis by O. L. Inman, of Antioch College. The society has shown a very rapid growth and its program shows commensurate expansion and participation by its members.

The Mycological Society of America held its fifth annual meeting from December 29 to 31, with H. M. Fitzpatrick in the chair. At the business meeting reports presented by the secretary-treasurer and by the managing editor of *Mycologia* showed the society and its journal to be in sound financial condition. Its membership is now 377 and shows a definite increase over that of last year. New officers elected for 1937 are: *President*, John Dearnness; *vice-president*, L. O. Overholts; *councilor*, H. M. Fitzpatrick, who also was elected *historian* by the council. The council elected J. N. Couch to serve a five-year term as *associate edi-*

tor of *Mycologia*. Through the council the support of the society was given to the Centraalbureau voor Schimmelcultuur at Baarn, Holland. The secretary gave a brief account of the very successful summer foray held at the Mountain Lake Biological Laboratory in Virginia from September 2 to 5. Joint sessions were held with the American Phytopathological Society and with the Section on Botanical Sciences. The retiring president, H. M. Fitzpatrick, gave an address on the "Historical Background of the Mycological Society of America," tracing its origin from its beginnings as part of the Section on Botanical Sciences of the American Association for the Advancement of Science. In addition to the president's address, 41 papers were submitted for presentation, covering the major fields of general interest, such as morphology, physiology, cytology, genetics and medical mycology.

The American Fern Society met on Friday morning. The program consisted of a symposium on "New Jersey Ferns," participated in by M. A. Chrysler, of Rutgers University, Robert T. Clausen, of the Bailey Hortorium at Ithaca, James L. Edwards, of Montclair, N. J., and Edgar T. Wherry, of the University of Pennsylvania. The geographic relations of about 75 species of ferns and fern-allies were discussed, and it was pointed out that several northern species reach their southern limits in the state, either in the highlands or as far down as Monmouth and Hunterdon counties. Some wide-spread species are absent from the pine-barrens, while various southern ones occur only there. The rarest New Jersey species are *Asplenium pinnatifidum* (or *trudelli*) and *Equisetum pratense*, the localities for both of which are now lost.

The geographical distribution of bryophytes and lichens was the principal topic which occupied the meeting of the Sullivant Moss Society. A. J. Grout reported the discovery on Long Island of several mosses characteristic of the southern coastal plain, whereas L. E. Anderson told of localized areas of northern bryophytes in North Carolina. W. C. Steere demonstrated that *Bryoxiphium norvegicum*, the "sword moss," on the basis of its present distribution, must be a preglacial and interglacial relic species.

The officers for 1937 will be: *President*, W. C. Steere; *vice-president*, Winona H. Welch; *secretary-treasurer*, R. A. Studhalter.

PROGRAMS RELATED TO BOTH ZOOLOGICAL AND BOTANICAL SCIENCES (F AND G)

(Reports from A. M. Banta, Orlando Park, M. Demerec, Paul S. Welch, J. E. Ackert)

The fifty-fourth annual meeting of the American Society of Naturalists featured its policy of attempting to correlate the different biological disciplines and

to further the philosophy of biology. The Biologists' Smoker, arranged by the Naturalists in collaboration with seven other biological societies and the American Association for the Advancement of Science, was held on Tuesday evening. This is the one affair of convocation week which brings together all the biologists. This year's attendance, estimated at 800 to 1,000, greatly surpassed expectations and was a highly successful get-together.

The round-table discussion on "Genetics and Development," sponsored by the zoologists, geneticists and naturalists, taxed the capacity of the largest available room, seating 500, at the Municipal Auditorium.

The Naturalists symposium on Thursday afternoon brought together an audience of about 500. "Supra-specific Variations in Nature and in Classification" was discussed from the view-point of zoology by Alfred C. Kinsey, from the view-point of botany by Edgar Anderson, and from the view-point of paleontology by George Gaylord Simpson. The excellent papers by these three outstanding younger workers were followed by a brief discussion and summary by William K. Gregory. It is impossible to make an intelligible brief statement concerning these papers except to state that the audience was convinced that real progress is being made in obtaining substantial evidence concerning the origin of the higher categories of plants and animals. The interested biologist will find these papers in the *American Naturalist* for March-April, 1937.

The annual Naturalists' dinner held on Thursday evening was well attended and was highly successful in all respects. It was followed by the presidential address of C. E. Allen, who discussed "Haploid and Diploid Generations." In this very thoughtful and authoritative address the speaker went far toward the clearing up of the puzzling relationships between, and the origin of, the diploid and haploid generations.

The twenty-second annual meeting of the Ecological Society of America began with the Tuesday morning session, at which papers on plant ecology were presented. W. H. Horr gave a report upon the "Effect of Drought on Kansas Trees," and emphasized soil structure and composition as well as infestation of trees by wood borers as influences determining the survival of trees. Soil composition in relation to forest units in north central New York was also emphasized by V. A. Young, and C. H. Diebold presented a series of interesting interrelationships between soil characteristics, water table, soil temperature and snow cover at the Arnot Forest, New York. H. J. Costing discussed the place of the loblolly pine in succession in the Piedmont of North Carolina, and B. W. Wells discussed the "Origin of the Southern Appalachian Grass Balds," in which the view was presented that

these balds were probably initiated through local human interference and persist for centuries as an aberrant herbaceous climax.

The ecological program for Tuesday afternoon was in two sections. The first of these was a joint symposium with the American Society of Zoologists on the subject of experimental populations. The first of the invitational papers was on "Experimental Populations of Microscopic Organisms," by Willis H. Johnson, and this was followed by "Experimental Studies of Insect Populations," by Thomas Park. The third paper was given by A. M. Banta on "Population Density as Related to Sex and Evolution in Cladocera," and the final paper was presented by Raymond Pearl on "Biological Principles Affecting Human and Other Populations." The symposium was well attended, and it was felt that the speakers had presented a timely review of a difficult subject. The discussion of the papers at the close of the symposium was led by W. C. Allee, presiding officer of the session.

The second section on Tuesday afternoon was a joint session with the Society of American Foresters on the subject of "Regional Problems in Forest Soils." H. A. Lunt discussed "Forest Soil Problems in New England," and T. S. Coile discussed those soil problems pertaining to the Piedmont plateau. "The Importance of Surface Geology in Forest Soils" was emphasized by H. J. Lutz. Nitrogen deficiency in forest soils of New York was discussed by R. F. Chandler, in which the theory was proposed that certain hardwood species which have a high nitrogen content appear more frequently on poor sites because of the fact that they absorb nitrogen efficiently. "Soil Profiles and Hardwood Growth" was reviewed by J. T. Auten, and the "Interrelations of Forests and Soils in the Post-Climax Forest Communities of the Grassland Formation" was discussed by J. M. Aikman.

The annual dinner of the Ecological Society of America was held on Tuesday evening. At its close the vice-president, J. G. Needham, read the presidential address of W. S. Cooper. The address reviewed certain aspects of the growth of the Ecological Society and made certain suggestions for its future development. Dr. Cooper was unable to attend the Atlantic City meetings because of illness, and Dr. Needham expressed the gratitude of the society to Dr. Cooper for a most successful year. Following the presidential address, V. E. Shelford presented an interesting résumé of the origin and early development of the Ecological Society of America, and this was followed by moving pictures in natural color, presented by John A. Small, the local representative of the society, and entitled "Some Plants of the New Jersey Pine Barrens."

On Wednesday morning there was a general session

for presentation of papers on "Animal Ecology." The first paper was by E. B. Powers and his associates upon "Carbon Dioxide as an Influence in Various Physiological Respiratory Responses in Fresh Water Fishes." This was followed by a report by V. D. Vladikov on the spawning and feeding habits of the haddock and the relation of these factors to commercial fishing activities. Four papers followed upon the general subject of activity. Orlando Park discussed the nocturnal activity of Panama rain forest animals and, secondly, discussed the activity of the cave crayfish, *Cambarus pellucidus*. This was followed by an analysis of the activity of another crayfish, *Cambarus virilis*, by T. W. Roberts, and W. J. Hamilton reported upon the "Activity, Home Range, and Homing Instinct of the Field Mouse." W. C. Allee presented a paper upon the effect of numbers on rate of cleavage in the eggs of the sea urchin, *Arbacia*, in which the rate of first cleavages was used as a measurement of physiological effects of population density, and it was shown that overcrowding retarded the rate of first cleavages. Bird and mammal communities in northern Illinois were discussed in a paper by W. C. Van Deventer. The session closed with a stimulating account of the "Ecology of the Forest Floor" by A. P. Jacot, in which the natural food of a species was stressed as of cardinal importance, and the lack of adequate information upon forest floor ecology was emphasized.

The general section of the Botanical Society of America met with the Ecological Society of America on Wednesday afternoon in a joint session. The initial paper was by T. K. Pavlychenko upon the "Root Systems of Certain Forage Crops in Relation to the Management of Agricultural Soils," and this report was correlated with the excellent demonstration of root systems placed on display by the author. The "Black Gum in New Hampshire" was the subject of a paper by H. I. Baldwin. F. C. Gates discussed "The Effect of Drought on Succession"; J. M. Aikman discussed the "Western Limits of Distribution of Important Species of Eastern Hardwoods," and R. F. Griggs discussed "Timberlines in the Northern Rocky Mountains." W. R. Chapline reported upon the importance of ecological methods in the restoration of the western range of the United States, and R. S. Campbell followed with the problems involved in measuring forage utilization on western ranges. The session closed with a paper by Waldo S. Glock, in which the age and season of growth of the western juniper of the Sierra Nevada were discussed.

Thursday morning was occupied by the final business meeting of the society. The following officers for 1937 were elected: R. E. Coker, *president*; H. de Forest, *vice-president*; Orlando Park, *secretary-treasurer*.

On Thursday afternoon a symposium was held with the American Society of Plant Physiologists and the Ecological Society of America on the subject of "Techniques." A number of important instruments and techniques of use to both physiologists and ecologists were discussed. H. L. Shirley reported upon the testing of drought resistance of tree seedlings, and R. H. Wallace upon "The Use of an Instrument for Recording Light and Temperature and Maintaining an Automatic Null." B. E. Brunstetter reported upon the "Spectograph," E. S. Miller on "Absorption Spectra of Alpha Carotene, Beta Carotene and Lycopene," and R. N. Jeffrey and G. O. Burr on "Hydrogen Ion Concentration in Relation to Metabolism of Aquatic Plants." B. E. Livingston and W. L. Norom reported upon the "Water-absorbing Power of the Soil as Related to Wilting," Hilda F. Rosene on "The Distribution of Water Intake in Excised Roots," and Philip R. White upon "Root Pressure Developed in Isolated Roots Growing in Vitro."

The Ecological Society's program closed with an all-day field trip to the Cape May Peninsula under the guidance of John A. Small.

The major portion of the program of the Genetics Society of America was devoted to demonstration papers. At three sessions 31 demonstrations were presented. The Tuesday morning session was occupied by botanical demonstrations, four of which dealt with *Datura*, three with maize and one each with *Tradescantia*, *Nicotiana*, *Hemerocallis* and *Reseda*. Among other things, the *Datura* group demonstrated the geographical distribution of certain chromosomal types, a striking effect of temperature and moisture on mutation rate in pollen and the assortment of chromosomes during microsporogenesis in triploids. H. B. Creighton presented evidence that a homozygous short deficiency in maize is responsible for a white seedling type and B. McClintock demonstrated on the same organism the effect of a homozygous deficiency appearing in mosaic patches. At the same session D. F. Jones showed the evidence for the occurrence of somatic segregation in maize. Two other demonstration sessions were devoted to zoological papers; the one on Wednesday afternoon being a joint session with the American Society of Zoologists. Ten out of the 20 papers presented dealt with *Drosophila*. At this year's meeting salivary chromosome work was represented by only one demonstration, viz., that of M. E. Hoover showing that inversions do not have any significant influence on synapsis. Transplant work, however, was represented by two demonstrations. D. F. Poulson and M. Rabinowitz showed an interesting series of demonstrations covering certain stages of the development of *Drosophila*. J. W. Gowen and W. C. Price reported a similarity in the behavior of viruses and

genes when treated with x-rays and ultraviolet rays. In addition to the demonstrations a joint discussion session on "Genetics and Development" was held with the American Society of Zoologists; and a joint round-table conference dealing with the development of resistant strains in animals and plants was held with the American Phytopathological Society. At the discussion session four short papers were presented, which were followed by a general discussion. The round-table conference was in charge of R. A. Emerson, who led the discussion after two short introductory papers given by J. W. Gowen and E. C. Stakman.

The Limnological Society of America held its second annual meeting on Wednesday forenoon and afternoon. The scientific program presented consisted of 20 papers. In addition, the program carried 14 papers read by title. The papers read dealt with various limnological investigations such as bacteria in Great Salt Lake, growth and temperature relations in certain Micro-Crustacea, lake succession, freshwater Medusae, algal floras, sea-run brook trout, modification of fish food production, limnology of the profundal benthic zone in Lake Michigan, energy budgets of an inland lake, lake sediments, light penetration in lake waters, oxygen in the thermocline, distribution of Protozoa, methods of rearing certain aquatic insects, and on the invertebrate fauna of a certain portion of the Hudson River. At the close of the scientific program the annual business meeting was held. The following officers were elected for 1937: *President*, J. G. Needham; *vice-president*, L. H. Tiffany; *elective member of the executive committee*, F. F. Fish.

The American Microscopical Society held its fifty-fifth annual meeting on Wednesday. The following officers were elected for 1937: *President*, W. W. Cort; *first vice-president*, O. E. Jennings; *second vice-president*, J. W. Scott; *secretary* (3 years), J. E. Ackert; *elective member of executive committee* (3 years), A. B. Dawson. Henry B. Ward, H. N. Lyon and William E. Dresher, who have served the society for fifty years, were elected to honorary membership. J. E. Ackert and A. M. Chickering were named to represent the society in the council of the American Association. The society voted to meet with the American Association for the Advancement of Science at Indianapolis in 1937.

SECTION ON ANTHROPOLOGY (H)

(Report from Ralph Linton)

This section held a meeting on December 30. Wilton M. Krogman submitted a report on racial types at Tepe Hissar, Iran, from the mid-fourth to the mid-second millennium B.C. Two distinct racial groups were present in the city throughout this period, one proto-Mediterranean, the other proto-

Nordie. The latter, whose members were in the minority, was probably intrusive from the steppes. The large series of skeletons provided opportunity for valuable conclusions as to the health and length of life of these ancient city dwellers, showing that urbanization exacted a heavy toll at this time. The average age of the Hissar II population was only 27.8 years and there were many evidences of pathological conditions. More than 25 per cent. of all adults showed arthritic bone changes at an average age of 30 years.

Thomas H. Evans presented a paper on metopism, showing that the occurrence of this abnormality is correlated with particular types of palate form, mandibular fossa and pterygoid base. These correlations suggest that new human types may originate through such morphological deviations.

Mrs. T. E. Evans showed the possible origin of the conventionalized form of the Egyptian scarab and of the beliefs connected with this object from the resemblance of the insect to the top of the human skull. John E. Wilson reported on a peculiar type of arrowhead found in a limited area in southern New Jersey. The cultural affiliations of this type have not yet been determined.

Nels C. Nelson gave the address of the retiring vice-president on "Pre-historic Archaeology, Past, Present and Future." He traced the development of this branch of anthropological study, stressing the recent development of adequate stratigraphic techniques and the important results obtained with them during the past few years. Progress in this science has been so rapid he concluded that, if it continues at the present rate, all the main problems of culture origins and interrelations will be solved within another century.

SECTION ON PSYCHOLOGY (I)

(Report from John A. McGeoch)

The sessions of the section were held from Monday to Wednesday. The large number of abstracts submitted made it necessary to hold two parallel sessions on both the morning and afternoon of Monday and Tuesday. The first session on Monday was devoted to papers on physiological psychology. David I. Macht reported a pharmacodynamic analysis of cobra venom which showed that the venom is not a local anesthetic for ascending and descending nerve fibers or for sensory nerve endings, but that it produces analgesia by acting on the higher cerebral centers. H. Jasper and M. Rheinberger presented a series of results from simultaneous records of the activity of four different brain regions of unanesthetized cats with both monopolar and bipolar methods of recording. All cortical regions are in a state of continuous

activity, but the type of activity of a given region varies greatly from moment to moment. K. Goldstein concluded from a study of behavior changes in frontal lobe lesions in human subjects that the basic changes in performance are not functions of changes in any one field or in any one performance, but that they are changes in total behavior. Studies of intellectual changes accompanying cerebral pathology, made by H. M. Hildreth, found different deterioration patterns for each pathological group and for the control. A. C. Cornsweet reported that during recovery from complete etherization rats display, under stimulation, behavior patterns which reappear in a progressive cephalocaudal order. Recurrent subcostal pain in children was found by I. N. Kugelmass to be alleviated by improved respiratory function and postural alignment. An analysis of the psychological measurements made on the ten members of the International High Altitude Expedition to Chile in 1935 and on Andean residents were presented by R. A. McFarland in a way to show that the various psychological functions are directly related to the velocities of certain chemical processes.

A parallel session on Monday morning was devoted primarily to social psychology. A study of a large number of psychological and educational characteristics of 70 communities of New York State was presented by J. B. Maller. H. H. Remmers reported that attitudes toward social issues may be considerably changed by application of the proper social stimulus materials; J. Zubin described an empirical scale for measuring militarism-pacifism; and H. Cantril described the comparative reactions of radio and face-to-face audiences. G. K. Bennett presented a coefficient of consistency by means of which it may be ascertained whether or not differences between series result from inherent unreliability of the samples or from some more fundamental factor. D. Wechsler presented a configurational theory of genius which accounts for the phenomenon in terms of a combination of superior ability and altered qualitative pattern.

Six papers on the psychology of learning were read at the first session on Monday afternoon. A. J. Mitrano reported an irradiation of inhibition which may be accounted for in terms of a gradient with reference to the consummatory response. In associative learning, knowledge of results for the series is of negligible influence compared to the immediate after-effects of the specific response, according to R. T. Rock, Jr. Knowledge of results for the series and for specific responses will summate, however. H. Ewert presented an operational analysis of learning curves in terms of speed and acceleration, which overcomes many of the statistical

difficulties presented by learning data. Results reported by W. S. Ray suggest that retroactive inhibition, retrograde amnesia and the loss of recent as contrasted with remote memories in certain psychoses are manifestations of a single underlying mechanism. A partial repetition by G. Hendrickson of an early experiment by Judd on transfer of training yielded results which in part confirmed and in part deviated from those of Judd and which suggest a change in interpretation of the theory of transfer by generalization; and L. P. Gardner described other transfer experiments involving the learning of cows and horses in a discrimination problem.

The second session on Monday afternoon, devoted to papers in abnormal psychology, was opened by a presentation of a composite portrait of children having low hypothyroid rates and a detailed case-study of the results of three years of medication, by Paul A. Witty. Studies by J. Q. Holsopple of a mirror drawing test for the examination of psychotic patients over a period of seven years yielded positive correlations between mirror drawing performance and several types of adjustmental difficulty. From a study of race, culture and mental abnormality, C. Landis concluded that, phenomenologically speaking, abnormal patterns of behavior and experience may usually be satisfactorily explained with reference to the cultural environment of the individual rather than to his racial heredity. H. Hoagland, D. E. Cameron and M. A. Rubin reported that alpha brain wave frequencies after insulin follow a curve that lags the blood sugar curve, thus supporting Hoagland's view that the frequencies are proportional to cortical metabolism. A new variability analysis of electroencephalograms was described which may serve as a measure of psychotic disintegration. E. I. Strongin and L. E. Hinsie found the parotid secretory rate for psychotic patients, both in the early and late stages of illness, to be higher than that of the average "normal" individual. Migraine need not, according to M. B. Jensen, be associated with neurotic symptoms. The correction and prevention of migraine is largely, if not entirely, a problem of proper habit formation. E. S. Cowles presented evidence for the view that chronic alcoholism results from an irritation of the meninges and an edema of the central nervous system.

The first session on Tuesday morning contained papers on general theory. E. Girden reported that isolated striate muscular responses may be conditioned following curarization, which has theoretical implications both for cortical functioning and for conditioning. G. R. Wendt presented evidence for the long-continued central maintenance of behavior once initiated and discussed the significance of this evidence for theories of learning and of motivation.

From a study of sensory attributes, as shown by the form of the isochromatic contours, E. G. Boring concluded that one attribute is distinguished from another only by the law of its variation as it is dependent upon the stimulus and that the existence of an attribute implies both differentiation of the stimulus and systemic differentiation within the mechanism of response. H. S. Langfeld outlined a theory of esthetic experience in terms of the motor theory of consciousness in which the esthetic response is conditioned by motor set. A comprehensive theory for psychology was presented by J. A. Melrose, in which memory is regarded as the unique datum of psychology and the behavior cycle as its unit. O. L. Reiser sketched the passage of psychology from its Galilean-Newton stage to its present relativistic stage of thinking and outlined the changed character of its problem.

At the other session on Tuesday morning, seven papers on physiological and comparative psychology were presented. A harmful effect of avitaminosis B₁ on maze performance without alteration of the per cent. of water in the brain or the microscopic appearance of the brain was reported by H. Stevens. Although tobacco smoke reduces the growth processes of white rats, L. A. Pechstein found that mild fuming speeds learning. Excessive treatment, however, inhibits learning. From a comparison of the maze learning of ferrets and rats, W. R. Miles concluded that the law of effect operates in only a restricted manner for the ferrets in the maze. A. Gesell presented evidence, both cinematic and tabular, upon detailed twin resemblances in behavior patterning and other characteristics which indicate deep-seated mechanisms of growth regulation which early determine many features of individuality. A. G. Bills concluded that mentally fatigued subjects suffer from a depletion of available oxygen and that this depletion is one important element in mental fatigue. A. S. Edwards described the results of 18 tests carried on through a period of 100 hours without sleep; and A. F. Blakeslee, T. N. Salmon and M. C. Hrubetz reported that, by their measures, taste acuity varies over a limited range during a period as long as three years.

In the second program devoted to papers on sensation and psychophysics, M. G. Preston reported that subjects not only avoid the repetition of judgments but also tend to give them in such a way as to overvalue the usual negative time error; and Irwin and Preston went on to show that the avoidance of repetition results from function at higher than perceptual levels. K. M. Dallenbach found the limens of temperatures for burning heat at different skin surfaces to lie between 46° and 51° C. A study of the functional relation between the magnitude of

cochlear response and intensity of stimulation, made by E. McCrady, Jr., E. G. Wever and C. W. Bray, demonstrated a general similarity of form for opossums between ages 59 and 82 days. The relation can be expressed as a power function with an exponent which does not depart greatly from unity. S. S. Stevens established numerical scales for the measurement of pitch and loudness and found that the subjective scale for pitch corresponds neither to the frequency scale of the physicist nor to the musical scale of the musician. The subjective scale for loudness departs widely from the ordinary decibel scale. Certainty in judgment, as J. Volkmann found, decreases in the vicinity of the category-threshold and alternative judgments occur in the same vicinity. S. B. Cummings, Jr., found a consistent diminution of vibratory sensitivity with cutaneous hypesthesia, which implies that both superficial and deep mechanical receptors are capable of giving rise to the vibratory sensation.

The papers of the second session on Tuesday afternoon were mainly upon the phenomena of affection and emotion. Work upon cardiac acceleration in emotional situations, by J. G. Beebe-Center and S. S. Stevens, yielded evidence that sudden cardiac responses in cats to emotional stimuli must be due to activity of the para-sympathetic system. Analysis by W. A. Hunt of moving pictures of the startle pattern in 60 infants, aged 8 days to 18 months, revealed a large number of incidental fear responses which are usually overlooked when observation unaided by motion pictures is employed. Examination by F. M. Clark of similar cinematic records revealed a wealth of plantar responses to an auditory stimulus. C. A. Ruckmick presented an experimental and a theoretical critique of the problem of detecting deceitful oral responses; E. J. Barnes reported no major effects upon mental work from constant musical distraction; and D. P. Boder and E. V. Beach described data upon the wants of adolescents, which suggested a method of discovering the social integration and social maturity of the individual.

The usual custom of a joint dinner with the Section on Education was continued this year. The dinner was held on Tuesday evening and was followed by the addresses of the retiring vice-presidents of the two sections. (See report of Section on Education).

One of the major features of this year's program was a symposium on "The Cortex and Behavior," arranged by and held under the chairmanship of L. Carmichael, and participated in by both physiologists and psychologists. In a paper on "Recovery of Function and the Problem of Functional Localization in the Cortex," J. G. Dusser de Barenne presented new facts concerning the functional organization of

the sensorimotor cortex and the visual cortex in relation to the thalamus, as determined by electrical recording and application of his local strychninization technique. R. L. De No spoke on "Intracortical Connections and Connections of the Cortex and Thalamus." Physiological conclusions were offered by him, based upon his remarkable histological studies. New evidence was given for neuron circuits in the brain. K. S. Lashley, in a paper on "The Interplay of Cortex and Thalamus in Sensory Functions," reported new evidence showing that the subcortical visual mechanism is even more important in mediating behavior than had been indicated in his previous studies. P. Bard presented a study on "Representation in the Cortex of Tactile and Proprioceptive Sensibility," reporting experiments which made possible the differentiation of the cortical areas involved in these two important receptor fields.

The single session on Wednesday morning was devoted to papers primarily on individual differences. H. Brandt described a logical decision test; R. S. Uhrbrock analyzed studies of the appearance of left-handedness; A. R. Lauer analyzed sex and age differences in a group of psychophysical traits; H. C. Lehman and D. W. Ingerham reported certain relations between chronological age and musical productivity; C. Patrick studied the processes of creative thought in groups of artists and non-artists; A. L. Benton reported no significant differences between more and less motivated subjects on a group intelligence test; and H. C. Hansen compared the scores of Indian pupils on verbal and non-verbal intelligence tests with results which showed that the Indian gains higher scores on the non-verbal than on the verbal tests.

SECTION ON SOCIAL AND ECONOMIC SCIENCES (K)

(Report from James Ford)

The first session was held jointly with the Section on Historical and Philological Sciences. Watson Davis, of Science Service, dealt with the history of science and the press and in the lengthy discussion which followed explained microphotography and its uses in the reproduction of rare historical documents or in making modern scientific researches available in cases in which no publisher can be found.

Joseph Mayer, secretary of the Section on Historical and Philological Sciences and consultant at the Library of Congress, presented a scholarly paper on medievalism in its relation to scientific advance and modern business, which showed "the conditioning rôle of medieval economic institutions" and how they rendered Adam Smith's theoretical assumptions unreal.

The Thursday morning session was opened by Marshall E. Jones, of the Massachusetts Department of

Public Welfare, with a paper on social work method in which current methods of placing children in foster homes were closely analyzed and one hundred selected case histories examined. Greater flexibility in the discovery and adaptation of home and community resources to the needs of individual children was shown to be necessary. Charles P. Sheldon, of Albany Medical College, dealt with the problem of marriage among persons with premature arrests of psychic development.

The address of the retiring vice-president, Shelby Harrison, director of the Russell Sage Foundation, entitled "Winning Social Advance through the Process of Accretion," showed the importance of coordinated research, leadership and organization. Joseph Mayer's paper on the medieval just price which followed revealed it to be a device for the maintenance of *status quo*, and "natural justice" was made synonymous with feudal stratification. A full hour of general discussion brought out the bearing of early practices and tradition upon contemporary economic and social policies.

SECTION ON HISTORICAL AND PHILOLOGICAL SCIENCES (L)

(Report from Joseph Mayer and Sylvia Mostow)

The Section on Historical and Philological Sciences met on Tuesday and Wednesday. Although the numbers in attendance were small, the interest was keen and the discussion excellent.

The first session, on Tuesday morning, was held jointly with the Section on Social and Economic Sciences, with James Ford, of Harvard University, presiding. Two papers were presented. The first paper, by Watson Davis, director of Science Service, took up the history of science and the press. Particular emphasis was laid upon what he called "dark areas" of science. These included the following: distortion or suppression of genetics prompted by nationalistic or racial bias; failure to use psychological testing techniques as an aid to the unemployed; superstition and lack of scientific methods of thought and action in everyday life; the hush-hush attitude, such as has been prevalent toward venereal disease; our failure to preserve peace by proper distribution and constructive utilization of human and natural resources. The second paper by Joseph Mayer, consultant in sociology at the Library of Congress, outlined the development of the modern business economy out of medievalism as a result of scientific advance. The effects of invention, geographical exploration and of machine technique upon the market and price system were emphasized. The chief economic issue in the transition continued to be one of what dominant class was to secure the greatest share of medieval "spoils" or modern "surplus," although the price revolution, arising from the influx of gold and silver from the New World,

greatly affected estate holdings, colonization, export trade, ship building and money lending. In considering changes in economic thought and policy that had taken place during the period, Dr. Mayer showed the continuance of the scholastic process of rationalizing the *status quo*, from the medieval "just price" and nascent mercantilism, through the doctrine of *laissez faire*, which rose to favor, despite obvious shortcomings, because it accorded with the aims of growing business and enabled merchants and industrialists to consolidate their control over a medieval tribute-rendering economic system.

At the second session on Tuesday afternoon two additional papers were presented. Shio Sakanishi traced in most interesting fashion the history of calendar-making in Japan and showed the intermixture of astrology and science in early efforts to establish a usable calendar. Between the years 696 to 1684 the government adopted the calendars used in China without any modification. In 1685 Shunkai Shibukawa, head astronomer of the Shogunate, worked out an improved calendar, incorporating all the new observations and original calculations which Japanese scholars learned from Dutch and other western sources. After a few more reforms, the Gregorian calendar was finally adopted in 1873, and for the first time the Japanese calendar rid itself of the strong influence of astrology and divination. The next paper, by Jekuthiel Ginsburg, of Yeshiva and Columbia Universities, traced the history of efforts by modern mathematicians to find a clue to the methods employed by Archimedes and the Hindus in approximating to $\sqrt{3}$, a problem which has baffled many historians. Attempted answers to this problem may be found in various periodicals, old and new. Dr. Ginsburg put forth the interesting suggestion that by assuming a crude method for striking averages—one that is considered too crude for modern use—many of these ancient approximations can be explained.

The third session, late the same afternoon, was given over to a symposium, under the leadership of Louis T. More, of the University of Cincinnati, on methods of teaching the history and philosophy of science. Dr. More outlined his method of teaching the subject, and this was followed by an animated and helpful discussion.

At the session on Thursday morning four papers were presented. The first, by Dr. More, traced the influence of the life and work of Robert Boyle, contrasting it with that of Isaac Newton. Dr. More likened the science of physics and chemistry to a complete sentence if taken together but incomplete if taken separately, chemistry serving as the subject and physics as the predicate, one static and the other dynamic. Boyle was designated as the father of chem-

istry. Dr. Karpinski in the second paper traced the history of mathematical publications in the United States up to 1850, most of the thousand or so books and the 3,000 editions covering elementary subjects. It was pointed out that nothing more could be expected in a new country without a great corpus of mathematical writings such as the old world had developed in the course of centuries. Referring to works in many languages, Dr. Karpinski cited Spanish works beginning with 1556 A.D. in Mexico and South America, a Dutch publication of 1730, early French works in Canada and New Orleans, German publications in Pennsylvania and one Choctaw arithmetic. The paper by Raymond J. Seeger, of George Washington University, dealt with Benjamin Franklin as a physicist and emphasized neglected elements in the work of that great American experimenter and speculator in physical science. Franklin's simple devices, broad interests and purposeful outlook showed him to be an ingenious experimenter and brought out his pioneering approach; his simple theories covering many phenomena, although most of them have now been superseded, showed him to be an ingenious speculator. Great stimulation to scientific activity resulted from the circulation of Franklin's hypotheses and caused him to be rightly called the first great scientist of America. The paper by J. W. Morgan, of Wittenberg College, described the state of science 130 years ago. It outlined the history of several of the most important scientific conceptions and theories during the early transition period from medieval to modern times, using as a primary source for the period studied an early abstract journal published in London from 1805 to 1815. Particular attention was given to Lavoisier, who freed chemistry from the restrictions of the phlogiston theory; to the continuance of phlogistic terms as late as 1810; to the beginnings of the atomic theory of Dalton; to Davy's brilliant electrochemical researches, which resulted in the discovery of potassium and sodium; and to the establishment of the "element" as basic for chemical advance.

The concluding session was held on Thursday afternoon with Dr. Seeger leading the discussion, which centered upon a paper by Philip Shorr on the progress of the history of medicine to the eighteenth century with particular reference to the "History of Physick" by Sir John Friend. Criticizing this history as no better than others of its time, Dr. Shorr cited as particular faults an over-emphasis on the contributions of the Greeks and the neglect of certain very important phases of medicine. As against eighteenth century practice, modern medicine, with its close relation to biological advance, stands in marked and instructive contrast.

SECTION ON ENGINEERING (M)

Subsection on Aeronautics
(Report from Lester D. Gardner)

The aeronautical meeting was held on Tuesday. T. P. Wright discussed "Speed and Airplane Possibilities." As a basis for his technical presentation he thought that the two fundamental concepts which weave themselves into all human relationships are space and time. The desire to decrease the effective size of the world by the conquest of space and the desire to increase the effective span of life by the saving of time can be found as primary motives in a very great number of human activities. It is interesting to note that a simple relationship of these two concepts expresses the physical phenomenon velocity or speed, thus, $D/T = V$. The improvement of speed of transportation, whether involving the sending of ideas and words or transporting things and persons, has been fundamental in the advancement of civilization. We thus find evolved in the former case the basic development of the telegraph and telephone and radio, and in the latter, of the wheel, the sailboat and steamboat, the steam and electric locomotive, the automobile, the airship and airplane. It has been said quite truly that "the very pace of life depends upon the speed with which matter can be changed into energy available for transportation. The airplane, which is our latest method of transportation of goods and persons, has already demonstrated its superiority in the matter of speed. Speed is the *raison d'être* of aviation."

When a chart is made, plotting speed against time, the rapid advancement of air transport, as well as other forms of aviation during the past six years, immediately becomes apparent. The present average speed of transport planes is 200 m.p.h.; for racing landplanes 352 m.p.h.; and for racing seaplanes 441 m.p.h. It is believed that these speeds will be increased within the next ten years so that the cruising speed of air transports will be 300 m.p.h., and the record for landplanes 425 m.p.h., and for seaplanes 500 m.p.h. To demonstrate these claims Mr. Wright presented calculations and charts which supported his contentions.

Igor I. Sikorsky, in describing "The Future of Transoceanic Air Transportation," said that he believed that during the coming five years it will become possible to reach Europe within about twenty hours of flying on board a luxurious air transport with comfortable staterooms, a dining saloon, smoking lounge, etc. The greatest difficulty to overcome is the considerable range required. To make Atlantic flying really successful, it is necessary to produce aircraft capable of actually covering a distance of about 3,500 miles plus a margin of at least another 1,000 miles.

To make such a service practical, it is further necessary that the aircraft carry, besides crew, about 10 per cent. of its gross weight in payload and another 10 per cent. in various equipment, such as seats, berths, dining accommodations, food, water, soundproofing, etc. The creation of an aircraft capable of fulfilling these requirements was impossible only a few years ago. It became possible at the present time as a result of various achievements in the line of aeronautical science, construction and methods of operation. It appears that the ship must be substantially larger in size than the average modern air transport. It is believed that 40 or 50 tons would prove to be the smallest practical size that would permit combining the long range with the lifting capacity and satisfactory accommodations on board to carry 40 or 50 passengers across the ocean.

At the beginning we may expect a cruising speed of about 160 m.p.h. Within ten years an operating speed of 200 to 250 m.p.h. appears probable. Furthermore, we can expect that after the establishment of transoceanic air lines, the next step would be to equip the aircraft with arrangements for high altitude flying which will permit operation at 20,000 to 25,000 feet altitude. At this height, it would become possible to increase still further the cruising speed, and, what is even more important, to fly always in a zone of excellent clear weather, above all major atmospheric disturbances. Within a few years to come, we can expect to have this final and most interesting step in the development of air travel. Our world will become smaller, it will become possible to travel across the Atlantic within about twenty hours, reach any point of the globe within two or three days flying and make excursions over the north pole. In line with this development, we can expect a further and most interesting expansion of the aircraft industry and science.

Major General Benjamin D. Foulois, former chief of the Air Corps, U. S. A., took part in the discussion which followed the presentation of the papers.

SECTION ON MEDICAL SCIENCES (N)

(Reports from Vincent du Vigneaud, Thomas J. Hill, John C. Krantz, Jr.)

The meetings of the Section on Medical Sciences were devoted to a symposium on cancer, with the exception of a joint session with the Subsection on Pharmacy and a session on viruses, the virus session being held in Philadelphia. The meetings of the symposium were unusually well attended and represented a high point in attendance at meetings of the Section on Medical Sciences. The discussions elicited by the papers were very lively and much worth while.

The symposium was divided into a number of sessions, each taking up some fundamental aspect of the

cancer problem. The Tuesday morning session was given over to a consideration of radiation, particularly the newer work involving high voltage radiation, while at the afternoon session heredity and constitutional factors were considered. All day Wednesday was devoted to a series of papers on the induction, stimulation and inhibition of tumorous growths, while on Thursday morning tissue culture and metabolism of cancerous tissue were the topics around which the papers centered. In addition, two general sessions on cancer were held before the entire association. The first general lecture was given on Thursday afternoon by C. C. Little, of the Roscoe B. Jackson Memorial Laboratory. In this lecture the social significance of cancer was evaluated. The second general lecture was given on Friday afternoon by Dr. Walter Schiller, of Vienna, on the changes and modifications in the conception of carcinoma.

The symposium on cancer was so arranged through the cooperation of the Section on Physics and the American Physical Society that the radiation portion of the cancer symposium followed the symposium of the physical group on "Radiological Physics," which was given on Monday morning and afternoon. To serve as a transition between the two programs and to introduce to the medical sciences section the recent developments in radiological physics that may have some application to biological problems, particularly to cancer, Merle A. Tuve, of the Carnegie Institution of Washington, discussed the artificial sources of high voltage radiations and their applications. In this discussion Dr. Tuve warned the biological sciences that in some respects the modern physics was no longer the exact science that the classical physics was and care must be taken in carrying over too quickly certain findings in the recent developments of high voltage radiation. The use of radioactive substances as indicators in biological work was also emphasized. The methods of measuring x-rays were then discussed by L. S. Taylor, of the National Bureau of Standards, a question which is vital to biological investigations as well as those of more purely physical nature. In considering the biological action of ionizing radiations, G. Failla, of the Memorial Hospital, presented a new theory correlating many apparently unconnected facts that have been observed. The theory was based on the hypothesis that the radiations in addition to producing ordinary ionization brought about reactions in which small ionizable molecules were formed out of large molecules, thus causing water to enter the cell. This would explain the swelling of certain cells in radiated tissue and would also explain the erythema action of soft x-rays. Other implications of the theory were also discussed. The comparative effect of neutrons and x-rays on normal and neoplastic tissue was then

considered by J. H. Lawrence, of Yale University. The cyclotron developed by E. O. Lawrence, which gives an intense source of neutrons, was used for the biological investigations. The effect of x-rays and neutrons was compared on white mice for their ability to produce leucopenia and for their lethal action. Dr. Lawrence emphasized that workers in laboratories producing neutrons must safeguard their health by avoiding unnecessary exposure to neutrons. Frequent blood counts and physical check-ups should be insisted upon. R. E. Zirkle, of the University of Pennsylvania, then took up the biological effect of alpha particles and their relation to the effects of neutrons. In this paper and the preceding one the belief was expressed that the neutrons were more effective for some kinds of cells than for others in comparison with x-rays. Neutrons are therefore being intensively studied as possible therapeutic agents. Alpha particles because of their low penetration can not be used in therapy but will serve as a valuable auxiliary tool in quantitative studies of the biological action of the neutron because of the similarity of their ionization tracks. That the combination of artificially produced fever with Roentgen-radiation seemed to be more effective than radiation alone in the treatment of various types of cancer was brought out in a paper by Stafford L. Warren and John Jares, of the University of Rochester. The session was brought to a close by a discussion of the recent progress in the study of radium poisoning by R. D. Evans, of the Massachusetts Institute of Technology. The development and use of very sensitive detectors of gamma radiation were described which permit quantitative observations on patients containing less than one millionth of a gram of radium. The measurement of radon from the breath of patients of radium poisoning was also related. Suspected cases of radium poisoning can now be tested and treatment instituted before fatal symptoms develop.

The session on heredity and constitutional factors was opened by Maude Slye, of the University of Chicago, who presented a theory for the genetics of malignancy and the localization of malignancy. Briefly the theory postulated, first, malignancy as a localized recessive character, each type of malignancy being a unit character capable of suppression by a dominant, and second, localization factors of such a nature that they provide the occasion for malignancy where they occur in tissues capable of malignancy, and when the necessary interrelation with an external causative factor arises. That some influence was transmitted directly from a female mouse to her female descendants was emphasized by C. C. Little, of the Roscoe B. Jackson Memorial Laboratory, as being of prime importance in determining whether they will have cancer of the breast. A new type of either trans-

mission or inheritance, which is not Mendelian, was thus claimed to be demonstrated for the first time. The principle may be far reaching in application. C. J. Lynch, of the Rockefeller Institute for Medical Research, then presented her fundamental work on the inheritance of susceptibility to lung tumors in mice. The respective rôles of heredity and somatic mutation in the etiology of tumors inducted by parasites and chemical irritants was next considered by W. F. Dunning and M. R. Curtis and F. D. Bullock, of the Institute of Cancer Research. It was concluded from their studies of tumor incidence in rats infested with *Cysticercus* larvae and in animals treated with benzpyrene and dibenzanthracene that genetics plays no part in the tumor incidence and that the genetic constitution of any cell can be overcome by the irritant action of carcinogenic agents. The relationship between the histology of spontaneous mouse tumors and the genetic constitution of the animals in which they arise was presented by A. M. Cloudman, of the Roscoe B. Jackson Memorial Laboratory. The genetics of mouse leukemia was then discussed by E. C. MacDowell, of the Carnegie Institution of Washington. It was brought out that the extrinsic factors make the determination of the genetic formula very difficult, but the genetic control of the intrinsic factors, even though they are unidentified, opens the way, especially in his first hybrid generation, for the identification of the effective extrinsic factors. Such control may have immediate medical application. The final paper on the program was by Felix Bernstein, of New York University, on the factors of heredity, age and acquired hypersensitiveness.

The session on induction, stimulation and inhibition of tumorous growths was opened by L. F. Fieser, of Harvard University, with a discussion of the organic chemical aspects of cancer work. In this discussion he presented the chemistry of the carcinogenic hydrocarbons and indicated the possible relations between structure and carcinogenic action that have been brought out by recent synthetic work. Apparently the five-membered ring in cholanthrene was shown to be unnecessary, but the work indicated that the presence of a methyl group at position 10 was extremely important, whereas it did not seem necessary for position 5 to be substituted. The structural relations were also brought out between the carcinogenic compounds and the sex hormones. The production of tumors by chemical agents was next discussed by F. C. Wood, of the Institute of Cancer Research, who emphasized that a given carcinogenic compound can produce very different and varied types of neoplasms. Studies pertaining to the appearance of lung tumors in mice injected with dibenzanthracene were related by H. B. Andervont, of the United States Public Health Service.

The work brought out that the injection of dibenzanthracene could induce tumors in organs distant from the site of the injection. By using strains which developed spontaneous tumors of the lungs and those that did not it was shown that the difference in susceptibility of various strains of mice to induce pulmonary tumors may be a matter of degree only. The influence of estrogenic chemicals upon the stimulation of atypical growths was then discussed by W. U. Gardner, of Yale University. The pathogenesis of the malignant tumors of the testis was next considered by R. S. Ferguson, of the Memorial Hospital. He indicated that such tumors are the result of neoplastic growth of the germ cell, and concluded that any germ cell, extratesticular, in the rete testis, in the normal tubule, may give rise at any stage in its life history to the most complex or simple exhibition of neoplastic teratoid growth. C. F. Geschickter, of Johns Hopkins Hospital, then took up the question of the relation of oestrin and other hormones to tumor formation in the breast. It was suggested that endocrine researches have added more to our understanding of benign tumors and conditions previously confused with early cancer than to an understanding of cancer itself. In the formation of true neoplasms apparently inherent variations in tissue susceptibility involving hereditary factors are predominant and endocrine stimulation merely sets the clock forward or backward, inducing or preventing the manifestations of such inherent qualities in the tissue.

The afternoon session on the same series of topics was opened by H. J. Bagg, of the Memorial Hospital, with a consideration of the factors involved in the experimental production of teratoma testis in the fowl. He was able to show that zinc chloride injections produced teratoma testis only when given in the spring of the year but that when potent gonad-stimulating extracts of the anterior pituitary were injected the chemical could produce the teratoma as late as the end of August. The hormone preparation itself did not produce teratoma testis. In a paper on the stimulation and inhibition of tumor growth by J. B. Murphy, of the Rockefeller Institute for Medical Research, the suggestion was made that malignancy is a result of a break in the hypothetical balancing mechanism of the cell, which consists of a stimulating and retarding factor. Work on the inhibiting substance obtainable from extracts of fowl tumors which is capable of neutralizing the filtrable causative agent was presented. A similar inhibiting substance has now been found in normal tissue, principally placenta, embryo skins and prelactating mammary glands. In the case of the latter it has been possible to get both a stimulating preparation as well. The chemical properties of the transmissible agent in the Rous chicken sarcoma No. 1 was next taken up in a paper

by J. W. Jobling, E. E. Sproul and Sue Stevens, of Columbia University. These investigators were able to extract the active principle by several fat solvents from the tumor tissue. The active principle appears to be very unstable and is particularly sensitive to oxidation. The lipid extract will not produce tumors alone, but a suspension in a saline extract of normal tissue is active. It was also found that apparently it is the protein in the extract of normal tissue which is active, since casein was also found effective. The tumors produced are histologically identical with the usual Rous sarcoma and are malignant, as attested by metastases. Experiments with carcinoma in frogs was described by B. Lucké, of the University of Pennsylvania. The probable etiologic relationship of a virus to this carcinoma was indicated. The session was concluded with a statistical analysis of the mortality from cancer by L. I. Dublin, of the Metropolitan Life Insurance Company. It was shown that 150,000 deaths from cancer will occur this year and cancer ranks second to heart disease. The rise in cancer mortality is practically limited to males and, among white men, increases in the recorded death rates were sizable only at ages above 55 years. Among white females such increase as appears has occurred at the ages above 65 years; in the broad age period 35 to 54 the trend of the death rate in this group was significantly downward.

The final session devoted to the metabolism of cancerous tissues was opened by W. H. Lewis, of the Carnegie Institution of Washington, who presented his recent work on the cultivation and cytology of cancer cells, motion pictures being utilized to bring out many of the very striking points. Dr. Lewis inclined to the belief that malignancy is due to some chemical change in the protoplasm and not to chromosomal or gene alteration. The biochemical significance of the Pasteur-Meyerhof reaction in intermediate carbohydrate metabolism and in particular that of cancer tissue was discussed by D. Burk, of the United States Department of Agriculture. The various explanations of the reaction by Pasteur, by Meyerhof and the more recent explanations by Lipmann and by Kluyver were discussed and the free and heat energy relations of main over-all reactions were interpreted. All malignant tissues, regardless of host, tissue or cause, shows an insufficiency of the Pasteur-Meyerhof reaction, that is, an insufficient rate of respiration in eliminating aerobic lactic acid fermentation. The relation of protein metabolism to malignant growth was then taken up by C. Voegtlin, of the National Institute of Health. The recent work of Dr. Voegtlin, with J. M. Johnson, M. E. Maver and J. W. Thompson, on the growth of tumors in hosts maintained on diets deficient in certain essential amino acids was discussed. It was shown that an adequate supply of lysine, tryptophane and cystine was essential

for the proliferation of spontaneous mouse sarcoma. When the diet was deficient in cystine and the growth of the carcinoma inhibited, glutathione could bring about resumption of the tumor growth, even as it does body growth under these conditions. Evidence was also presented that the lytic and synthetic activity of cathepsin is regulated by the oxygen tension, pH and apparent oxidation-reduction potential of the system. The rôle of the amino acids and nucleic acid derivatives in developmental growth and their possible significance to the cancer problem was next considered in a paper by F. S. Hammett, of the Lankenau Hospital Research Institute. The session was brought to a close by G. H. Scott, of Washington University, who discussed the distribution of inorganic salts in adult and embryonic cells and tissues, with special reference to cancerous tissues.

The session on viruses held at Philadelphia in the hall of the Philosophical Society was opened by a paper by W. M. Stanley, of the Rockefeller Institute for Animal and Plant Pathology, in which was presented his important and fundamental work on the crystallization and chemical studies of the tobacco-mosaic virus proteins. This was followed by a presentation by R. W. G. Wyckoff, of the Rockefeller Institute, of the ultra-centrifugal concentration of viruses and other biologically active proteins. S. Mudd, of the University of Pennsylvania, then presented his recent studies on labile bacterial antigens and described the methods of their preparation and preservation. The fact that a filtrable virus was involved in many upper respiratory infections was discussed by Y. Kneeland, of Columbia University. The session on viruses was brought to a close by G. P. Berry, of the University of Rochester, who presented his interesting work on the transformation of the virus of rabbit fibroma (Shope) into that of infectious myxomatosis (Sanarelli).

The Subsection on Dentistry held its meeting on December 28. Of the 16 papers presented, 14 were devoted to the biological aspect of dental science. The meeting was under the direction of the American Division of the International Association of Dental Research with the cooperation of the American Dental Association, the American Association of Dental Schools and the American College of Dentists.

Some interesting features of the program included the discussion of the purposes of the Institute of Clinical Oral Pathology by Theodor Blum. Two papers from the institute were presented, one by Raymond Gettinger on the development of the dental pulp and its relation to pathological change, the other by Theodore Kaletsky on the dependability of electric currents in testing retrogressive changes within tooth pulps. The results of a study of some of the properties of colloidal impression materials were presented

by E. W. Skinner and W. R. Kern. An equation expressing the relationship between the time and temperature of vulcanization of dental rubber was presented by P. B. Taylor, Frank Hovorka and James Mohler. Lawrence Baker presented a paper showing by vital staining the manner of bone development following induced functional changes. M. W. McCrea presented a histological study of dental granuloma emphasizing the regularity of the presence of epithelium in either its resting or proliferated stages. A histological study of ameloblastomata given by Hamilton Robinson stressed the necessity of dentin as an active agent in the deposition of enamel and the impossibility of enamel being formed without this precursory substance.

The group from Yale University, consisting of L. W. Burket, Henry Miller, Casper Burn and David Weisberger, contributed a series of papers on the relation of infection to systemic disease. These papers recited the bacteriological findings in teeth from necropsies, the experimental production of tooth infection in monkeys and its relation to systemic disease and the effect of *streptococcus viridans* in the teeth of normal rabbits as compared to rabbits sensitized to this organism.

An incineration method for the determination of the ash content of the tooth follicle during odontogenesis was presented by H. R. Churchill. Maxwell Karshan gave the results of a lengthy chemical study of salivas of caries-resistant and caries-susceptible people. He indicated that the calcium content is the most likely salivary factor present. Women under treatment with the hormones estrone and gonadotropic hormone folluetin were shown to have disturbances of the gums and oral mucosa by D. E. Ziskin. L. I. Grossman and B. M. Brickman showed that the pH of nocturnal saliva is definitely lower than that of diurnal saliva. A case report of carcinoma of the tongue as a sequel to leukoplakia was read by Malcolm Carr. B. I. Comroe discussed the diagnostic importance of the tongue in internal medicine, pointing out the many diseases which have oral manifestations. The last paper of this interesting meeting was given by Leon H. Collins, who discussed the nasal accessory sinuses and their diagnostic importance to dental practice.

The Subsection on Pharmacy held two sessions; one on Monday morning and the other on Monday afternoon, which was held jointly with the Section on Medical Sciences. The morning session was opened by a paper by Marvin R. Thompson, of the University of Maryland, on the assay of digitalis preparations. It was demonstrated that the International Reference Standard Digitalis powder gives rise to variable preparations compared with it in Great Britain, United States and Canada, where the methods set forth for extracting the standard are different. A

recommendation was made for the unification of these methods. Arthur Osol, of the Philadelphia College of Pharmacy and Science, presented a conductivity method for the determination of traces of chlorides in the presence of other ions. C. Jelleff Carr, of the University of Maryland, discussed the metabolism of the adrenalectomized rat. In general, it was shown that during the survival period after adrenalectomy, the metabolism diminished 25 per cent. without accompanying disturbance of carbohydrate metabolism. A paper presented by J. C. Forbes, of the Medical College of Virginia, discussed the isolation of a crystalline purine base from liver which protected rats against carbon tetrachloride and chloroform cirrhosis. Alfred Barol, of Philadelphia, set forth certain cardinal features in the selection of medicaments for the neutralization of excessive gastric acidity. The amphoteric hydroxide of aluminum was considered best suited for this purpose. The methods employed for the detection of the *cannabis sativa* and its preparations were reviewed by James C. Munch, of Temple University. The presence of chlorophyll interferes with the characteristic reactions for cannabinol, the generally accepted active principle of cannabis. Frances Beck, of the University of Maryland, presented studies on the effects of the anhydrides of many of the sugar alcohols on the dissociation constant of boric acid. Arno Viehoever, of the Philadelphia College of Pharmacy and Science, discussed experiments on the feeding of the berries of the matrimony vine to rats. The nutritious value of these berries was comparable to that of tomatoes in the rat's diet.

The joint session in the afternoon was opened with a paper on drugs affecting the autonomic nervous system by Theodore Koppanyi, of Georgetown University. Among other important observations it was shown that physostigmine stands out as the drug capable of inhibiting an esterase in the blood responsible for the continuous destruction of acetylcholine. Maurice Feldman, of the University of Maryland, presented a contribution to the etiology of gallstones, in which he showed that the pH of the bile of various species was a salient etiologic factor in the dissolution and formation of gallstones. The effect of posture on the alveolar carbon dioxide tension in man was discussed by R. J. Main, of the Medical College of Virginia. He showed that standing produced a drop in alveolar carbon dioxide and a mild alkalemia, which perhaps is indicative that man has not yet completely adapted himself to his upright posture. T. B. Magath, of the Mayo Clinic, presented a study of the incidence of Echinococcus disease in the United States and Canada. The incidence was highest in centers of immigration. Of interest was the fact that, although dogs in many

foreign countries are infested with the echinococcus, particularly in Iceland, the dogs in North America are very rarely infested. The pharmacology of the drugs that affect the autonomic nervous system was reviewed by Abraham Myerson, of the Palmer Memorial Hospital, and, experimenting with human subjects, he confirmed many of the well-known actions of the autonomic drugs observed on animals. Joseph L. Svirbely, of the Carnegie Institute of Technology, presented studies on the effect of selenium dioxide on the vitamin C content of the organs of the rat. The selenium compound produced a marked decrease in the liver content of vitamin C; this action of selenium dioxide is antagonized by glutathione. Sensitivity to radiation of chromosomes was presented by A. Marshak, of Palmer Memorial Hospital. The chromosomes of the mouse, bean and pea show abnormalities upon radiation with the inhibition of mitosis. A detailed study of a toxicological nature of chronic arsenical poisoning from well water was presented by J. Wyllie, of Queen's University. The symptoms, origin and geologic aspects of the case were presented.

SECTION ON AGRICULTURE (O)

(Reports from M. F. Morgan, H. B. Tukey,
William H. Martin)

A joint session was arranged with the northwestern section of the American Society of Agronomy. The program was opened by the address of the retiring chairman of the section, H. K. Hayes, in which he presented an illuminating picture of the rapid strides that have been made recently in China, where he has been engaged in special studies during the past year. This was followed by a series of eight papers dealing chiefly with various phases of pasture investigations.

H. B. Sprague, of the New Jersey Agricultural Experiment Station, discussed the possibilities of improvement in pasture herbage through the development of better strains of grasses and clovers. The native wild white clover appears to present exceptional opportunities along this line. "Watch the cow in her feeding habits," said D. B. Johnstone-Wallace, of Cornell University, in a discussion of pasture management in relation to the composition of the pasture. B. A. Brown, of Storrs Agricultural Experiment Station, pointed out the limitations of artificial clipping as compared to animal production as a basis of measuring response to pasture treatments. W. H. Pierre, of West Virginia University, showed the effect of superphosphate in increasing both phosphorus and calcium content of various pasture species. The significance of changes in chemical composition of pastures from the standpoint of animal nutrition was brought out in discussion of L. A. Maynard, of Cor-

nell University. He indicated that the feeding tests on rats and similar small animals may not be directly applicable to ruminants. This is especially true with respect to non-protein nitrogenous materials, which may be synthesized by biological action in the digestive system of the cow or sheep.

The American Society for Horticultural Science met in sixteen sections, with a presentation of 201 papers. A conception of the trend in horticultural research may be gathered from the nature of the sessions. There were three sections devoted to problems with tree fruits, three dealing with vegetable crops, two dealing with floriculture and ornamental horticulture, two dealing with mineral nutrition, one dealing with plant breeding, one dealing with plant propagation and rootstocks, and one dealing with fruit setting and embryo development. The broadening of the field of horticulture is clearly evident from these facts. Twenty years ago a horticultural program consisted almost entirely of papers on tree fruits. Vegetable crops have now reached an equal status with tree fruits, and ornamental horticulture and floriculture are forging rapidly ahead. Plant breeding and propagation and rootstock problems remain of about equal interest, with some indication that they are increasing in importance; while the new section devoted to fruit setting and embryo development indicates a growing interest in this phase of horticulture.

Joint sessions were held with the Potato Association of America and with the American Society of Plant Physiologists and the physiological section of the Botanical Society of America. This last-named session, sponsored by the Horticultural Society, dealt with mineral nutrition, including the minor elements, with E. J. Kraus, of the University of Chicago, as chairman. G. T. Nightingale, of the University of Hawaii, presented a paper showing the relation of potassium and calcium to nitrogen metabolism in plants; J. E. McMurtrey, Jr., of the United States Department of Agriculture, showed color photographs of symptoms of mineral deficiencies; W. H. Chandler, of the University of Chicago, discussed the problem of zinc deficiency, particularly as applied to horticultural crops in California; and O. F. Curtis, of Cornell University, discussed the movement of mineral elements in the plant. Additional papers were presented during other sessions on boron deficiencies in cauliflower, turnips, apples and peaches, showing that the mineral element and deficiency studies are of immediate concern to commercial practices.

Photosynthesis continues to be a major subject for discussion, including effects of carbon dioxide concentration, temperature, light and other factors. The president's address by Alex Laurie, of Ohio

State University, given at the banquet, reviewed the research development of floriculture and ornamental horticulture. Liberty Hyde Bailey was also present and spoke upon the necessity for horticulturists to maintain a variety and species concept throughout their work, and not to overlook the taxonomic and systematic background essential to a thorough understanding of plant behavior. Motion pictures of insects, birds and plants were shown, featuring some interesting growth movements in plants.

The twenty-third annual meeting of the Potato Association of America included joint sessions with the American Society for Horticultural Science and the American Phytopathological Society. Progress in the solution of some of the nutrient problems of the potato crop was reported by Ora Smith, New York; John Bushnell, Ohio; Gilbert F. Lea and John B. Smith, Rhode Island; and C. H. Metzger, Colorado. In discussing the rôle of certain of the minor elements in potato nutrition, Hester and Carolus reported that the use of copper, manganese and zinc gave no yield increases under Virginia conditions. Considerable interest was shown in the discussion of the possibility of developing varieties resistant to diseases and possibly to insects. Workers from New York and Ohio reported a definite preference of certain insects for several of the commonly grown varieties.

The following officers were elected: *President*, Fred H. Bateman, of Grenloch, N. J.; *vice-president*, F. A. Krantz, of the Minnesota Agricultural Experiment Station; *secretary-treasurer*, William H. Martin, of the New Jersey Agricultural Experiment Station; *members of the executive committee*, Julian C. Miller, Frank W. Hussey, Ora Smith, C. H. Metzger.

SECTION ON EDUCATION (Q)

(*Reports from William S. Gray, Harry A. Carpenter*)

The papers presented at the opening session of the Section on Education related to individual differences and desirable adjustments to them. The factors that effect differences in emotional responses were considered by Daniel Prescott, of Rutgers University. His analysis led to the conclusion that variations depend largely upon differences in the meaning or significance of situations to individuals. The relation between maturity and achievement was discussed by S. A. Courtis, of the University of Michigan. The data presented showed that there is an intimate relation between these two factors when the achievement of an individual is interpreted in terms of his own growth curve and cycles of growth. Wide differences in the cultural knowledge of students was reported by A. R. Lauer, of Iowa State College.

Girls are inferior to boys and continue their growth longer than the latter. F. L. Fitzpatrick, of Teachers College, Columbia University, found that expressed preferences for science topics were not consistent among students and indeed were quite unreliable. Ralph D. Spence, of Teachers College, Columbia University, emphasized the large importance of individual differences in graduate study and described the plan adopted by his institution in selecting an advanced curriculum in terms of clearly defined individual needs. Lindsey Blayney, of Carleton College, presented evidence of the value in providing individual help and guidance to students in mastering the grammar required in translating English into German.

The second session was concerned with studies relating to testing and the curriculum. Florence B. Stratmeyer, of Teachers College, Columbia University, emphasized the value of comprehensive examinations in improving instruction, and Ben D. Wood, of Columbia University, described the economy which could be effected at all levels in scoring tests through the use of the International Test Scoring machine. Arthur B. Moehlman, of Ohio State University, discussed the advantages of preparing social science materials by means of the coordinated efforts of specialists in the several departments comprising this general field. A report by G. W. Hutson, of the University of Pittsburgh, showed the increasing importance in Pennsylvania high schools of English and history and the decreasing importance of the foreign languages. As a result of an analysis of science curriculums in the United States and England, Benjamin C. Gruenberg, of the American Association for Adult Education, showed that the needs of the adult lay public are not considered, particularly their needs as consumers.

The third session consisted of reports of scientific studies from members and fellows. The problems studied were broad in scope and the findings were illuminating.

The fourth session was a joint meeting with the Section on Chemistry and the Division of Chemical Education of the American Chemical Society. The central theme related to the preparation of teachers of chemistry. The introductory papers by J. H. Simons, secretary of the Section on Chemistry, and William S. Gray, secretary of the Section on Education, represented the points of view of the chemist and the professional educator and identified the major controversial issues. The chief differences in the views expressed related to the function of general education, the relation of chemistry to general education and the nature of the general education needed by teachers. The discussion which followed, led by Ralph Powers, of Teachers College, Columbia

University, and Ross A. Baker, of the College of the City of New York, contributed greatly to the clarification of thinking concerning the broader issues involved.

The meeting terminated with the joint dinner of the Section on Education and the Section on Psychology. F. B. Knight, of the University of Iowa, retiring vice-president of the Section on Education, summarized a series of studies in arithmetic which emphasized the wide range of types of learning involved in the simple operations of addition, subtraction, multiplication and division. His data showed also that pupils could be trained to sensitivity to the various types encountered. Robert M. Ogden, of Cornell University, retiring vice-president of the Section on Psychology, discussed the relation of naive geometry to art. He defined naive geometry as a sensibility to spatial relations and maintained that the naive apprehension of such relations provides the systematic foundations of art. "True works of art endure a geometric analysis which reveals the principles of their composition."

Morris Meister presided at the morning meeting of the American Science Teachers' Association. He introduced W. J. Humphreys, of the United States Weather Bureau, who discussed "The Composition of the Upper Atmosphere." After discussing the historical development of our present knowledge of the lower atmosphere, Dr. Humphreys presented the latest views concerning the upper regions of the earth's atmosphere and traced the scientific methods by which science attempts to solve its problems. This was of particular value to science teachers who are charged with development of scientific attitudes and training in the use of the method of science.

Oscar Riddle, of the Carnegie Institution of Washington, representing natural science, and Roy W. Hatch, of the Montclair State Teachers College, representing social studies, discussed "The Relative Claims of Natural Science and of Social Studies to a Core Place in the Secondary School Curriculum." Discussion of these papers was led by E. E. Wildman, director of science education, Philadelphia, and C. L. Bennig-hof, Western Maryland College. These papers will be printed later. It was evident from the interest displayed that this forenoon's meeting was outstanding in the annals of science teachers' meetings.

At the association's annual luncheon the speaker was Dr. Edwin G. Conklin, president of the American Association for the Advancement of Science, who discussed "The Aims of Science Teaching." The afternoon meeting was opened by an address, "The Next Ten Years in Science Education," by Otis W. Caldwell. Based upon much evidence in the way of past experiences, Dr. Caldwell pointed the way in which it seemed that science education should advance. This

paper was discussed by S. R. Powers, Teachers College, Columbia University.

Earl R. Glenn, of Montclair State Teachers College, discussed "The Need for a National Publication for Science Teachers." Mr. Glenn pointed out that teachers are now served by at least four important science journals—*The Chemical Education Journal*, *School Science and Mathematics*, *Science Education* and *Science News Letter*. Each of these journals is serving a section only of the science teaching profession. However, it appears to be financially impracticable to expect all teachers to subscribe to all journals. Moreover, there appear to be certain types of articles and certain phases of science education not now covered adequately by the existing journals. This paper was discussed by C. J. Pieper and by Louis J. Mitchell. The last speaker of the afternoon was John C. Johnson, of the State Teachers College, West Chester, Pa., who discussed "Desirable Training for Science Teachers." Dr. Johnson proposed a practical curriculum based upon a long study and investigation by members of teachers' colleges. The paper was discussed by O. E. Underhill, Teachers College, New Britain, Conn.

Following the general sessions a business meeting was held. The president reported for the organization committee, which held a meeting during the evening of December 30. At this time the tentative constitution was carefully considered and changes were made in the interest of simplification and clearing up ambiguous statements. Phillip G. Johnson, of Cornell University, reported the results of this conference, and that the revised constitution was approved by the organization committee. The revised constitution, therefore, becomes the constitution of the American Science Teachers' Association.

The treasurer, Homer LeSourd, Milton Academy, reported that the association had to date more than 110 charter members. It was also reported that the following organizations had indicated their intention to affiliate with the American Science Teachers' Association: National Association for Research in Science Teaching, Chemistry Teachers Club of New York, New York State Science Teachers' Association, Nebraska State Science Teachers' Association and Texas State Science Teachers' Association. Reports of representatives from other organizations indicate that many more will affiliate in the near future. To complete affiliation each organization must elect one or more delegates to the board of directors of the A. S. T. A., according to the constitution, and remit the required fee per delegate to the treasurer.

The president reported the very great help that had been given the A. S. T. A. by the executive committee of the American Association for the Advancement of Science.

The following officers were elected: *President*, Harry

A. Carpenter, Rochester Schools, Rochester, N. Y.; *first vice-president*, Earl R. Glenn, Montclair State Teachers College, Montclair, N. J.; *second vice-president*, Jerome Isenbarger, Wright City Junior College, Chicago; *secretary*, Harry A. Cunningham, Kent State College, Kent, Ohio; *treasurer*, Homer LeSourd, Milton Academy, Milton, Mass.; *directors-at-large*, Morris Meister, director of science for junior high-school grades, New York City; G. P. Cahoon, Ohio State University, Columbus, Ohio; W. J. Klopp, supervisor of secondary schools, Long Beach, Calif. The officers elected a fourth *director-at-large*, and Otis W. Caldwell, general secretary of the American Association for the Advancement of Science, was chosen.

ORGANIZATIONS RELATED TO THE ASSOCIATION AS A WHOLE

(Reports from Edward Ellery, Nellie F. Matlock,
Margery C. Carlson)

The Society of the Sigma Xi held its thirty-seventh convention on Tuesday afternoon. Delegates were present from 47 of the 68 chapters and 7 of the 33 clubs. The alumni committee reported the distribution of \$2,000 as grants-in-aid to eight of the applicants. The president reported that certificates in commendation of research had been granted to 10 candidates from seven institutions in the fields of physics, chemistry and biology. During the year 1936 new chapters of Sigma Xi were installed at Carleton College and the University of Buffalo. Charters were granted to George Washington University, Carnegie Institute of Technology at Pittsburgh, the University of Utah and Oregon State College at Corvallis. The treasurer reported that the permanent invested funds of the society amounted to slightly over \$38,000. The *Sigma Xi Semi-Centennial History and Record* will be published in February. Amendments to the constitution were adopted, bringing Sigma Xi clubs into official connection with the national organization, and giving club delegates to annual conventions the privilege of voting on all questions affecting the Sigma Xi alumni members and associates. Henry G. Knight, chief of the Division of Chemistry and Soils of the U. S. Department of Agriculture, was elected a *member of the alumni committee* for the ensuing five years to succeed himself; and E. J. Lund, of the University of Texas, was chosen as a *member of the executive committee* for the term of five years to succeed Henry V. Wilson, whose term of office expired in 1936.

The twenty-ninth meeting of the American Nature Study Society was held from December 29 to 31. On Tuesday morning there was a presentation of nature study, as developed in the leading nature camps in the country, and the significance of Hawk Mountain Sanctuary. On Tuesday afternoon the program consisted of discussions on the visual aids in nature study,

its worth and its influence in the life of a city. Most unusual was the rare picture of humming birds being fed from the hand of the speaker, Mrs. Laurence Webster. By means of the slow motion pictures, one was able to see the actual movements of wings and tails of these birds during flight. On Wednesday both morning and afternoon programs were given over to a discussion of the fundamental relations of science and education. This particular theme was developed by eminent nature leaders in the field of science. The president, E. Laurence Palmer, at the close of the afternoon session presented a chronology of American nature study, showing movies of the late Mr. and Mrs. Comstock, John Burroughs and David Starr Jordan. At the Wednesday evening banquet Dennis Glenn Cooper, writer-photographer, gave an illustrated travel lecture in natural colors of "Isle Royale," our newest national park, presenting exclusive pictures of Isle Royale forest fires. The meetings closed on December 31 after a joint session with the American Science Teachers' Association.

The Sigma Delta Epsilon Graduate Women's Scientific Fraternity held a luncheon at which sixty members and guests were present. Virginia Bartow, Department of Chemistry, University of Illinois, presented the annual address on "Women in Chemistry." The business session was held during a breakfast attended by thirty-six members. Evelyn Fernald, Rockford College, Rockford, Ill., was elected president for the coming year.

REPORT OF THE COMMITTEE ON GRANTS

Your Committee on Grants in its meeting at Atlantic City on December 31, 1936, gave careful consideration to a total of 27 applications for research aid. The gross amount desired by these applicants totaled upwards of \$10,000. We have had a total of \$4,000 placed in our hands for allocation. As in previous years, this committee has looked with more favor on applications for research equipment and supplies than on indefinite items of travel expense and maintenance. We have not felt at liberty to make grants for the salaries of assistants.

Grants from the \$2,000 fund appropriated by the American Association for the year 1937 are recommended by your committee as follows:

Harry F. Clements, for research on the mechanism of freezing resistance in the needles of <i>Pinus ponderosa</i> and <i>Pseudotsuga taxifolia</i>	\$ 275
N. T. Bobrovnikoff, for an investigation on the spectra of faint celestial bodies	400
T. T. Chen, for research on the physical basis of heredity in unicellular organisms. The behavior of chromosomes in fission, endomixis and conjugation in paramecium in relation to problems of heredity and variations in Protozoa	225
Titus Carr Evans, for a study on the sequence of	

morphological and physiological changes following roentgen irradiation of insect embryos	200
Newell S. Gingrich, for an experimental study of the diffraction of x-rays by liquids	300
W. F. G. Swann, for an investigation of the contributions of secondaries and higher order radiations to the measured cosmic radiation, particularly with relation to the secondaries associated with the soft component	300
E. J. Workman and R. E. Holzer, photographic study of lightning discharge correlated with the electrical structure of the thunderhead	300
Total	\$2,000

The fund of \$2,000 made available to this committee for use in 1937 through the gift of Mr. Newcomb Cleveland has been allocated as follows:

Errett C. Albritton, for an investigation of (possible) action currents in the nerve tract connecting the supra-optic nucleus and the post-pituitary	\$ 300
Alfred M. Elliott, for research on the nutrition of protozoa and to determine the effect of some "plant hormones" on the growth of a single celled animal	200
Wendell Gingrich, for research on the immunization and passive transfer of immunity in avian malaria	200
Walter S. Hunter and Clarence H. Graham, for a study of muscle and retinal potentials in connection with conditioning and vision	325
Dorothy Wolff, for moving-picture studies of the physiology of the labyrinth for correlation with microscopic sections	150
Emmett B. Carmichael, for a study of the relations of temperature to the toxicity of rattlesnake venom following its injection into animals	200
Laurence Irving, for a study of the O ₂ and Co ₂ capacity of the blood of fresh-water fish as a factor in respiration	200
G. Albin Matson, to determine the blood group distribution among the American Indians on reservations in Canada north of the Blackfeet Reservation	175
S. B. Barker, for a study of the metabolism of ketogenic materials by the depancreatized dog	250
Total	\$2,000

It is only fair to say that applicants whose requests were not granted need not thereby feel that their propositions were considered unimportant. The committee believes that our list of applicants should be increased rather than decreased and that the announcement should make clear that grants are not usually given for salary or travel expenses.

Respectfully submitted for the committee,
(Signed) WALTER R. MILES,
Chairman

JANUARY 1, 1937