younger dates were used for calculating rates of deposition.

In Fig. 1, the O^{18} temperatures (derived from *Globigerinoides sacculifera*) as determined at the University of Chicago are plotted as a function of age, which was obtained from the rate of deposition that results from C^{14} determinations at the U.S. Geological Survey. It was assumed that this rate was constant and equal to that at which the upper part of the cores was deposited. Despite the obvious uncertainties of this assumption, it can be seen that the temperature trends as a function of time in the three cores investigated so far agree surprisingly well. If the rate of deposition was different during glacial times from that during the more recent period, then this difference must have been nearly the same in the three cores.

Assuming that this difference was negligible, one finds that a period of decreasing temperatures began about 80,000 years ago. The temperature reached a minimum about 15,000 years ago; this time coincides within the accuracy of the method with the time of the maximum extent of the North American ice sheet. Thereafter, a relatively rapid temperature increase took place, leading to conditions resembling those of the present. Although no indications for fluctuations of a 3500-year period can be recognized, the record from the core material seems to parallel the continental glacial and postglacial events in a crude but unmistakable way. Extrapolating backward in time, we find that the record shows a less pronounced temperature minimum about 55,000 years ago that preceded a relatively moderate period about 45,000 years before the present. The warm period of about 90,000 years ago may be correlated with the Sangamon time of North America, and the moderate period of 45,000 years ago may be correlated with a yet unnamed oscillation that is recognized in Pleistocene stratigraphy of the northern areas of North America (*3*). With respect to European glacial chronology, the sequence resembles that proposed by Zeuner (*16*) if one correlates the temperature interstadial of 45,000 years ago with LG 2/3 and the time about 85,000 years with LG 1/2. Such correlation with the respective Würm phases may well require revision. However, a certain similarity of the temperature record in the core material with the astronomical insolation curve of Milankovitch (*17*), on which Zeuner's chronology is based, cannot be denied. This, at least, is the conclusion that Emiliani (*13*) derives from the combined temperature records of his cores, which in some instances go back to the beginning of the Pleistocene, and from sedimentation rates estimated from various methods of dating. In particular, the 40,000-year period in the obliquity of the earth's axis (*18*) seems to be reflected in these records. The minima in the obliquity, however, precede the temperature minima by nearly 10,000 years.

Summary

It appears that there is evidence for two main types of climatic fluctuations that have occurred during the Last Glaciation on two different time scales, one of the order of 40,000 years and another of the order of 3500 years. The Last Glaciation embraces at least two of the long periods (Fig. 1) upon which are superimposed oscillations of the short period (Table 1). Apparent contradictions in radiocarbon dates (*19*) are at least in part the result of miscorrelations between events on these two different time scales (*20*).

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20. This article is a contribution from the Scripps Institution of Oceanography, new series, No. 843. Thanks are due to C. Emiliani for making his manuscript (*13*) available to me prior to its publication. The critical comments of R. Rex, M. Rubin, and C. Emiliani are appreciated.

Program of the Gordon Research Conferences

W. George Parks

The Gordon Research Conferences of the American Association for the Advancement of Science for 1956 will be held from 11 June to 31 August at Colby Junior College, New London, N. H.; New Hampton School, New Hampton, N. H.; and Kimball Union Academy, Meriden, N. H.

Purpose. The conferences were established to stimulate research in universities, research foundations, and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of scheduled lectures and discussion groups. Sufficient time is available to stimulate informal discussions among the members of a conference. Meetings are held in the morning and in the evening, Monday through Friday, with the exception of Friday evening. The afternoons are available for recreation, reading, or participation in discussion groups as the individual desires. This type of meeting is a valuable means of disseminating information and ideas that otherwise would not be realized through the normal channels of publication and scientific meetings. In addition, scientists in related fields become acquainted, and valuable associations are formed that often result in collaboration and cooperative efforts between different laboratories.

It is hoped that each conference will extend the frontiers of science by fostering a free and informal exchange of

The author is director of the Gordon Research Conferences and head of the department of chemistry at the University of Rhode Island.

ideas among persons actively interested in the subjects under discussion. The purpose of the program is not to review the known fields of chemistry but primarily to bring experts up to date on the latest developments, to analyze the significance of these developments, and to provoke suggestions concerning the underlying theories and profitable methods of approach for making new progress.

In order to protect individual rights and to promote discussion, it is an established requirement of each conference that all information presented is not to be used without specific authorization of the individual making the contribution, whether in formal presentation or in discussion. Scientific publications are not prepared as emanating from the conferences.

Registration and reservations. Individuals interested in attending the conferences are requested to send their applications to the director on or before 1 April. Each applicant must state the institution or company with which he is associated and the type of work in which he is interested. Attendance at each conference is limited to 100.

The director will submit the names of those requesting attendance to the Conference Committee for each conference. This committee will review the names and select the members in an effort to distribute the attendance as widely as possible among the various institutions and laboratories represented. A registration card will be mailed to those selected as soon as possible. Advance registration by mail for each conference is required, and registration is completed on receipt of the card and a deposit of $25 made payable to the Gordon Research Conferences, AAAS. The deposit of $25 will cover the registration fee of $20 and provide $5 credit against subsistence expenses.

Academic individuals and others on personal expense may apply for a reduction of $10 in the registration fee. Application for this special fee must be made when the registration card is returned.

The room rates are as follows: $2.50 per night per person in a double room with single beds; $3.00 per night per person in a single room; $3.50 per night per person in a single or double room with private bath (the number of rooms available with bath is limited; assignments are made in the order that applications are received). Meals in the dining room are served at the rate of $6.50 per day per person. Gratuities are provided for by an additional charge of 10 percent, which is added to each bill. Members attending a conference are expected to live at the conference location because the conferences are organized to provide a place for scientists to get together both formally and informally. It is to the advantage of all participants to attend a conference for the entire week. If special circumstances warrant living elsewhere, all individuals, including academic members, are required to pay a registration fee of $25.

Accommodations are available for a limited number of women to attend each conference, also for wives who wish to accompany their husbands. All such requests should be made at the time of the request for attendance because these limited accommodations will be assigned in the order that specific requests are received. Children under 12 years of age cannot be accommodated. Dogs or other animals will not be permitted in the dormitories.

Special fund. A special fund from the registration fees is put at the disposal of the chairman of each conference by the Management Committee to assist scientists from academic and government institutions who cannot attend or participate because of financial limitations. This fund is provided with the object of increasing the participation of research workers of academic and government laboratories; it is limited to scientists who have been invited by the chairman to attend a conference in order to present a paper or because it is expected that they will make significant contributions during their stay at the conference. The money is to be used as an assistance fund only and may be used to contribute toward the traveling and/or subsistence expenses at the conference. Total travel and subsistence expenses normally will not be available.

Cancellations. The notice of cancellation must be received in the office of the director 3 weeks prior to the conference. If such notice is received 3 weeks in advance of the conference, $20 will be refunded from the $25 deposit. No refund will be made for cancellations received within the 3-week period.

Attendance. Requests for attendance at the conferences, or for any additional information, should be addressed to W. George Parks, Director, Department of Chemistry, University of Rhode Island, Kingston, R. I. From 10 June to 1 September, mail should be addressed to Colby Junior College, New London, N. H.

Colby Junior College

Catalysis

H. H. Voge, *chairman*
R. L. Burwell, Jr., *vice chairman*

11 June. R. L. Burwell, Jr., "The exchange reaction between alkanes and deuterium on heterogeneous catalysts"; G. M. Schwab, "New results on kinetics and nature of some catalytic reactions"; C. G. Overberger, "Polymerization catalysis by metal alkyls."

12 June. H. Pines, "New sodium-catalyzed reactions of hydrocarbons"; D. J. Berets, H. Clark, G. L. Simard, Mrs. G. C. Serreze, "Vanadium oxide catalysts—I, electrical properties, II, kinetics of *o*-xylene oxidation"; J. H. Singleton, "Hydrogen sorption and the parahydrogen conversion on evaporated nickel."

13 June. Karl Hauffe, "Heterogeneous catalysis on semiconductor surfaces"; P. H. Miller, Jr., "Electron-transfer mechanisms at surfaces of semiconductors"; R. A. Alberty, "Mechanism and kinetics of enzyme catalysis"; D. A. Koshland, Jr., "Organic mechanisms in enzyme catalysis."

14 June. C. J. Plank, D. J. Sibbett, R. B. Smith, "Comparison of various catalysts in cracking pure hydrocarbons"; R. G. Haldeman, "Regeneration of cracking catalysts"; H. A. Benesi, "Acid strengths of catalyst surfaces from indicator colors"; T. J. Gray, "Defect nature of silica-alumina cracking catalysts."

15 June. G. Parravano, "The carbon monoxide-steam reaction on metal catalysts"; R. B. Anderson, J. F. Shultz and M. Abelson, "The influence of catalyst geometry on the rate of the Fischer-Trossch synthesis with reduced and nitrided iron catalysts."

Petroleum

John S. Ball, *chairman*
Lawrence H. Flett, *vice chairman*

18 June. H. S. Mosher, "Preparation and decomposition of hydroperoxides"; Guy Waddington, "Application of thermodynamics to petroleum problems."

19 June. Some petroleum research fund investigations, C. R. Wagner, *chairman*: Cheeves Walling, "Reactions of mercaptide radicals with hydrocarbons"; D. F. DeTar, "Aliphatic intramolecular chain transfer reactions"; W. O. Huntsman, "Double-bond migration and racemization of olefins during hydrogenation."

20 June. Radiation of hydrocarbons: H. A. Ohlgren, "The influence of radiation on thermal and catalytic cracking, hydroforming, alkylation, and petrochemical reactions"; R. O. Bolt, "Hydrocarbons as reactor-moderator coolants."

21 June. S. F. Birch, "Separation of sulfur compounds from petroleum"; *Gordon Conference Anniversary Program,* L. Flett, *chairman*; O. V. Tracy, "The fruits of petroleum chemistry."

22 June. R. B. Williams, "Applications of nuclear magnetic resonance to petroleum problems."

Separation and Purification

H. G. Cassidy, *chairman*
Karl Kammermeyer, *vice chairman*

25 June. Arthur Rose, "Logical evaluation of separation processes"; B. J.

Mair, "Fluorochemicals as an aid in separation methods."

26 June. G. J. Pierotti, C. H. Deal, E. L. Derr, "Molecular structural effects on solution behavior—implications in separation processes"; E. L. Mackor, "The basicity of aromatic molecules."

27 June. H. W. Patton, "Gas adsorption chromatography"; A. B. Littlewood, "Separative efficiency in gas partition chromatography"; L. C. McCabe, "Trace and unknown contaminants; air pollution."

28 June. R. M. Barrer, "Developments of the molecular sieve method of separation"; L. C. Craig, "Fractional dialysis and its relation to other separation techniques"; H. E. Kremers, "Separation and purification of the rare earths."

29 June. R. N. Hall, "The controlled addition of impurities to semiconductors."

Polymers

C. G. Overberger, *chairman*
W. E. Cass, *vice chairman*

2 July. H. Mark, "Recent advances in polymer chemistry"; C. C. Price, "Polymerization of *dl* and *l*-propylene oxide"; H. N. Friedlander, "Role of organometallics in heterogeneous polymerization of ethylene"; K. Ziegler, subject to be announced; W. B. Reynolds, "Olefin polymers from the Phillips low pressure process."

3 July. G. Natta, "Isotactic polymers"; P. Giustiniani, "Production and properties of the new crystalline isotactic polymers"; F. P. Redding and E. R. Walter, "Some aspects of the crystallinity and related properties of high-density polyethylene and α-olefin polymers.

4 July. C. Sadron, "Light scattering in solutions of electronically orientated macromolecules"; H. Boardman, " 'Penton'—a new polyether derived from 3,3-bis (chloromethyloxetane)"; P. J. Flory, "Some aspects of crystallization of polymers."

5 July. F. S. Dainton, "Polymerization of acrylamide in aqueous solution"; J. W. Williams and K. Van Holde, "The theory and practice of sedimentation analysis"; J. H. Freeman, "Organic chemistry of the phenol-formaldehyde reaction."

6 July. C. F. Hammer and E. E. Lewis, "The molecular structure of polyethylene and its influence on the properties of melts"; R. G. Arnold, "Recent advances in isocyanate chemistry."

Textiles

G. R. Seidel, *chairman*
H. A. Secrist, *vice chairman*

9 July. Wilson A. Reeves and William Weaver, "Some recent advances in the chemical transformation of cotton into new fibers"; G. J. M. Sprokel, "Electrostatic properties of finished cellulose acetate yarns."

10 July. Milton Harris and Robert Saxon: "Chemical modifications of wool as related to fiber properties"; L. G. Ray, "Textured filament yarns."

11 July. Herman Mark, "New polymers as potential fiber formers"; W. Weltzein, subject to be announced.

12 July. Stanley Backer, "Dimensional effects in measurement of textile properties"; Alfred Marzocchi and J. K. Park, "Glass textile sizes and finishes."

13 July. John Menkart, "Wool fiber shape factors: effect on fiber properties, processing behavior, and fabric properties."

Corrosion

J. J. Harwood, *chairman*
W. R. Robertson, *vice chairman*

Kinetics and Mechanisms of Reactions

16 July. Recent advances in electrochemistry, N. Hackerman, *chairman*: R. Piontelli, "Electrochemistry of metals"; D. C. Grahame and I. R. Miller, "The adsorption of polyelectrolytes on a mercury surface"; A. J. Kolk, "Recent developments and current research in fused salt electrolysis"; J. E. B. Randles, "Mechanism of electrode reactions and related electrochemical phenomena."

17 July. New researches in passivity, M. Cohen, *chairman*: R. Speiser, "Some aspects of passivation"; H. H. Uhlig, "Passive films on iron"; M. Cohen, "Passivity of iron"; Panel session, "Mechanism of passivity."

18 July. Nucleation of localized corrosion, J. Petrocelli, *chairman*: P. M. Aziz, "The probability nature of pitting corrosion"; W. D. Robertson, "Structure-dependent nucleation of chemical reactions at metal surfaces"; M. A. Streicher, "Nucleation of corrosion in stainless steel"; Panel session, "Nucleation of corrosion reactions."

19 July. Kinetics of corrosion reactions, W. D. Robertson, *chairman*: A. J. deBethune, "Kinetics of heterogeneous reactions"; A. C. Makrides, "Some studies of the kinetics of corrosion reactions"; L. Epstein, "Corrosion by liquid metals"; W. D. Manly, "The phenomena of liquid-metal corrosion."

20 July. Fundamentals of protective coatings—the "wash primer" system, E. R. Allen, *chairman*: M. Bloom, "The mechanism of protective film formation"; F. Eirich and R. Ullman, "Polymer resins and their metal complexes in adsorption and adhesion."

Instrumentation

Donald Williamson, *chairman*
Axel Peterson, *vice chairman*

23–27 July. Page S. Buckley, "Present and future control problems"; R. McKennell, "Recent developments in rheological instrumentation"; John Strong, "Academic courses for degrees in instrumentation"; Larkin Scott, "The application of simplified digital techniques to certain data-handling problems"; R. L. Garman and S. W. Athey, "Application of television techniques to measurement and control"; John J. Grebe, "Instrumentation unlimited"; Warren S. McCulloch, "Human senses as instruments"; T. F. Hueter, "Sonic techniques in industry and science"; V. Salmon and J. S. Arnold, "The Stanford ultrasonic bond meter"; O. E. Orbom, "A proposal for the establishment of an automation laboratory"; Raymond Jonnard, "Internally referred photoelectric system for automatic interference recording"; James D. Hardy, "A gradiometer for the measurement of thermal conductivity of feathers and fur"; James D. Hardy, "A radiometer for measuring skin temperature during exposure to infrared radiation"; David H. Fuller, "Industrial vapor-phase chromatography"; E. W. Silvertooth, "Relative and absolute control of shaft speeds by digital techniques"; Nathaniel Brewer, "A continuous plant stream plastometer for measurement of non-Newtonian viscosity"; T. K. Slawecki, "Low-cost two-dimensional heat-transfer analyzer"; H. Ziebolz, "Development of a purebred digital electrohydraulic servo system"; Elliot H. Woodhull, "Design of a liquid sample cell for infrared analyzers"; A. C. Hall and G. L. Knopf, "Experience with the Bendix time-of-flight mass spectrometer"; Marcus O'Day, "The dynamic use of the Seebeck effect for the direct conversion of heat into electric energy"; Robert J. Jeffries, "An instrumentation foundation?"; T. R. Vick Roy, "Precision *p*H control of nylon salt strike"; T. M. Dauphinee, "An instrument to measure the temperature of moving surfaces"; John F. Bishop, "Application of vapor-phase chromatography to continuous process control"; Ross D. Spangler, "A high-speed stress-strain machine"; Samir A. Haddad, "An application of differential amperometry."

Elastomers

B. S. Biggs, *chairman*
E. E. Gruber, *vice chairman*

30 July. S. N. Muchnick, "Adhesive bonding of metals"; D. M. Alstadt, "Fundamentals of rubber adhesion"; S. M. Ohlberg and L. E. Alexander, "Crystallinity and orientation in organosiloxane polymers—x-ray diffraction studies"; E. L. Warrick, "Crystallinity and orientation in organosiloxane polymers—physical measurements."

31 July. G. Natta, "Synthesis by anionic polymerization of new elastomers and unsaturated crystalline polymers"; General discussion of synthesis and properties of *cis*-polyisoprene and related polymers: W. S. McNatt, "Biosynthesis of rubber."

1 Aug. R. M. Pierson, "Formation and properties of networks involving addition polymers having reactive end

groups"; H. Westlinning, "Interaction between rubbers and fillers"; G. Kraus, "The significance of swelling equilibria in carbon black reinforced elastomers."

2 Aug. J. W. Sellers, D. Inman, M. P. Wagner, "Reinforcement by fine particle silica"; I. Auerbach, W. C. Kuryla, S. D. Gehman, "A diffusivity approach for studying the molecular structure of elastomers"; L. Mullins, "Recent developments in theories of elastic behavior and mechanical failure of rubber."

3 Aug. K. W. Scott, "Dynamic properties of strained elastomers"; J. P. Berry, "Stress relaxation of natural rubber vulcanizates."

Food and Nutrition

Robert A. Harte, *chairman*
Harry Spector, *vice chairman*

6 Aug. Atherosclerosis and nutrition, Forrest E. Kendall, *chairman*: E. H. Ahrens, Jr., "Effects of dietary fats on serum lipides"; C. B. Anfinsen, Jr., topic to be announced. *New factors,* Lemuel D. Wright, *chairman*: speaker and topic to be announced.

7 Aug. Trends in food habits and their nutritional implications, Harry Spector, *chairman*: Hazel K. Stiebeling, "Food consumption of various income classes"; Bernard E. Proctor and Charles N. Frey, "Impact of advances in food technology"; O. V. Wells, "Analysis of the effects of farm surpluses and special food, distribution activities"; Robert L. Berg, "The nutritional problems of the allergic patient"; J. F. Muller ,"Technologic aspects of special dietary food processing."

8 Aug. Amino acids: Clarence P. Berg, "Nutrition and metabolism of the *d*-amino acids." *Relationship of nutrition to mental disturbances,* R. C. Ellingson, *chairman*: Max Horwitt, "Nutritional requirements in mental health"; Marvin Armstrong, "Studies on the relation of the biochemical defect to the development of the mental defect in phenylketonuria"; Donald B. Tower, "Amino acid metabolism in normal and epileptogenic cerebral cortex."

9 Aug. Flavor, Loren B. Sjostrom, *chairman*: Karl Pfaffmann, topic to be announced; Torsten Hasselstrom, "Food flavors." *Worldwide nutrition problems,* W. H. Sebrell, Jr., *chairman*: Robert R. Williams, "Food enrichment"; speaker to be announced, "Kwashiorkor."

10 Aug. Eastern Utilization Research Branch activities, R. A. Harte, *chairman*: R. K. Eskew, "Preparation of full-flavored fruit juice concentrates and powders"; W. G. Gordon, "Isolation and composition of the proteins of milk."

Vitamins and Metabolism

Karl Folkers, *chairman*
George W. Kidder, *vice chairman*

13 Aug. Robert S. Olson, "Coenzyme syntheses in various nutritional states"; Fritz Lynen, "The substitution of pantothenate in coenzyme A-dependent reactions"; I. C. Gunsalus, "Metabolic transformations of lipoic acid"; Paul Gyorgy, "Studies on the nutrition of human bifids"; William Shive, "Some biological effects of glutamine."

14 Aug. Clifford Shunk, "Studies on factor III and vitamin B_{12}"; K. Bernhauer, "Synthesis and biosynthesis in the cobalamin series"; John White, "X-ray structural determination of vitamin B_{12}"; Hellmuth Heinrich, "Vitamin B_{12} metabolism under normal and pathological conditions"; J. R. Couch and T. M. Ferguson, "The histopathology of avian embryonic vitamin deficiencies—vitamin B_{12} and vitamin E."

15 Aug. Esmond E. Snell, "Model reactions in studies of the metabolic role of vitamin B_6"; Louis D. Greenberg, "Studies of vitamin B_6 and riboflavin deficiencies in the rhesus monkey"; James S. Dinning and Paul R. Day, "Nutritional muscular dystrophy in the monkey"; M. K. Horwitt, "Vitamin E requirements of man"; Robert S. Goodhart, "Nutrition surveys (i) evaluation of methods (ii) incidence malnutrition in Cuba."

16 Aug. Joel G. Flaks and John Buchanan, "Single carbon transfer reactions and purine biosyntheses"; Harry Broquist, "Some aspects of folic acid metabolism"; Charles A. Nichol, "Reduced derivatives of folic acid in leukemic cells"; Charles Gilvarg, "Biosynthesis of diaminopimelic acid by *E. Coli*"; Lemuel D. Wright, "The microbiology and isolation of a new growth factor"; Donald E. Wolf, "Chemical studies on a new growth factor."

17 Aug. H. J. Deuel, Jr., "Essential fatty acids in reproduction in the rat"; D. H. Laughland, "Studies related to a biochemical and physiological role of vitamin A"; Charles H. Hill, "Vitamins and disease resistance."

Medicinal Chemistry

Bernard B. Brodie, *chairman*
K. E. Hamlin, *vice chairman*

20 Aug. Sleep: Nathaniel Kleitman, "Physiology of sleep"; Seymour S. Kety, "Biochemistry of sleep"; Keith Wheeler, "The chemistry of new sedative and hypnotic drugs"; Louis Lasagna, "Clinical disorders of sleep."

21 Aug. Skin: Stephen Rothman, "Introductory remarks"; E. J. Van Scott, "Keratinization"; Stephen Rothman, "Sebum production"; Walter B. Shelley, "Physiology and pharmacology of pruritus"; J. H. Draize, "Percutaneous absorption"; Marion B. Sulzberger and Victor H. Witten, "Pharmacology of topical application."

22 Aug. Drug action: Nathan Kaplan, "A new concept in mechanism of drug action"; Adrien Hogben, "Mechanisms of gastrointestinal absorption of drugs"; James Fouts, "Synergistic and potentiating mechanisms in drug action"; Speaker to be announced, "Interaction of drugs with receptor sites."

23 Aug. Psychopharmacology: Robert W. Hyde, "Present status of psychopharmacology from the clinical viewpoint"; Richard York, "Evaluation of psychopharmacological drugs in the clinic"; Arthur Riopelle, "Evaluation of psychopharmacological drugs in the monkey." *Clinical investigation*: Panel discussion, "Problems of clinical investigation of drugs," R. K. Richards, *moderator*: John J. Burns, A. H. Holland, Louis Lasagna, other panel members.

24 Aug. Psychopharmacology: Leonard Cook, "Evaluation of psychopharmacological drugs in the rat"; W. A. Wilson, "Central nervous system areas involved in the conditioned response"; Keith Killam, "Drug effects on the response to stimulation of specific central nervous system areas."

Cancer

H. S. N. Greene, *chairman*
Arthur Kirschbaum, *vice chairman*

27 Aug. W. Ray Bryan, "The problem of quantitative biological experimentation in the tumor-virus field"; Vincent Groupe, "The brain of newly-hatched chicks as host tissue for Rous sarcoma virus"; A. M. Prince, "The use of the chick embryo in quantitative studies of the Rous sarcoma virus"; Ludwig Gross, "Filterable agents causing leukemia, parotid gland tumors, and/or soft-tissue sarcomas following inoculation into newborn mice of susceptible strains."

28 Aug. J. W. Beard, "Etiology and interrelationships of the avian leukemias"; H. B. Andervont, "Recent studies on the milk factor"; J .T. Syverton, "The pathogenesis of the rabbit papilloma to carcinoma sequence"; R. R. Wagner, "Interaction of influenza virus and tumor cells."

29 Aug. M. C. Nui, "Studies on embryonic induction"; S. M. Rose, "Differentiation and the tumor problem"; N. Kaliss, "Limitations of the use of transplantable tumors in cancer research"; H. Toolan, "Embryonic skin homografts."

30 Aug. H. Busch, "Metabolism of radioactive plasma protein in tumor-bearing rats"; W. C. Hueper, "The role of environmental agents in human carcinogenesis"; H. Lisco, "Comparative studies on radiation carcinogenesis in man and animals"; B. S. Openheimer and I. Danishefsky, "Biological and chemical studies of the induction of malignant tumors by imbedding polymas."

31 Aug. P. Shubik, "Chemical carcinogenesis in chronic toxicity tests"; P. Kotin, "A mechanism for the pathogenesis of lung cancer."

New Hampton School

Organic Reactions and Processes

Robert B. Carlin, *chairman*
Harvey J. Taufen, *vice chairman*

11–15 June. G. Natta, "Isotactic polymers"; W. J. Bailey, "Pyrolysis of esters"; G. F. Hennion, "Acetylene chemistry"; W. E. Parham, "Heterocyclic compounds containing sulfur"; C. C. Price, "Dehydration of alcohols"; H. R. Guest, "Acrolein"; W. E. Hanford, "Fluorinated olefinic monomers"; R. I. Stirton, "Isophthalic acid"; H. J. Taufen, "Some terpene chemistry"; I. Wender and H. W. Sternberg, "The oxo process"; W. P. Utermohlen, Jr., "Preparation and some properties of aliphatic mercaptans"; R. T. Arnold, "Reactions of isobutylenes involving simple bond shifts."

Metals at High Temperatures

V. N. Krivobok, *chairman*

18 June. High-temperature deformation, F. N. Rhines, *chairman*: J. Fisher, "Dislocation movements in creep deformation"; E. Parker, "Role of substructure on plastic properties"; W. Hibbard, *chairman*: E. S. Machlin and M. Abrahams, "Etch studies of dislocations in silver subjected to creep"; L. L. Marsh, "Creep deformation of single crystals."

19 June. G. J. Dienes, *chairman*: A. R. Chaudhuri, "Grain boundary deformation"; H. Brunner, "Strain across grain boundaries"; F. N. Rhines, "Third stage creep." *Fracture at elevated temperatures.* A. Focke, *chairman*: E. Peryman, "Fracture surfaces"; N. J. Grant, "Relationship between deformation and fracture"; B. Lazan, "Fracture in dynamic creep."

20 June. Strength of materials, N. J. Grant, *chairman*: W. Hibbard, "Solid solution strengthening"; F. Cuff, "Strengthening through cold work"; J. Freeman, "Hot working relationships"; R. Wilde, "Aging in high-temperature alloys." H. Young, *chairman*: F. H. Norton, "Strength of ceramics at elevated temperatures"; T. Shevlin, "Strength of cermets"; O. Preston, "The wrought-metal metal-oxide systems."

21 June. High-temperature oxidation and surface reactions, E. N. Skinner, *chairman*: K. F. Andrew, "High-temperature oxidation"; C. E. Birchenall, "The growth of oxides on metals and alloys"; A. Brasunas, "Accelerated oxidation"; G. P. Smith, "High temperature liquid corrosion." *General topics,* J. Frye, *chairman*: W. D. Manly, "Role of environment on creep performance"; P. Gordon, "Recrystallization"; P. Beck, "Abnormal grain growth."

22 June. B. Lazan, *chairman*: W. Betteridge, "Relaxation phenomena and fatigue"; A. Cochardt, "Damping in high-temperature materials"; L. F. Coffin, "Thermal stresses, thermal stress fatigue, and thermal shock."

Proteins and Nucleic Acids

George B. Brown, *chairman*
Christian B. Anfinsen, *vice chairman*
Structural and Metabolic Interrelationships

25 June. H. Schachman, "Physical chemical studies on nucleic acids and nucleoproteins"; M. H. F. Wilkins, "Molecular structure of deoxyribose nucleoproteins"; A. Bendich and L. F. Cavalieri, "Properties of the DNA macromolecule"; G. L. Brown, "Chromatographic fractionation of nucleic acids"; E. Chargaff, P. Doty, A. Rich, D. Bradley, L. D. Hamilton, J. W. Rowen, M. Rosoff, C. Dekker, discussion.

26 June. C. F. Crampton, "Comparative studies on chromatographically purified histones"; A. E. Mirsky and V. Allfrey, "Nucleoprotein systems of the cell nucleus"; J. N. Davidson, "On metabolic relationships of nuclear and cytoplasmic nucleic acids"; A. Dounce, G. Schmidt, H. M. S. Smellie, W. H. Stein, S. Moore, J. L. Irvin, H. N. Munro, D. H. Marrian, discussion.

27 June. S. Spiegelman, "The roles of nucleic acids in protein synthesis"; E. T. Bolton, "Adsorption and incorporation of amino acids, purines and pyrimidines in microorganisms"; P. C. Zamecnik, "Studies on the role of RNA and nucleotides in protein synthesis"; G. C. Webster, "Some relationships of nucleotides to protein synthesis in cell-free extracts of plants"; S. Zamenhof, M. E. Balis, R. Roberts, F. Binkley, J. Strominger, J. E. Varner, M. L. Petermann, discussion.

28 June. W. M. Stanley, opening remarks; G. Schramm, "The constitution of the protein and the nucleic acid of TMV and their interaction"; H. Fraenkel-Conrat, "Reconstitution of active virus from protein and nucleic acid of different strains of TMV"; B. Commoner, "Studies on the reactivation of tobacco mosaic virus fragments"; R. Markham, R. E. F. Matthews, W. F. Harrington, P. Newmark, G. Gamov, discussion; round-table discussion.

29 June. S. Ochoa, "Enzymatic synthesis of polynucleotides"; L. Heppel, "Enzymatic studies on ribonucleic acid and small polyribonucleotides"; V. Potter, F. Lipmann, E. Goldwasser, C. Heidelberger, M. Friedkin, E. Bennett, A. Kornberg, discussion.

Coal

H. H. Storch, *chairman*
John Mitchell, *vice chairman*

2 July. R. A. Friedel, "Absorption spectra of coal and its degradation products"; I. G. C. Dryden and E. I. Doucette, discussion; H. C. Howard, D. W. van Krevelen, J. T. McCartney, "Structural significance of the physical properties of coal"; J. L. E. Hofer, S. Ergun, I. G. C. Dryden, discussion.

3 July. "Structural significance of the physical properties of coal" (continued); R. B. Anderson, D. W. van Krevelen, P. Fugassi, "Sorption of gases and liquids by coal."

4 July. I. Wender and M. B. Neuworth, "Organic chemical approaches to the structure of coal"; S. Freedman, S. Langer, S. Ergun, presentations and discussion.

5 July. M. Passer, R. S. Montgomery, H. B. Rickert, "Special analytical and separation procedures for coal and its degradation products"; W. C. Ellis, "Chemistry of low-temperature tar from lignite"; M. Rogoff, "Microbiological studies of coal."

6 July. Discussion of proposed new journal for fuel technology and of 1957 programs.

All sessions will be chiefly round-table discussions with a minimum of prepared presentations.

Radiation Chemistry

Robert L. Platzman, *chairman*
C. J. Hochanadel, *vice chairman*

9 July. Chemical utilization of nuclear energy, Farrington Daniels, *chairman*: E. Rabinowitch, "Conversion of the energy of light into chemical free energy"; A. O. Allen, "Remarks on the potentialities of radiation chemistry for utilization of nuclear energy"; E. G. Linder, P. Rappaport, J. J. Loferski, "Direct conversion of radiation into electricity." Interaction of radiation with solids, L. H. Gray, *chairman*: R. K. Swank, "Emission of light by organic compounds under irradiation"; Ralph Livingston, "Paramagnetic resonance studies of free radicals in solids."

10 July. Kinetics of radical reactions. F. S. Dainton, "Rates of hydroxyl-radical reactions"; T. J. Hardwick, "Radical reaction rates applied to radiation chemistry." *The "free" electron in dipolar media,* L. Onsager, *chairman*: G. Stein, "Physical and chemical studies of the solvated electron"; W. K. Wilmarth, "Chemical evidence for the solvated electron."

11 July. Radiation chemistry of aqueous systems I, J. L. Magee, *chairman*: E. J. Hart, "Energy-dependence of the chemical yield by heavy ionizing particles"; N. Barr, "Energy-dependence of the chemical yield by heavy ionizing particles." *Radiation chemistry of aqueous systems II,* W. H. Hamill, *chairman*: F. S. Dainton, "Radiation-induced polymerization of acrylamide in dilute aqueous solution"; J. Ghormley, subject to be announced; L. I. Grossweiner, subject to be announced.

12 July. Radiation chemistry of gases: G. S. Hurst, "Ionization by alpha par-

ticles in mixtures of gases"; R. R. Williams, Jr., "Radiation chemistry of methane: ion-molecule reactions"; H. M. Rosenstock, subject to be announced; S. Thompson, subject to be announced. *Miscellaneous topics,* J. Ghormley, *chairman*: P. J. Dyne, "Some problems in dosimetry"; J. E. Willard, "Radiation chemistry of the alkyl halides"; T. F. Doumani, subject to be announced; D. J. Metz, subject to be announced.

13 July. Radiation chemistry of polymers, F. Hutchinson, *chairman*: M. Dole, "Melting properties of irradiated polyethylene"; A. A. Miller, "Crosslinking and degradation of polymers by irradiation."

Organic Coatings

Harry Burrell, *chairman*
E. G. Bobalek, *vice chairman*

16 July. Herman B. Wagner, "The statistical approach to coatings problems." Panel discussion: R. L. Hawkins, Jr., Mark P. Morse, W. Schickner, "Case histories of statistics applied in coatings."

17 July. W. K. Asbeck, "Adhesion of organic coatings to metal substrates"; G. G. Sward, "Adhesion of organic coatings to wood substrates."

18 July. E. H. Merz, "Microscopy of heterogeneous polymeric systems"; W. R. Moore, "Cellulose derivative-solvent interaction."

19 July. Henry Yuska, "Alkyd-amine resin interactions"; W. D. Coder, "Pentaerythritol reactions in coatings resins."

20 July. F. J. Modic, "Recent developments in silicone coatings."

Chemistry and Physics of Metals

Bruce Chalmers, *chairman*
B. L. Averbach, *vice chairman*

Equilibrium States of Metallic Systems

23–27 July. E. S. Machlin and A. S. Nowick, "Lattice vacancies in crystals"; E. A. Gulbransen and A. U. Seybolt, "Solid gas equilibria"; G. C. Kuczynski and B. E. Warren, "Order-disorder"; C. Wagner and L. S. Darken, "Liquid alloy equilibria"; O. K. Rice and A. Skapski, "Theory of liquids"; W. D. Robertson and R. B. Gordon, "Structure and properties of liquids"; R. A. Oriani and O. J. Kleppa, "Thermodynamics of solutions"; J. O'M. Bockris and R. Schuhmann, Jr., "Slag-metal equilibria"; A. D. Le Claire, subject to be announced.

Chemistry of Steroids and Related Natural Products

Josef Fried, *chairman*
E. J. Corey, *vice chairman*

30 July. E. E. Van Tamelen, subject to be announced; V. Boekelheide, "Some recent work on the chemistry of the erythrina alkaloids."

31 July. D. H. R. Barton, "The chemistry of columbin"; G. Büchi, "Structural studies on some sesquiterpenes"; C. Djerassi, subject to be announced.

1 Aug. B. Bloom and E. Agnello, "Chemistry of ring D substituted corticoids"; R. B. Woodward, subject to be announced.

2 Aug. G. Stork, "A total synthesis of 11-oxygenated steroids"; K. Gerzon, "The chemistry of erythromycin."

3 Aug. S. Gurin, "Biosynthesis and catabolism of cholesterol."

Analytical Chemistry

W. D. Cooke, *chairman*
E. W. Balis, *vice chairman*

6 Aug. A. J. P. Martin, "Vapor-phase chromatography"; K. A. Krause, "Ion-exchange separations."

7 Aug. H. Frieser and G. H. Morrison, "Separation by extraction"; P. Delahay, "Electrochemical methods."

8 Aug. B. L. Vallee, "Flame spectroscopy."

9 Aug. E. L. Stanley, "The determination of traces of organic materials and residues"; open discussion session.

10 Aug. W. S. Horton, "X-ray fluorescence spectrometry."

Inorganic Chemistry

John F. Gall, *chairman*
Hans B. Jonassen, *vice chairman*

13 Aug. Chemistry of the metal-carbon bond I, John C. Bailar, *chairman*: speakers and subjects to be announced.

14 Aug. Chemistry of the metal-carbon bond II: speakers and subjects to be announced.

15 Aug. The distant future of inorganic chemistry: speakers and subjects to be announced.

16 Aug. Solid-state chemistry I, Roland Ward, *chairman*: speakers and subjects to be announced.

17 Aug. Solid-state chemistry II: speakers and subjects to be announced.

Statistics in Chemistry and Chemical Engineering

Lee Crump, *chairman*

20 Aug. W. J. Youden, *chairman*: Grant Wernimont, "The basis for interpreting results from a testing process." J. C. Whitwell, *chairman*: A. M. Dutton, "Statistics and experimentation."

21 *Aug.* R. J. Hader, *chairman*: S. L. Anderson, "Robust tests." C. W. Dunnett, *chairman*: Paul N. Somerville, "Selecting the best from k populations."

22 Aug. J. S. Hunter, *chairman*: Paul Meier, "Sensitivity testing." Shelby A. Miller, *chairman*: Robert De Baun and F. Akutowicz, "Some examples of the use of statistics in industrial experimentation."

23 Aug. H. F. Smith, *chairman*: Jacob Horowitz, "What chemists and chemical engineers should know about time series." Chairman to be announced: Ralph A. Bradley, "Recent research on statistical problems in subjective testing."

24 Aug. G. H. Symonds, *chairman*: Lionel Weiss, "Statistical decision theory."

Adhesion

Richard F. Blomquist, *chairman*
Don K. Rider, *vice chairman*

27 Aug. D. H. Kaelble and C. A. Dahlquist, "Analyses and mechanics of peel tests for adhesion"; N. A. deBruyne, "Recent studies on adhesion in England."

28 Aug. Robert L. Patrick, "Investigation of fundamental phenomena involved in adhesion"; M. H. Jellinek, "Carbofunctional silicones for chemical adhesion."

29 Aug. C. B. Norris, "Stress concentrations in adhesive-bonded joints"; K. F. Charter, "Curing and thermal stresses in resin-to-metal bonds."

30 Aug. R. A. Oriani, "Physics and chemistry of metals as applied to adhesion." Panel discussion: S. M. Muchnick, R. F. Blomquist, H. B. Linford, "Metal surface preparation for adhesive bonding."

31 Aug. Polymer degradation and adhesion. R. Simka, "I, Theory"; B. G. Achhammer, "II, Experimental."

Kimball Union Academy

Lipide Metabolism

E. H. Ahrens, *chairman*
Cecil Entenman, *vice chairman*

11 June. Analytical: Donald H. Wheeler, "Analytical methods for fatty acid composition"; S. L. Herb, "Micromethods for determination of polyunsaturated fatty acids"; Klaus Hofmann, "Chromatography of fatty acids with emphasis on the separation of bacterial lipides"; Jules Hirsch, "Chromatographic separation of complex lipide classes with silicic acid"; Herbert J. Dutton, "Analysis of lipides by countercurrent distribution."

12 June. Fatty acid metabolism: David E. Green, "Fatty acid oxidation and synthesis with purified enzyme systems"; Joseph R. Stern and George I. Drummond, "Enzymatic aspects of acetoacetate metabolism"; Minor J. Coon, "Enzymatic synthesis of β-hydroxy β-methylglutarate and other branched chain acids"; Priscilla Hele and George Popják, "Fatty acid synthesis in enzyme preparations of mammary gland"; Eugene P. Kennedy, "Enzymatic synthesis of phospholipides."

13 June. Donald J. Hanahan, "Incorporation of fatty acids into phospholipides"; Bengt Borgström, "Studies on pancreatic lipase"; Lewis I. Gidez, "Lipide metabolism in experimental

lipemia." *Essential fatty acids*: Ralph T. Holman and J. J. Peifer, "Functions of essential fatty acids"; Harry J. Deuel, Jr., "Interrelationships of cholesterol and essential fatty acid metabolism."

14 June. Sterol metabolism. Nancy Bucher, "Lipide synthesis in cellular fractions of rat liver"; Harry Rudney, "Biosynthesis of branched chain acids"; T. T. Tchen and K. Bloch, "The squalenecholesterol transformation"; Erwin Schwenk, "New experiments on the biosynthesis of cholesterol"; Ivan D. Frantz, Jr., "Possible late intermediates in cholesterol synthesis"; Ezra Staple and Sam Gurin, "Catabolism of the cholesterol side chain in *in vitro* systems."

15 June. Sune Bergström, "Quantitative aspects of sterol and bile acid metabolism"; Leon Hellman, "Isotopic studies of lipide and sterol metabolism in man"; George V. LeRoy, "Comparative studies of cholesterol metabolism in laboratory animals and man."

Stream Sanitation

Clair N. Sawyer, *chairman*
Leslie A. Chambers, *vice chairman*

Bases of Water Quality Criteria

18–19 June. Requirements for human use: M. Starr Nichols and Jules S. Cass, "Toxicological aspects"; Martin E. Flentje and A. A. Rosen, "Consumer acceptance"; Paul Kabler and W. L. Mallmann, "Microbiological aspects."

19–20 June. Requirements of aquatic life: Peter Doudoroff and John Cairns, Jr., "Fish and other vertebrates"; Charles E. Renn, "Invertebrates"; C. Mervin Palmer, "Phytoplankton and rooted aquatics."

20 June. Requirements for agricultural uses: L. V. Wilcox, "Irrigation"; Stuart G. Dunlop, "Stock raising and market produce."

21 June. Requirements for industrial uses: Eskel Nordell, "Food and beverage"; speaker to be announced, "Organic chemical"; Eskel Nordell, "Power"; C. Fred Gurnham, "Metallurgical and inorganic chemical."

22 June. Integration: Vinton W. Bacon and Leslie A. Chambers, "Interrelationships and multiple uses."

Nuclear Chemistry

L. Yaffe, *chairman*
E. K. Hyde, *vice chairman*

25–29 June. The theoretical aspects and applications of the unified model of the nucleus. Geochemistry and cosmochemistry. Naturally occurring radioactivities (other than heavy elements). Low energy nuclear reactions. Absolute alpha and beta counting. Nuclear chemistry techniques. Experiments dealing with the antiproton. A report on various types of pulse-height analyzers.

Chemistry and Physics of Isotopes

T. I. Taylor, *chairman*
Russell Baldock, *vice chairman*

2 July. Isotope effects in spectroscopy including emission, infrared, microwave, mass and nuclear magnetic resonance, J. Rand McNally, Jr., *chairman*: speakers and subjects to be announced.

3 July. Determination of mechanisms from isotope effects on reaction rates, Jacob Bigeleisen, *chairman*: Henry Taube; F. H. Westheimer; K. D. Wiberg; J. H. Wong; subjects to be announced. *Isotope effects on physical and chemical properties*: Jacob Bigeleisen; E. F. Hammel; A. S. Friedman; subjects to be announced.

4 July. Isotope abundance measurements and isotope dilution analysis, Russell Baldock, *chairman*: Russell Baldock, "Techniques of abundance measurements and isotope dilution analysis"; Leonard Herzog, "Application of isotope dilution"; L. O. Gilpatrick, "Determination of low concentrations of uranium by isotope dilution." *Isotopes in geology,* Earl Ingerson, *chairman*: T. S. Lovering, "Isotopes in geochemical exploration"; J. L. Kulp, "Recent developments in geochronology"; R. Wanless, "Mass spectrometric analyses by the Canadian Geological Survey"; George Wetherill, "Discordant lead-uranium ages."

5 July. Methods of separating isotopes, William Spindel, *chairman*: Klaus Clusius, "Separation of isotopes by thermal diffusion"; Alfred Klemm, "Isotope effects of ionic migration in fused salts"; William Spindel and T. I. Taylor, "Production of 99.9-percent nitrogen-15 by chemical exchange." Presentation of new data and discussions of current research activities.

6 July. General topics in isotopes research, Alfred P. Wolf, *chairman*: speakers and subjects to be announced.

Solid-State Studies in Ceramics

J. R. Johnson, *chairman*
H. O. Thurnauer, *vice chairman*

9 July. Gordon Finlay, "High-temperature materials"; Peter Gibbs, "Reaction rate theory in ceramics"; H. E. Kissinger, "Reaction kinetics in differential thermal analysis."

10 July. V. K. LaMer, "Nucleation"; F. C. Kracek, "Polymorphism"; M. J. Buerger, "Silicate structures."

11 July. J. M. Warde and A. G. Tharp, "Determination of the geologic age of rocks by unit cell dimensional changes induced by radioactivity"; W. R. Foster, "Phase equilibrium approach to the problem of oil-ash corrosion"; R. W. Mooney, "Phosphors and fluorescence"; Rustum Roy, "Solid solubility and the distribution of solute ions between solid solvents."

12 July. W. D. Kingery, "Heat conduction in ceramics"; J. G. Cohn, "Solid-state reactions of special interest in ceramics." *Panel discussion on ferrites,* G. G. Palmer, *moderator*: F. E. Vinal and William Bauer, panel members.

13 July. Scott Anderson, "Infrared spectroscopy of glasses."

Chemistry, Physiology, and Structure of Bones and Teeth

R. F. Sognnaes, *chairman*
D. H. Copp, *vice chairman*

16 July. Ground substance, G. Wislocki, *chairman*: K. Meyer, "Chemistry of ground substance"; L. Belanger, "Histophysiology of chondroitin sulfate: synthesis turnover and potential role in mineralization"; D. W. Fawcett, *chairman*: S. Glasstone-Hughes, "Experimental studies in tooth development."

17 July. The skeleton as an alkaline reserve, W. Neuman, *chairman*: R. Bogoroch, P. Yen, J. H. Shaw, R. F. Sognnaes, "Comparative studies on radiosodium turnover in bones and teeth of rats and rhesus monkeys"; W. Stoll, "Chemical studies on the nature of bone sodium"; G. B. Forbes, "The contribution of the skeleton in sodium homeostasis"; W. D. Armstrong, *chairman*: Y. Ericsson, "Solubility of calcium phosphate with special reference to the liquid-solid system of saliva, enamel, and tartar deposition."

18 July. Citric acid and vitamin D, M. Logan, *chairman*: L. Singer and W. D. Armstrong, "*In vitro* studies on uptake and turnover of citrate in calcified tissues"; M. S. Thompson and A. B. Hastings, "Factors affecting the citrate content of hydroxylapatite"; J. Crawford, D. Gribetz, W. Canada, P. Hurst, B. Castleman, "Influence of vitamin D on calcium and citrate metabolism in rats." P. E. Boyle, *chairman*: J. T. Irving, "A comparison of the influence of various dietary factors on the calcification sequences in enamel, dentin, and bone."

19 July. Bone seekers, R. Harris, *chairman*: J. C. Aub and W. B. Looney, "Long-term observations following administration of radium, lead, and thorium"; J. Jowsey, "Mechanism of yttrium, strontium, and sulfur deposition in bone"; H. Foreman, "Mode of plutonium and strontium combination with bone." F. C. McLean, *chairman*: B. Engfeldt, "Bone and tooth pathology investigated by microradiography and microinterferometry."

20 July. Round table discussion on the mechanism of calcification, H. Hodge, *chairman*: R. S. Bear, "Structure of collagen"; W. F. Neuman, "The earliest events in calcification"; R. A. Robinson, "Crystal-water replacement during the calcification of osteoid"; A. E. Sobel, "The initiation of calcification."

Chemistry at Interfaces

Willard M. Bright, *chairman*
Charles G. Dodd, *vice chairman*

23 July. Surface energies of solids, Norman Hackerman, *chairman*: Stephen Brunauer, "Energies of ionic surfaces"; George Jura, "Surface and interfacial energy of molecular crystals"; J. G. Aston, "Adsorption of rare gases on heterogenous surfaces."

24 July. Solid-solid interfaces, Frank Healey, *chairman*: W. T. Read, "Dislocation theory of grain boundaries"; G. C. Kuczynski, "Mechanisms of sintering"; David Tabor, "Adhesion of clean metals"; D. G. Flom, "Friction and transfer in sliding contacts."

25 July. Monolayers and films, Hans Trurnit, *chairman*: L. S. Bartell, "Investigation of thin films by ellipsometry"; John Ross, "Adsorption of sodium dodecyl sulfate at air-liquid interfaces"; J. T. Davies, "Cohesion and charge effects in detergent films."

26 July. Dispersed systems, Charles G. Dodd, *chairman*: A. A. Bondi, "Properties of moderately-concentrated dispersions in oil"; J. W. Jordan, "Reactions of montmorillonite with organic cations"; John Turkevich, "Studies of colloidal gold."

27 July. Round table discussion, Donald Graham, *chairman.*

Ion Exchange

H. C. Thomas, *chairman*
W. J. Sloan, *vice chairman*

30 July. O. D. Bonner and G. E. Boyd, "Equilibria and thermodynamics"; R. F. Baddour and R. H. Bretton, "Kinetics."

31 July. M. R. J. Wyllie and M. J. Beran, "Flow in packed beds"; W. J. Sloan and A. A. Brooks, "Applications."

1 Aug. K. S. Spiegler and W. F. Graydon, "Membranes"; H. G. Cassidy and P. N. Craig, "Preparation of exchangers."

2 Aug. G. L. Gaines, "Inorganic exchangers"; H. F. Walton and E. C. Freiling, "Separations, cation exchange"; F. Nelson and A. Preuss, "Separations, anion exchange."

3 Aug. M. J. Hatch, "Ion retardation resins."

High-Pressure Research

P. W. Bridgman, *honorary chairman*
E. W. Comings, *chairman*
H. G. Drickamer, *vice chairman*

6 Aug. New techniques for high-pressure research: L. Coes, "Mineral synthesis at high pressure"; G. Benedek, "Magnetic and nuclear resonance techniques at high temperature"; O. L. Anderson, "A new rapid high-pressure technique." *Solid mechanics*: E. A. Davis, "Creep rupture tests on thick-walled cylinders."

7 Aug. Chemical physics: B. Vodar, "Electronic spectra at high pressure"; G. Benedek, "Nuclear resonance effects at high pressure"; M. F. Crawford, "Infrared and Raman spectra of compressed gases." *Properties of liquids and gases at high pressure*: B. F. Sage, subject to be announced.

8 Aug. Solid-state physics: A. W. Lawson, "Recent high-pressure research at the University of Chicago." *Pilot plant and industrial equipment*: speaker and subject to be announced.

9 Aug. Detonation as a source of high pressure: T. C. Poulter, subject to be announced. *Special topics in high pressure*: P. W. Bridgman, subject to be announced.

10 Aug. Chemical processes and design: speaker and topic to be announced.

Toxicology and Safety Evaluations

Bernard L. Oser, *chairman*
Norton Nelson, *vice chairman*

13 Aug. Chronic animal studies, Bernard L. Oser, *chairman*: Bert J. Vos, "The number of animals needed in toxicity tests"; J. M. Barnes, "Nature and elucidation of chronic toxic effects." *The biochemical approach,* Harold C. Hodge, *chairman*: R. T. Williams, "Chemical aspects of the metabolism of chlorinated hydrocarbons"; Hans Popper, "Toxic liver injury"; Bernard B. Brodie, "Pathways of drug metabolism."

14 Aug. Inhalation toxicity, V. K. Rowe, *chairman*: Joseph F. Treon, "Inhalation of vapors and gas"; Theodore F. Hatch, "Inhalation of dust, fumes, and aerosols." *Response of the skin to irritants and allergens,* David W. Fassett, *chairman*: Donald Birmingham, "Procedures for evaluating causative agents in contact dermatitis"; Herman N. Eisen, "Some chemical factors in contact dermatitis"; Thomas W. Tusing, discussion.

15 Aug. Carcinogens, John A. Zapp, *chairman*: O. G. Fitzhugh, "The design of chronic toxicity studies with particular reference to carcinogenicity"; Paul R. Cannon, "Dietary carcinogenesis"; Philippe Shubik, "Cocarcinogens." *Carcinogens* (continued), Norton Nelson, *chairman*: Douglas M. Gay, "Cytological follow-up of workers exposed to bladder carcinogens"; Marvin Kuschner, "Techniques for the evaluation of possible lung carcinogens."

16 Aug. Nonmammalian toxicity and in vitro *techniques,* Horace W. Gerarde, *chairman*: C. M. Pomerat, "Evaluation of chemical toxicity with tissue culture techniques"; Peter Doudoroff, "Principles and problems of fish toxicity." *Sociological and public health aspects,* Don D. Irish, *chairman*: Bernard L. Oser, "Social implications and responsibilities pertaining to safety evaluations"; Wayland J. Hayes, subject to be announced.

17 Aug. Special classes of potential toxicants, Henry F. Smyth, *chairman*: Frank R. Blood, "Are special studies needed for surface active agents"; Thomas W. Tusing, "Special problems of cholinesterase inhibitors."

Infrared Spectroscopy

E. R. Blout, *chairman*
G. B. B. M. Sutherland, *vice chairman*

20 Aug. Introduction and general theory, R. C. Lord, *chairman*: J. Van Kranendonk; E. B. Wilson, Jr.; M. K. Wilson; R. C. Lord; subjects to be announced.

21 Aug. Gases, G. B. B. M. Sutherland and F. A. Miller, *chairmen*: H. L. Welsh; B. L. Crawford, Jr.; B. Vodar; subjects to be announced.

22 Aug. Liquids and solutions, with special emphasis on hydrogen bonding, E. R. Blout, *chairman*: R. S. Halford; G. M. Barrow; G. C. Pimentel; E. R. Lippincott; subjects to be announced.

23 Aug. Solids, R. S. Halford, *chairman*: R. M. Hexter; D. F. Hornig; H. H. Günthard; C. Haas; R. Mecke; H. W. Thompson; W. C. Price; N. R. Sheppard; subjects to be announced.

24 Aug. Intermolecular effects in empirical molecular structural analysis, N. Wright and V. Z. Williams, *chairmen*: W. J. Potts; N. B. Colthup; subjects to be announced.

Glass

F. W. Preston, *honorary chairman*
O. L. Anderson, *chairman*
T. H. Davies, *vice chairman*

Strength, Fracture, and Surfaces

27 Aug. General introduction: F. W. Preston, subject to be announced; speaker to be announced, "Report on International Congress on Glass." *Time and temperature effects,* E. B. Shand, *chairman*: T. C. Baker, "Strength dependence on temperature"; G. S. Horsley, "Unpublished results on static fatigue out to 2 years."

28 Aug. High breaking strength, G. R. Machlan, *chairman*: W. H. Otto, "Properties of high-strength fibers"; R. M. Witucki, "Report on high-strength bulk glass"; O. C. Hansen, "Report on high-strength fibers." *Classical view on strength,* J. E. Burke, *chairman*: E. Orowan, "Critique of Griffith flaw theory"; Speaker to be announced, "The size effect on flaw distribution."

29 Aug. Flaws and their detection, S. Bateson, *chairman*: W. R. Prindle, "Surface flaws by the electron microscope"; M. B. Hogan, "Stress concentrators"; M. Hirata, "Growth of rapid fracture"; *Fracture diagnosis,* L. G. Ghering,

chairman: E. F. Poncelet, "Fracture propagation"; H. Kolsky, "High speed photography."

30 Aug. Surfaces, J. W. Michener, *chairman*: E. U. Condon, subject to be announced; W. F. Koehler, "Geometry of glass surfaces." *Surfaces,* H. E. Simpson, *chairman*: speaker to be announced, "Chemical reactivity of glass surfaces; the use of tracers."

31 Aug. Speaker to be announced, "Ionic diffusion in surface domain"; speaker to be announced, "Coupling of protective films and organic films to glass."

Graham Edgar, Chemist of Parts

First as a youthful university professor and then as a creative industrial chemist and a capable executive, Graham Edgar led a full life and will be remembered in many ways. Nevertheless, his principal contribution—like that of many another modest research worker and teacher—has gone largely unrecognized. Those few in a position to know say that Edgar's discovery and preparation of isooctane and his missionary work with the engineers in the U.S. Air Force were directly responsible for the early development of 100-octane aviation gasoline. This fuel was an important factor in winning the Battle of Britain and in the subsequent Allied superiority in the air during World War II.

Born in Fayetteville, Arkansas, on 19 September 1887, Edgar grew up in an era when education was obtained with an economy of time and money that is unknown today. Before he was 22 he had joined the faculty of the University of Virginia, with a B.S. degree from the University of Kentucky and a Ph.D. in chemistry from Yale. He was a member of Phi Beta Kappa, Sigma Xi, and Tau Beta Pi. His initial research was in the sternly disciplinary field of analytic chemistry; his later work covered a wide range in both physical and organic chemistry. The abstractor of his first papers foreshadowed the character of all of Edgar's research when he said, "The method is very accurate . . . with excellent results obtained thereby."

Edgar taught at Virginia for 15 years, with an interlude during World War I. His wartime service included research at California Institute of Technology and work for the National Research Council and the Ordnance Department, notably in the Fixed Nitrogen Laboratory. Indeed, his first patent, which he obtained during this period, related to the manufacture of fertilizer. The appropriateness of a pedagogue's contributing to this particular art always tickled Edgar's lively wit!

As a teacher, Edgar is remembered by his students with both affection and awe. Apart from his teaching, his major contribution to education was the chapter on "Homogeneous equilibria" in Taylor's classic, *Treatise on Physical Chemistry.* It was characteristic of Edgar that this work was published, not independently, but as part of a cooperative project.

Up to this point, Edgar's career had followed a conventional course. But he himself was innately a pathfinder, not a follower. When the opportunity came, he had the courage to leave the security of the university and turn to the exploration of new territory in industry. In June 1924, he joined the General Motors Chemical Company to help in the development of an infant industry: the use of tetraethyl lead as an antiknock for gasoline. Thus, in August 1924, he was one of the original staff of the then-named Ethyl Gasoline Corporation.

That industry was a far from healthy infant, and its survival was the result in no small part of Edgar's care. Working with only a handful of employees and with the most primitive facilities, he carried out both pure and applied research of significant importance. In 1925, on the basis of an inspiration of Thomas Midgley's, Edgar suggested and tested the first workable method for recovering bromine from sea water. In 1926, he made the first synthesis of the branched-chain hydrocarbon known as isooctane, discovered its unexpected antiknock value, developed a method for its manufacture, and produced it in pilot-plant quantities. He obtained the companion straight-chain hydrocarbon, *n*-heptane, from a surprising source: the oil of the Jeffrey pine that grows in California. On the basis of his work with these two compounds, Edgar in 1927 established the octane-number scale that is still in use for determining the antiknock quality of gasolines.

He then synthesized all the nine isomeric heptanes in high purity and, with the participation of specialists in a number of university laboratories and the National Bureau of Standards, determined their important physical properties, thereby setting the pattern for the type of cooperative program that was later employed with such success by the American Petroleum Institute and other groups. This was followed by pioneer research in the slow oxidation of different hydrocarbons and the development of the theory of fuel knock and antiknock action. At the same time, Edgar perforce had many practical problems, which he handled with expedition and acumen.

Later years found him increasingly occupied with matters of his company's policy and management, but he kept a guiding hand on its research program. In September 1952, at age 65, he was retired as vice president of Ethyl Corporation and Ethyl-Dow Chemical Company; however, as a consultant, he remained active in the corporation's affairs. Although smitten with leukemia early last year, he persevered and was still working on his final publication shortly before his death on 8 September 1955.

Today, many of us are better chemists—and citizens—for having come under the influence of Graham Edgar's personality. We enjoyed the fruits of his wide learning, ready wit, and gusto for the good things in life; and we came away with respect for his candor, his integrity, his contempt for pretense in any form, and his abiding courage to speak out for his convictions. He set us a good example.

HAROLD A. BEATTY
Ethyl Corporation, Detroit, Michigan