Meetings and Societies

Scientific Basis of Weather Modification

Shortly after the 1946 discovery of the Dry-Ice cloud seeding technique by Schaefer (Schenectady) and during the first rush of amateur and commercial rain makers who were showering a bewildered public with a variety of claims of success for turning supercooled clouds into precipitating snow and rain, a whimsical but unknowingly pertinent cartoon appeared in a national magazine. It showed two clergymen quizzically gazing through a church window at the raindrops spattering outside, with one asking the other, "I wonder if its theirs or ours?" Ten years later, the clergyman's problem is still very much the meteorologist's problem, but the latter is steadily narrowing the range of his uncertainty. In the course of his efforts to so delimit his uncertainty, the meteorologist has virtually developed a whole new branch of his field, cloud physics, and the past decade's effort to learn useful techniques of modifying clouds has entrained the services of chemists, physicists, statisticians, and even astronomers.

In an attempt to take stock of the present position of cloud modification and related fields, an international Conference on the Scientific Basis of Weather Modification Studies was held 10–12 Apr. at the University of Arizona's Institute of Atmospheric Physics. This conference brought together at one time and in one place scientists representing nearly every one of the world's leading cloud modification research groups. Nine foreign scientists (whose travel to the conference was supported through a grant from the Rockefeller Foundation) and 26 U.S. scientists presented research results on all aspects of the problem, ranging from the physics and chemistry of nucleation through the seeding of large cyclonic storms and on into the intricacies of statistical evaluation of seeding results.

If a discerning layman had come to this conference with a primary interest in the question of whether scientists had yet found a practicable way of increasing precipitation, his conclusion after listening to their papers and discussions for 3 days would have to be that, as yet, whatever successes they have are confined to certain very favorable situations. In contrast to the often glowing claims that have emanated in recent years from some commercial cloud-seeders, the observer would have heard from this gathering of researchers a long series of still unsettled questions that bear crucially on the techniques and economics of artificial cloud nucleation.

The only indications of substantial positive results from the usual commercial-type seeding operations, using ground-based silver iodide generators, for which present statistical significance was claimed at the conference were the results of an evaluation made by the staff of President Eisenhower's Advisory Committee on Weather Control. The evaluations dealt with a number of commercial rain-making operations carried out in selected winter storms in the mountainous West Coast region during the past few years. These evaluations were subjected to rather strong criticisms by some of the statisticians present, on the basis that it was not possible to draw valid conclusions from this type of operation owing to lack of randomization in the tests, and secondarily because of certain possible errors in the statistical model used in the analysis (a point that did not become quite clear to nonstatisticians present but whose resolution appears to be in sight).

It was pointed out, however, by Thom (Washington), who supervised the evaluations, that the Advisory Committee for Weather Control had been required, by virtue of its statutory obligations, to use such data, and had sought to extract therefrom what statistical information it could, notwithstanding the lack of scientific design in the original operations. He urged that the positive indications obtained should be considered primarily as suggesting further research on the seeding potentialities in the areas studied.

The difficulties encountered by the advisory committee in carrying out its responsibilities were generally recognized by the conferees; however, there was the feeling expressed that because of these technical statistical uncertainties, some implications of recent committee communications and press statements may not have been warranted. This question hinges in part on statistical questions that are still to be settled. All other conference reports of scientific efforts to appraise the effects of past cloud-seeding efforts seemed to fall into one or the other of the following categories: (i) experiments on a small scale (on individual clouds or cloud groups) in which some indisputable positive effects have been observed; (ii) large-scale experiments which have not so far yielded clearly established positive results of recognized significance, either because the technique used was inefficient or because the sensitivity of the statistical tests employed was low owing to lack of adequate observational data.

Notwithstanding the fact that no dramatic research results on rain-making techniques were reported, an observer would have found in the proceedings of this conference a number of indications of cautious optimism on the part of the scientists regarding *future* developments and could have seen clearly that the decade of research which was being reviewed had brought real progress in the form of greatly increased knowledge of the physics of clouds and precipitation. It seemed agreed that recent progress has been nowhere more significant than in the recognition, just within the past few years, that the growth of raindrops by collision and coalescence is as important as the classical ice-crystal process for natural precipitation. And one cloud-seeding technique in particular, that directed at dissipating stratus cloud decks, seemed to be accepted as an accomplished fact, based especially on work summarized by aufm Kampe and Weickmann (Belmar).

Optimism was expressed by many conferees relative to the prospects of inducing significant increases of precipitation under certain restricted types of weather conditions in regions where a broad air current is forced to rise over an extensive mountain barrier. Under such conditions, clouds tend to form more or less continually and, equally important, strong air currents are present to transport into the clouds seeding agents (notably silver iodide particles) released from ground generators. Conference attention seemed to center on such mountain-barrier regions, chiefly because recent experiments in several parts of the world have cast certain doubts on the extent to which ground-released nuclei reach cloud altitudes over any other types of terrain before photolytic decay or surface changes deactivate the nuclei, although much more work is still required on these questions. Ludlam (London and Stockholm) mentioned forthcoming tests to be made under essentially these mountain-barrier conditions in Sweden. Bowen (Sydney) described seeding experiments now in progress, wherein aircraft are releasing silver iodide in a randomized time sequence at cloud altitudes upwind from

the Snowy Mountains in southeastern Australia. In the latter case, the first year's results showed substantial positive effects, but Bowen emphasized the lack of statistical significance at this stage.

Neumann (Tel Aviv) reported seeding trials that have been underway in Israel for 3 years but have not been well known in this country. Seeding with ground-based silver iodide generators is conducted on a randomized basis. The accumulated experience of the first 3 years' work suggested that something of the order of 50 years of such randomized trials would be needed to detect a 20-percent increase at the 5-percent confidence level using the original statistical design, so efforts are now being made to incorporate a more efficient design into the tests.

Braham, Battan, and Byers (Chicago) discussed several aspects of still another randomized seeding experiment in which aircraft released large amounts of water spray (drops of the order of 100 μ in diameter) into clouds over Puerto Rico and obtained statistically significant radar evidence that this treatment *initiated* precipitation processes in the tradewind clouds. Rough calculations suggest economic difficulties in consequence of the inherently high expense of flying thousands of gallons of water to cloud-top altitudes. This experiment, nevertheless, stands out as the first in which a clear-cut positive effect of cloud seeding has been demonstrated in a carefully designed randomized treatment scheme.

There has long been recognition that existing methods of generating silver iodide (*e.g.*, burning acetone solutions of silver iodide) may be very far from optimal. However, uncomfortably little truly careful work to examine the generator processes and output has been done in the past decade. It was, therefore, most encouraging to hear Mason (London) report current studies wherein electron diffraction and x-ray diffraction techniques are being used to study the nature of the particles produced by several basic methods. Mason reported that almost none of them contained the simple hexagonal (icelike) crystalline silver iodide, as had always been assumed, but rather that mixed crystals, often of cubic lattice, predominated. Mason believes that their poor crystalline structure is a result of reduction of AgI to metallic silver under the influence of the hydrogen present in the combustion atmosphere of generators. His findings document the need for intensive study of nuclei generators and hold out, implicitly, hope that research could yield marked improvements in this phase of seeding technology. Sänger (Zürich) reported interesting evidence that he has recently found which suggests that cupric sulfide may be equal in effectiveness to silver iodide as an ice-nucleating material and less subject to decay effects.

A number of papers on many of the more detailed problems now confronting cloud-modification research added greatly to the success of the conference, but they will not be summarized here, since they are of somewhat less general interest. The proceedings of the conference are being published in the form of a collection of mimeographed 500- to 1000-word summaries of the papers presented. A limited number of copies will be available to educational and research institutions in this country and abroad. Requests should be addressed to the Institute of Atmospheric Physics, University of Arizona, Tucson.

It seemed to me that this conference did fulfill very well its intended purpose of taking stock of the present status of research in cloud modification and cloud physics. From it, the conclusion may be drawn that the past decade of effort counsels greater conservatism regarding the extent to which clouds may be made to yield precipitation than was initially manifested by enthusiastic exponents of seeding. The present seeding techniques may fall short of producing increases that can easily be identified, the number of situations in which real effectiveness of seeding potentially exists may be more limited than originally hoped, or the large natural variability of precipitation may be obscuring statistical discrimination of even substantial increases. Perhaps all three of these factors play a part in the still existing uncertainty regarding the efficacy of man's most recent rainmaking efforts. This still leaves room for what Reichelderfer (Washington) described in his conference paper as "realistic optimism," a term in which the adjective connotes due respect for the many complexities of the natural processes that occur within clouds and the noun connotes a feeling that we cannot possibly have optimized seeding techniques yet and much remains to be learned.

In all, there was quite complete agreement among the conferees that a strong case can be made for still more vigorous cloud-modification and cloud-physics research. A considerable measure of agreement was reached at the conference concerning the chief lines along which such research might best be directed in the near future.

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Meeting Notes

■ An international symposium on particle accelerators, detection techniques and high-energy physics, which was arranged by the European Organization for Nuclear Research, was held 11–22 June at the Institut de Physique in Geneva, Switzerland. The following countries were represented at the conference: Australia, Belgium, Canada, Czechoslovakia, Denmark, France, Federal Republic of Germany, Greece, India, Italy, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, U.S.S.R., United Kingdom, U.S.A., and Yugoslavia. UNESCO also sent an observer.

The first week of the symposium was devoted entirely to high-energy particle accelerators. During that period, about 50 papers were given on the chief problems raised by the construction of modern accelerators, such as the theoretical aspects of the question, the study of magnets, the radio-frequency accelerating system, the injection and ejection of particles, the operation of the machines, and so forth. The technical features of the large accelerators now in operation or being built were explained in detail, and finally, entirely new principles were put forward whose practical application would considerably improve the performance of existing accelerators.

During the second week of the symposium, attention was focussed on detection methods and on the theoretical aspects and experimental techniques of the physics of elementary particles. The 70 papers delivered dealt with a wide variety of questions, such as Wilson chambers, bubble chambers, over-compression and counting techniques, experimental and theoretical physics concerning mesons, nucleons and antiprotons, quantum field theories, the structure of the proton, mesic atoms, and so forth. A news report from Geneva states that the exchanges of views that took place between participants, both inside and outside the conference room, proved extremely fruitful, and that the frankness shown by all concerned bodes well for the possibility of future international cooperation in physics.

■ The 28th meeting of the Pan American Sanitary Organization Executive Committee ended on 13 June with the signing of its final report embodying 16 resolutions. The meeting opened on 5 June under the chairmanship of Jorge Jiménez Gandica, director of the Division of Public Health of Colombia. Manuel A. Sanchez Vigil, director of the National Institute of Hygiene, Nicaragua, was vice-chairman. Most of the resolutions adopted will be presented for final action to the PASO Directing Council at its ninth meeting, which is scheduled to convene on 16 Sept. in Antigua, Guatemala.

The $2,400,000 budget proposed by Fred L. Soper, director of the Pan American Sanitary Bureau, Regional Office of the World Health Organization, for the bureau's operations in 1957 was ap-

proved by the committee. This represents an increase of $200,000 over the 1956 budget.

Looking toward construction within the next few years of new offices more suitable for the expanding operations of the bureau, the committee approved the director's recommendation to add $100,000 surplus funds to a Building Reserve Fund, bringing that fund up to $200,000. A recommendation that $23,524 be used to meet initial architectural expenses for the new building also was approved.

The committee has asked the directing council to authorize the director to draw on the Building Reserve Fund "in the event that additional funds should be necessary for the intensification of the malaria eradication program." Throughout the session great stress was laid on the program for the eradication of malaria throughout the Americas, a program which has been made worldwide by the World Health Organization and which might require additional funds to meet any critical situation that might arise.

■ Within the past year the American Academy of Microbiology has been established and incorporated in the State of Delaware. The organization was formed to: (i) promote the highest professional standing of microbiologists, (ii) carry on professional activities on behalf of the science of microbiology, and (iii) promote programs of recognition, certification and/or accreditation of microbiologists where needed to accomplish the aforesaid purposes.

A board of governors has been named to organize and administer the affairs of the academy and receive applications for fellowship. Fellows in the academy will be required to have a doctor's degree, or a level of education which is acceptable to the committee on election and the board of governors, and a minimum of 7 years of postdoctoral work in microbiology. The members of the board of governors are J. H. Bailey, I. L. Baldwin, W. J. Cromartie, G. M. Dack, S. R. Damon, R. Donovick, G. Edsall, H. O. Halvorson, R. D. Housewright, P. W. Kabler, R. G. E. Murray, E. H. Spaulding, R. A. Starkey, J. T. Syverton, and Orville Wyss. The executive secretary is G. I. Wallace, and the present office of the academy is 456 Noyes Laboratory, Urbana, Ill.

■ The Thomas Alva Edison Foundation was host to the National Committee for the Development of Scientists and Engineers at a 1-day conference at West Orange, N.J., on 21 June. The purpose of the conference was to present to a group of representative citizens a discussion of the factors in our national life that generate the unusual demands for highly qualified scientific and technical personnel. The conference was open to the press. On the following day, the National Committee held its second regular meetings in executive session (the President established the committee on 3 Apr.).

The opening session was addressed briefly by Charles Edison, honorary president of the Thomas Alva Edison Foundation; Howard L. Bevis, chairman of the National Committee and president of Ohio State University; and Charles F. Kettering, president of the Edison Foundation and former vice-president of General Motors. The chief addresses on the morning program were given by Clifford Furnas, assistant secretary of the Department of Defense, who discussed the "Requirements growing out of the nation's security needs"; and Herbert Scoville, Jr., assistant director of the Central Intelligence Agency, who spoke on "Maintaining America's technological superiority—the threat of Russian competition."

Lee A. DuBridge, president of California Institute of Technology, addressed the afternoon session on the "Special need for highly qualified scientific and technological personnel," and M. H. Trytten, director of the Office of Scientific Personnel, National Academy of Sciences–National Research Council, delivered an "Assessment of the general trends in the supply of scientific and engineering manpower."

At the dinner meeting two groups of case studies on the current and potential shortages of technical manpower were presented. Charles B. Jolliffe, vice president and technical director of the Radio Corporation of America, described the situation in the electronics industry, and George W. Best, director of chemical research for the Ethyl Corporation, discussed the situation in chemistry.

■ A working party of senior geologists concerned with the preparation of a regional geological map for Asia and the Far East recently concluded a 5-day meeting in Bangkok under the chairmanship of V. P. Sondhi (India). This was the second session of the working party, which included some 50 participants from 13 countries and territories, among them the directors of geological surveys in Burma, China, India, Indonesia, Japan, the Republic of Korea, Malaya, and Thailand and specialists from France, the Netherlands, the U.S.S.R., the United States, and Hong Kong. The meeeting was held under the sponsorship of the Economic Commission for Asia and the Far East.

Major decisions reached included plans for financing the preparation of the map; questions of coordination of various national works; target date for completion of country geological maps; map projection; and preparation of index maps showing the status of geological surveys. The meeting also decided to begin compilation of a regional mineral distribution map for Asia and the Far East, as well as regional maps showing mineralization epochs and provinces as a guide for mineral prospecting. An *ad hoc* committee composed of India, Indonesia, and Japan was established to assist in this work.

■ Data on safeguards associated with the types of research and power reactors being developed by the United States and the United Kingdom were exchanged at a joint meeting held in Chicago, 12–15 June, under the terms of the U.S.-U.K. Agreement for Cooperation. Classified papers were included in the agenda and attendance was limited primarily to representatives of the United Kingdom and of the U.S. Atomic Energy Commission. U.S. papers will be made available to interested U.S. industrial concerns under the Access Permit Program.

A second reactor safety meeting on U.S. problems, open to "L" and "Q"-cleared employees of access permit holders, will be held in the late fall or early winter. It is hoped that access permit holders will submit papers and suggest topics to be included on the program for the second meeting.

■ The 61st summer meeting and the 36th colloquium of the American Mathematical Society will be held at the University of Washington, 20–25 Aug. The meetings are in conjunction with the meetings of the Biometric Society, the Econometric Society, the Institute of Mathematical Statistics, and the Mathematical Association of America.

Salomon Bochner of Princeton University will deliver the colloquium lectures, entitled "Harmonic analysis and probability." C. B. Allendoerfer of the University of Washington will present a 1-hour address on "Some recent advances in differential geometry in the large," and Kenkichi Iwasawa of the Massachusetts Institute of Technology, will speak for an hour on "A theorem on Abelian groups and its application in algebraic number theory." There will be a session of invited 20-minute papers in applied mathematics. For information, write to the American Mathematical Society, 80 Waterman St., Providence 6, R.I.

■ The 15th International Congress of Pure and Applied Chemistry (analytical chemistry) will be held in Lisbon, Portugal, 9–16 Sept. under the sponsorship of the International Union of Pure and Applied Chemistry. According to the provisional program, the scientific sessions will include five general lectures, ten sub-section lectures, and individual papers limited to 10–20 minutes.

The ten sub-sections of the congress

are as follows: microchemical methods; biological methods; electrical methods; optical methods; radio chemical methods; organic complexes; results and statistical interpretations; methods of absorption and distribution; generalities and standardization of methods and different applications.

Excursions are being planned for the congress participants, including possibly a 4-day voyage to the Island of Madeira. In addition to a series of social events, the organizing committee is arranging visits to various factories in the Lisbon area.

The president of the National Academy of Sciences–National Research Council has appointed the following U.S. representatives to the congress: S. E. Q. Ashley, General Electric Company; Roger G. Bates, National Bureau of Standards; W. D. Cooke, Cornell University; G. M. Kline, National Bureau of Standards; I. M. Kolthoff, University of Minnesota; Walter J. Murphy, American Chemical Society; F. D. Tuemmler, Shell Development Company; John Turkevich, Princeton University; Grant T. Wernimont, Eastman Kodak Company; Philip W. West, Louisiana State University; and John H. Yoe, University of Virginia.

■ The U.S. National Committee of the International Scientific Radio Union has scheduled a meeting at the University of California, Berkeley, 11–12 Oct. A combined technical session of interest to all participants will be held on the morning of 11 Oct., to be followed by one or more sessions in each of the following fields: Commission 2, radio and troposphere; Commission 3, ionospheric radio; and Commission 4, radio noise of terrestrial origin.

Authors are invited to submit titles and 100 to 200 word abstracts *before 20 July*. The abstracts should be sent to the appropriate commission chairman or secretary: Commission 2, Dr. J. B. Smyth, Smyth Research Associates, 3930 Fourth Ave., San Diego 3, Calif.; Commission 3, Prof. L. A. Manning, Stanford University, Stanford, Calif.; Commission 4, Prof. A. W. Sullivan, University of Florida, Gainesville, Fla.

Forthcoming Events

August

13–16. National Medical Assoc., 61st annual, New York, N.Y. (J. T. Givens, 1108 Church St., Norfolk 10, Va.)

15–22. Canadian Teachers' Federation, Fredericton, N.B., Canada. (G. G. Croskery, 444 MacLaren St., Ottawa, Ontario, Canada.)

16–21. Symposium on X-Ray Microscopy and Microradiography, Cambridge, England. (W. C. Nixon, Cavendish Lab., Cambridge.)

17–25. International Cong. of Entomology, 10th, Montreal, Canada. (J. A. Downes, Div. of Entomology, Science Service Bldg., Ottawa, Ont., Canada.)

19–23. International Cong. on Diseases of the Chest, 4th, Cologne, Germany. (Executive Offices, American College of Chest Physicians, 112 E. Chestnut St., Chicago 11, Ill.)

19–24. International Symposium on Combustion, 6th, New Haven, Conn. (Combustion Symposium Office, Mason Lab., Yale Univ., New Haven 11.)

20–21. Mathematical Assoc. of America, 37th summer, Seattle, Wash. (H. M. Gehman, Univ. of Buffalo, Buffalo 14, N.Y.)

20–21. National Telemetering Conf., Los Angeles, Calif. (R. E. Rawlins, Lockheed Aircraft Corp., Burbank, Calif.)

20–24. Conf. on Scientific and Technical Writing, Philadelphia, Pa. (H. F. Arader, Univ. of Pennsylvania, 3400 Walnut St., Philadelphia 4.)

20–24. Institute of Mathematical Statistics, Seattle, Wash. (G. E. Nicholson, Jr., Dept. of Statistics, Univ. of North Carolina. Chapel Hill.)

20–24. International Cong. of Physical Medicine, 2nd, Copenhagen, Denmark. (S. Clemmesen, Kommune-hospitalet, Copenhagen.)

20–24. Plant Science Seminar, 33rd annual, St. Louis, Mo. (F. L. Mercer, St. Louis College of Pharmacy, St. Louis 10.)

20–25. American Mathematical Soc., 61st summer, Seattle, Wash. (J. H. Curtiss, AMS, 80 Waterman St., Providence 6, R.I.)

21–24. Western Electronic Show and Convention, Los Angeles, Calif. (B. Angwin, General Electric Co., 11840 W. Olympic Blvd., Los Angeles 64.)

22–29. World Cong. of Sociology, 3rd, Amsterdam, Netherlands. (T. B. Bottomore, Skepper House, 13 Endsleigh St., London, W.C.1, England.)

24–28. American Astronomical Soc., joint with Astronomical Soc. of the Pacific, Berkeley, Calif. (J. A. Hynek, Harvard College Observatory, Harvard Univ., Cambridge 38, Mass.)

26–30. American Inst. of Biological Sciences, Storrs, Conn. (H. T. Cox, 2000 P St., NW, Washington 6.)

The following 23 meetings are being held in conjunction with the AIBS meeting at Storrs, Conn.

26–30. American Bryological Soc. (L. J. Gier, Dept. of Biology, William Jewell College, Liberty, Mo.)

26–30. American Fern Soc., annual. (Mildred E. Faust, 501 University Pl., Syracuse 10, N.Y.)

26–30. American Microscopical Soc. (R. W. Pennak, Dept. of Biology, Univ. of Colorado, Boulder.)

26–30. American Soc. for Horticultural Science, annual. (F. S. Howlett, Ohio Agricultural Experimental Station, Wooster, Ohio.)

26–30. American Soc. of Human Genetics. (E. J. Gardner, Dept. of Zoology, Utah State Agricultural College, Logan.)

26–30. American Soc. of Limnology and Oceanography, annual. (B. H. Ketchum, Woods Hole Oceanographic Institution, Woods Hole, Mass.)

26–30. American Soc. of Parasitologists, annual. (A. C. Walton, Knox College, Galesburg, Ill.)

26–30. American Soc. of Plant Physiologists, annual. (A. W. Galston, Dept. of Botany, Yale Univ., New Haven, Conn.)

26–30. American Soc. of Plant Taxonomists, annual. (R. C. Rollins, Gray Herbarium, Harvard Univ., 22 Divinity Ave., Cambridge 38, Mass.)

26–30. Biometric Soc., ENAR. (A. M. Dutton, Univ. of Rochester, Box 287, Station 3, Rochester 20, N.Y.)

26–30. Botanical Soc. of America, annual. (H. C. Bold, Vanderbilt Univ., Nashville, Tenn.)

26–30. Ecological Soc. of America, annual. (J. F. Reed, Dept. of Botany, Univ. of Wyoming, Laramie.)

26–30. Mycological Soc. of America, annual. (C. J. Alexopoulos, Dept. of Botany, Michigan State Univ., East Lansing.)

26–30. National Assoc. of Biology Teachers. (P. V. Webster, Bryan City Schools, Bryan, Ohio.)

26–30. Nature Conservancy. (G. B. Fell, 4200 22 St., NE, Washington 18.)

26–30. Phycological Soc. of America, annual. (P. C. Silva, Dept. of Botany, Univ. of Illinois, Urbana.)

26–30. Soc. of General Physiologists. (A. M. Shanes, National Inst. of Arthritis and Metabolic Diseases, Bethesda 14, Md.)

26–30. Soc. for Industrial Microbiology, annual. (C. P. Porter, Dept. of Biological Sciences, Purdue Univ., West Lafayette, Ind.)

26–30. Soc. of Protozoologists, annual. (N. D. Levine, College of Veterinary Medicine, Univ. of Illinois, Urbana.)

26–30. Soc. of Systematic Zoology. (R. E. Blackwelder, 3728 Second St. South, Arlington 4, Va.)

27–29. American Soc. of Zoologists, 53rd annual. (R. T. Kempton, Marineland Research Laboratory, Marineland, Fla.)

27–29. Genetics Soc. of America, annual. (H. B. Newcombe, Atomic Energy of Canada, Ltd., Chalk River, Ont.)

27–31. American Soc. of Naturalists, annual. (B. Wallace, Biological Lab., Cold Spring Harbor, Long Island, N.Y.)

26–1. International Soc. of Haematology, 6th cong., Boston, Mass. (ISH, New England Medical Center, Harrison Ave. at Bennet St., Boston 11.)

27–31. Biological Photographic Assoc., 26th annual, Rochester, N.Y. (BPA, c/o 343 State St., Rochester 4.)

27–31. Colloquium on Statistical Mechanics of Transport Processes, IUPAP, Brussels, Belgium. (I. Prigogine, 40 Avenue F. D. Roosevelt, Brussels.)

27–31. Infrared Spectroscopy Inst., 7th annual, Nashville, Tenn. (N. Fuson, Dept. of Physics, Fisk Univ., Nashville 8.)

28–2. Colloquium on Semiconductors and Phosphors, IUPAP, Garmisch-Partenkirchen, Germany. (H. Maier-Leibnitz, Walter-von-Dyck-Platz 1, Munich 2, Germany.)

29–5. British Assoc. for the Advancement of Science, annual, Sheffield, England. (Secretary, BAAS, Burlington House, Piccadilly, London, W.1., England.)

29–8. International Soc. of Soil Science, 6th cong., Paris. (F. A. Van Baren, ISSS, Royal Tropical Inst., Mauritskade 63, Amsterdam, Netherlands.)

30–5. American Psychological Assoc., Chicago, Ill. (F. H. Sanford, 1333 16 St., NW, Washington 6.)

30–5. Psychometric Soc., Chicago, Ill. (L. V. Jones, Dept. of Psychology, Univ. of Chicago, Chicago 37.)

September

1–9. International Cong. of Anthropological and Ethnological Sciences, 5th, Philadelphia, Pa. (Secretary, American Organizing Committee, International Cong. of Anthropology, National Acad. of Sciences–National Research Council, 2101 Constitution Ave., Washington 25.)

2–7. Laurentian Hormone Conf., AAAS, Mont Tremblant, Quebec, Canada. (Committee on Arrangements, LHC, 222 Maple Ave., Shrewsbury, Mass.)

4–5. Meteoritical Soc., 19th meeting, Bloomington, Ind. (C. W. Beck, Dept. of Geology, Indiana Univ., Bloomington.)

4–6. International Assoc. of Milk and Food Sanitarians, annual, Seattle, Wash. (H. L. Thomasson, IAMFS, Box 437, Shelbyville, Ind.)

(See issue of 15 June for comprehensive list)