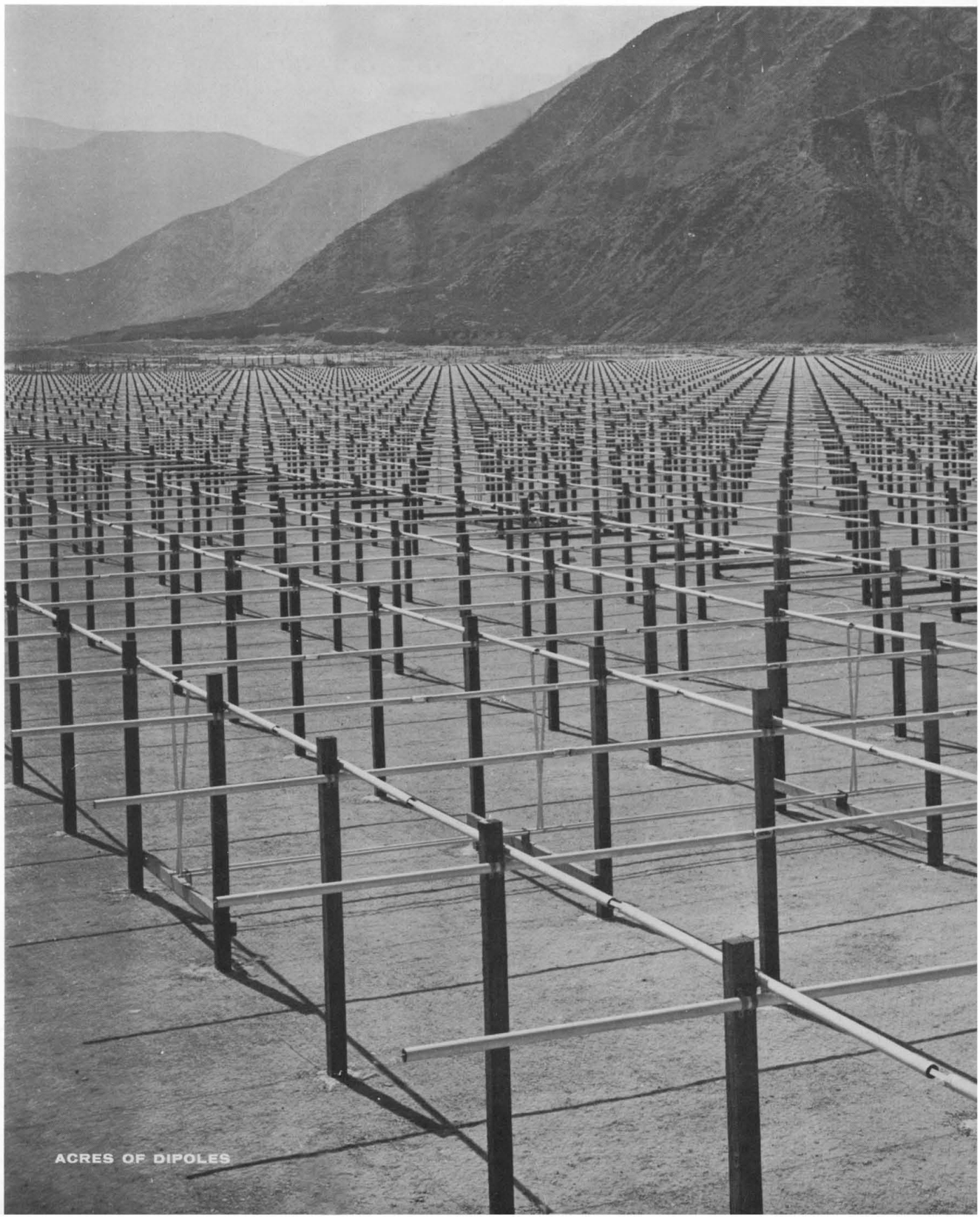
SCIENCE

1 February 1963

Vol. 139, No. 3553

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



ACRES OF DIPOLES

NUMBER 2 IN A SERIES

Chemists seeking to detect the presence of free radicals in chemical systems will find EPR Spectrometry the most sensitive and rapid technique available. The ability of Varian EPR Spectrometers to detect as low as 2×10^{11} free radicals (10^{-8} molar concentrations), and to respond in times less than 100 microseconds, has rendered all other techniques obsolete.

This ability to detect, and in many cases to identify free radicals is inherent in the basic phenomenon of Electron Paramagnetic Resonance, since EPR Spectrometers respond **only** to chemical systems containing unpaired electrons.

EPR
IN THE WORLD OF CHEMISTRY

FREE RADICAL INDUCED POLYMERIZATIONS

INITIATION

$$CF_3\text{–}\dot{N}\dot{O} + C_2F_4 \xrightarrow{k_1} CF_3\text{–}NO\text{–}CF_2\text{–}CF_2\cdot$$

PROPAGATION

$$CF_3\text{–}\dot{N}O\text{–}CF_2\text{–}CF_2\cdot + CF_3\text{–}NO \xrightarrow{k_2} CF_3\text{–}\dot{N}O\text{–}CF_2\text{–}CF_2\text{–}\dot{N}O\text{–}CF_3$$

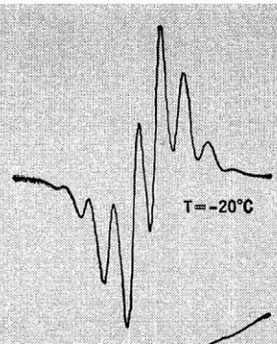
In the study of copolymerization reactions the question often arises whether the polymerization is "free radical" or "ionic". EPR can provide the answer very quickly and easily because of its unique ability to detect free radicals.

Further, if free radicals are **detected** in the polymerization, it is then feasible to **identify** the free radicals using other basic features of the technique. Thus EPR can provide a better understanding of the initiation and propagation steps, as well as the termination of the reaction.

PROPAGATING FREE RADICAL

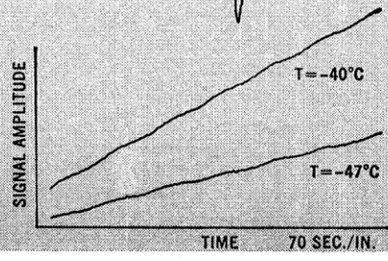
$CF_3\text{–}\dot{N}O\text{–}CF_2\text{–}CF_2\text{–}\dot{N}O$ (with CF_3 branch)

FIG. 1



GROWTH CURVES OF PROPAGATING RADICAL

FIG. 2



Some unusual characteristics of the copolymerization of CF_3NO with C_2F_4, such as initiation and propagation at very low temperatures and in the absence of light, led to speculation that this polymerization went via a free radical mechanism. A recent report (1) on the study of this reaction by EPR verified the free radical nature of the reaction.

When CF_3NO and C_2F_4 are mixed at dry ice temperatures and placed in the EPR spectrometer no signal is observed. As the temperature is slowly increased to —57°C, a signal begins to develop and grows with time. As the temperature is increased the growth rate of the propagating radical increases. The spectrum at left (Fig. 1) was taken during propagation.

The rate of polymerization can be followed by measuring the rate of growth of this propagating radical. Fig. 2 illustrates a typical growth curve obtained directly from the EPR Spectrometer by monitoring the signal as a function of time with an x-y recorder equipped with a constant time base.

(1) L. H. Piette & G. H. Crawford, Sept., 1962, 142nd National Meeting, A.C.S., Atlantic City, New Jersey.

Detection and identification of free radicals are not the only results obtainable from the EPR spectrum, however. It is also possible to measure the rate of free radical formation for studies of complete reaction kinetics.

Varian EPR Spectrometer systems and accessories are designed for a wide range of applications in the fields of chemistry, biology, medicine and physics. For additional information about the example above and other chemical applications of EPR, please write: INSTRUMENT DIVISION.

VARIAN associates

PALO ALTO 18, CALIFORNIA

1 February 1963
Vol. 139, No. 3553

SCIENCE

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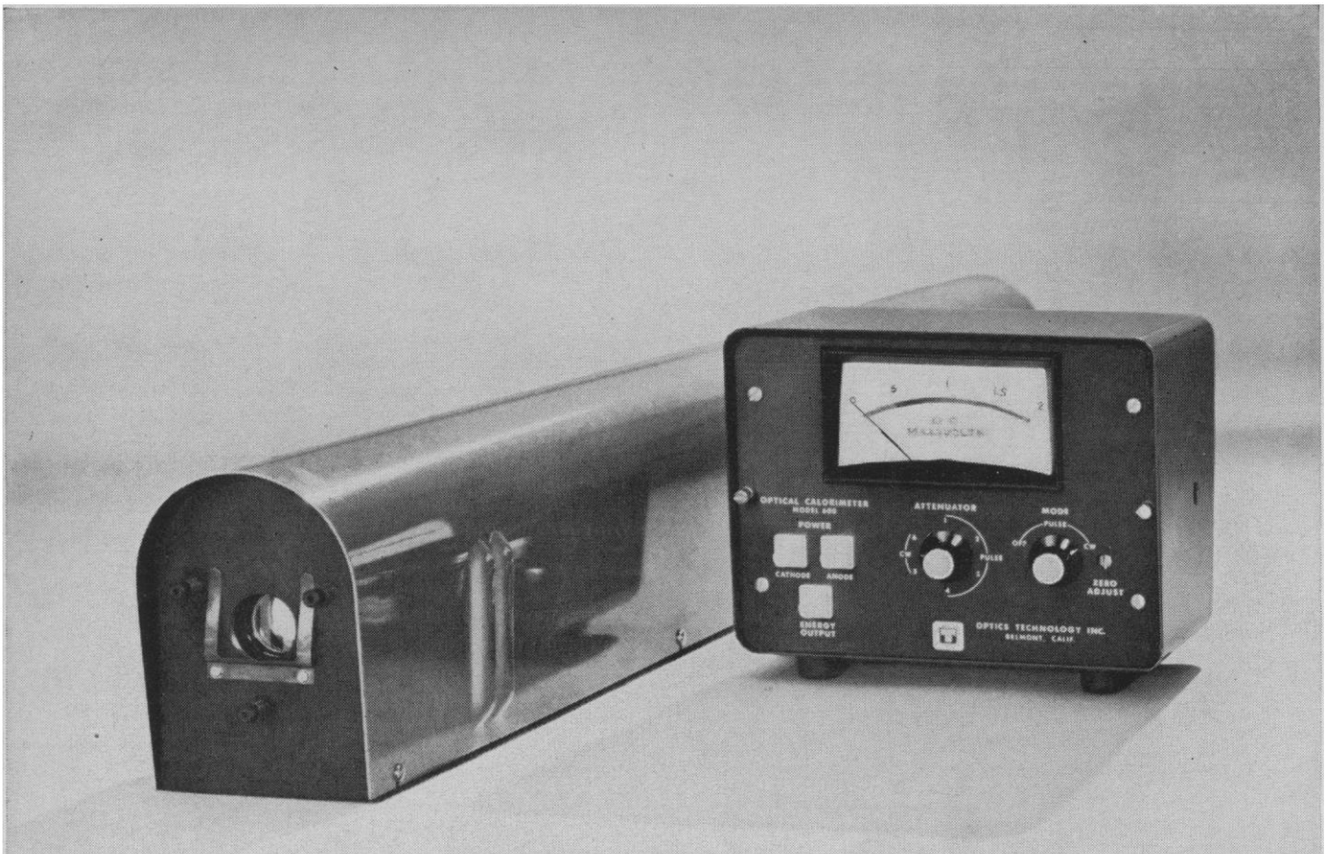
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Part of the array of dipoles of the radar antenna at the Jicamarca Radar Observatory near Lima, Peru. The observatory, now in the final stages of construction, is a joint venture of the Central Radio Propagation Laboratory of the U.S. National Bureau of Standards (Boulder, Colo.) and the Instituto Geofísico del Perú, Lima. It is situated in a deep valley in the foothills of the Andes. The antenna array covers some 22 acres. Each dipole is about 10 feet long, a half wavelength at the operating frequency of 50 megacycles per second. The peak transmitter power is about 5 megawatts. See page 389.



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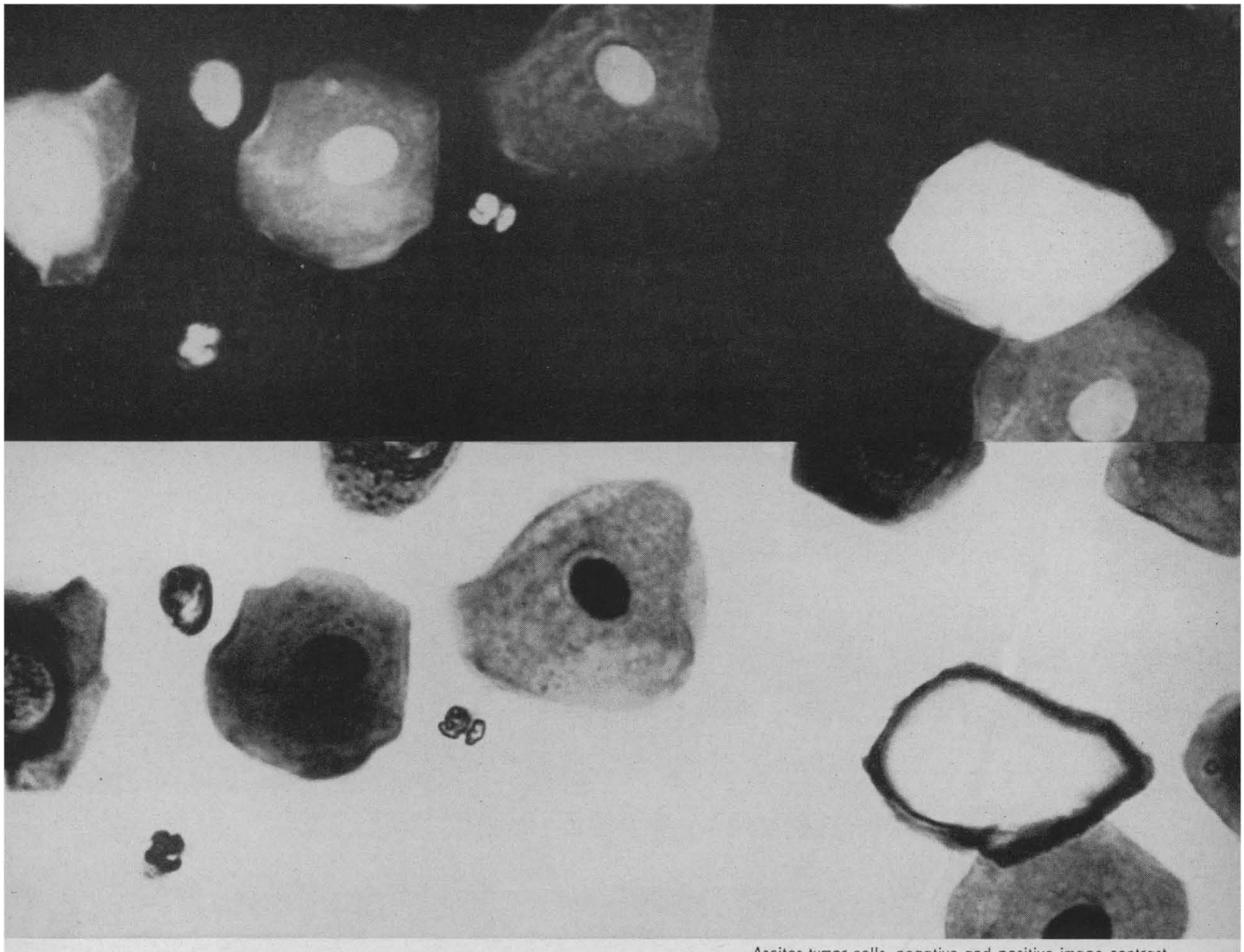

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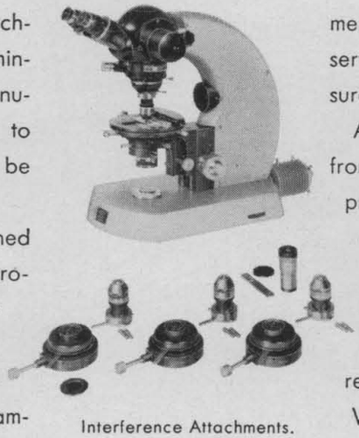

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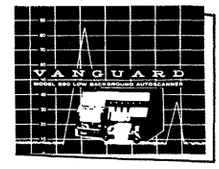
Informative brochure available! If you would like detailed information about Vanguard's Model 880 Autoscanner, send for this free brochure. It outlines distinctive features and lists all operational characteristics.



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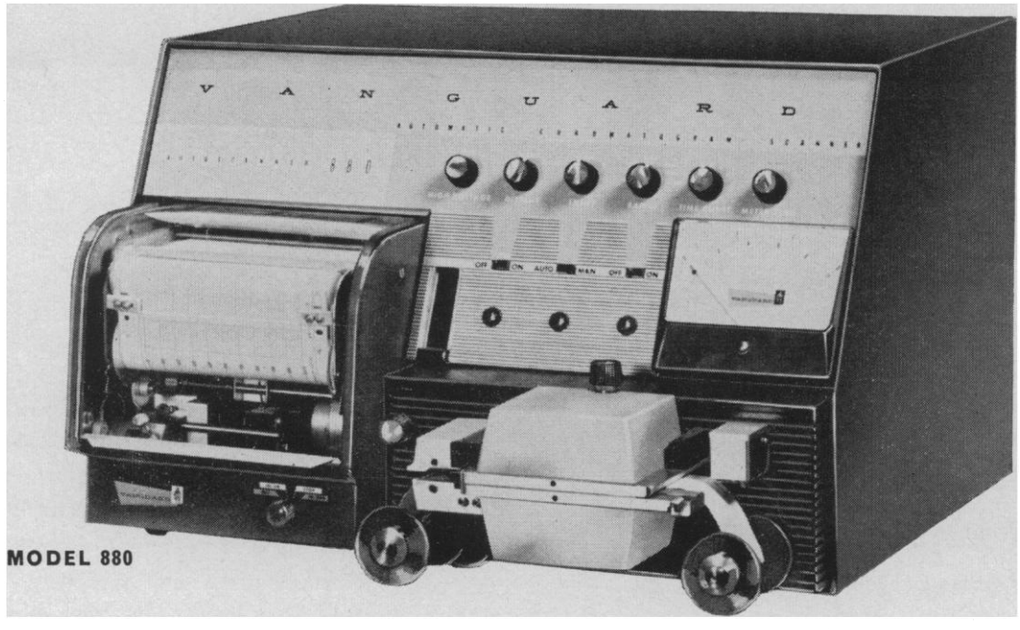

MODEL 880

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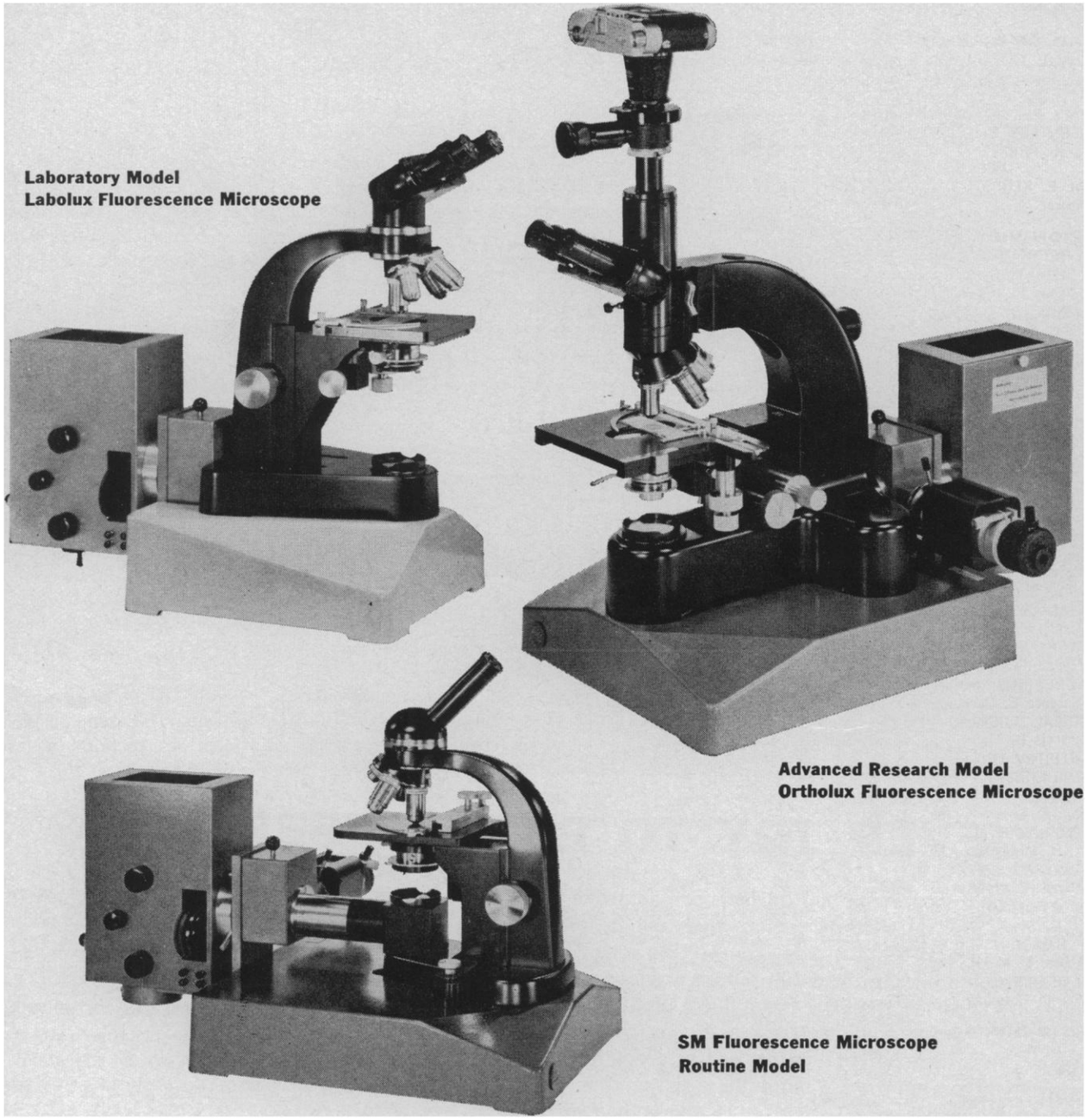

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1 February 1963, Volume 139, Number 3553

SCIENCE

Government Support of Research

The legislative process for support of science seems to function best when a spectacular package is involved. Although Congress has attempted to give every encouragement to science over the past decade, there has been particular emphasis on research in medicine, high-energy nuclear physics and, more recently, space. It is almost certain that funds for space research will increase sharply. This is an important frontier, but only one of many. There are negative features of these great spectaculars. The President's request for $98.8 billion is certain to come under attack, but appropriations for defense and space research are unlikely to suffer. Other areas are relatively more vulnerable, and some may receive less money during the next fiscal year. Formerly, when one segment of research was supported on a large scale, other areas also benefited. With research and development appropriations now taking an unprecedented proportion of the national budget, further expansion across the board may not come so easily as in the past.

Another negative feature arises from the fact that the number of competent investigators is limited. The great expansion in space research will in part be accomplished by recruiting workers away from other fields. Many areas of science which have promise of yielding important philosophical and practical results will suffer as talent is withdrawn.

Still another negative feature is a psychological one. Scientists, like other human beings, are affected by fads. They tend to go with the crowd. The research worker who does not go with the crowd encounters a rather bleak climate. He is likely to be regarded by administrators and laymen as an odd fellow who is not in tune with the times. Under this pressure, undue emphasis develops on glamorous areas.

Government policies are shaping academic research in this country, but who in government has as his primary responsibility the duty to give continuing serious thought to the effects—positive and negative—of excessive concentration on a few areas? Support for research should be balanced and should reflect needs and opportunities throughout science. One organization which could be helpful is only sporadically called on. The National Academy of Sciences is broadly representative of the sciences. Its members are drawn from all sections of the country. Unfortunately the Academy has recently had little influence in formulating broad policies with respect to science. The organization has been used principally as an agent to generate still more spectaculars such as the International Geophysical Year. The National Academy of Sciences–National Research Council could serve a broader function, and the government would be well advised to avail itself of this source of wisdom and experience.—P.H.A.

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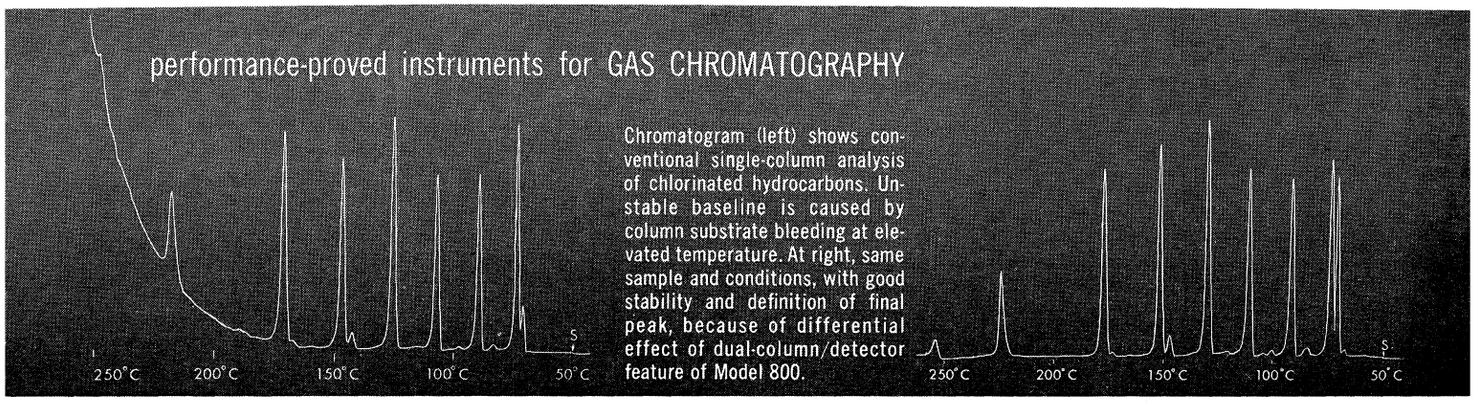

Chromatogram (left) shows conventional single-column analysis of chlorinated hydrocarbons. Unstable baseline is caused by column substrate bleeding at elevated temperature. At right, same sample and conditions, with good stability and definition of final peak, because of differential effect of dual-column/detector feature of Model 800.

NEW CHROMATOGRAPH'S DIFFERENTIAL FLAME IONIZATION DETECTOR ADDS SENSITIVITY TO BASELINE STABILITY

Perkin-Elmer's new Model 800 is the first gas chromatograph to give you a differential flame ionization detector. Combined with dual columns and a highly-accurate linear temperature programmer, it provides high sensitivity and range with maximum baseline stability, particularly in the analysis of trace components at high temperatures.

Dual columns can completely cancel out the effects of column substrate bleeding during either programmed or isothermal analyses, allowing full use of the ionization detector's inherent sensitivity. Dual injection ports permit you to use either column independently.

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For more information on the Model 800 gas chromatograph, write to Instrument Division, Perkin-Elmer Corporation, 910 Main Avenue, Norwalk, Connecticut.

Meetings

Meeting Notes

The following are scheduled meetings to be held in the U.S.S.R. and other Eastern European countries. Similar lists will appear quarterly in this section. In cases where the dates, location, or organizers and their addresses are not known, the Academy of Sciences of the nation in question is given as a source.

March 1963

22. **Industrial Crystallization**, seminar, Usti nad Labem, Czechoslovakia. (Physical Chemistry Laboratory, Research Inst. for Inorganic Chemistry, Usti nad Labem)

March (no dates given)

Mechanization and Automation of **Geodetic, Cartographic**, and **Photogrammetric** Work, seminar, Prague, Czechoslovakia. (B. Volfik, Research Inst. for Geodesy, Topography, and Cartography, Prague)

Theoretical and Experimental Investigation of **Titanium Alloys**, 3rd seminar, Moscow, U.S.S.R. (A. A. Baykov Inst. of Metallurgy, Laboratory of the Chemistry of Metal Alloys, Moscow)

Geodetic seminar and conf., Prague, Czechoslovakia. (B. Volfik, Research Inst. for Geodesy, Topography, and Cartography, Prague)

April 1963 (no dates given)

Use of **Electronic Computers** in the Structural Analysis of Crystals, 3rd conf., Novosibirsk, U.S.S.R. (Academy of Sciences of the U.S.S.R., Lenin Prospekt, Moscow)

Public Health Information, 2nd natl. scientific conf., Prague, Czechoslovakia. (Central Inst. for Public Health Information, Sokolska 54, Prague 2)

April–May 1963

Methods of Preparing Information for **Program Control Machines**, 2nd interdepartmental conf., Kiev, Ukrainian S.S.R. (Academy of Sciences of the Ukrainian S.S.R., Kiev)

May 1963

9–11. Hungarian **Mining and Metallurgical Soc.**, aluminum conf., Budapest and Szekesfehervar. (Orszagos, Magyar Banyaszati es Kohaszti Egyesulet Aluminum Konferencia, Szabadsag ter 17, III. em. 307, Budapest 5)

13–16. **Histochemistry**, 1st intern., Warsaw, Poland. (H. G. Godlewski, Inst. of Experimental Pathology, Polish Acad. of Sciences, Dworkowa 3, Warsaw 12)

20–22. **Pharmaceutical** congr., 4th natl., Gottwaldov, Czechoslovakia. (Preparatory Committee, Gottwaldov, P.O. Box 14)

24–25. **Hospital Pharmacists**, Zwickau, East Germany. (Mr. Buettner, Heinrich-Braun Hospital, Zwickau)

28–31. **Gas Chromatography**, 4th symp., Leuna, Kreis Merseberg, East Germany. (Secretariat, Subcommission for Gas Chromatography, Leipzig 0 5, Permoserstrasse 15)

May (no dates given)

Oscillographic Polarography with Alternating Current, 2nd intern. colloquium, Bratislavia, Czechoslovakia. (Czechoslovenská Společnost Chemická Hradcanské Nam. 12, Prague 1)

Polish **Orthopedic** and **Traumatological Soc.**, 15th scientific conf., Lublin. (Secretariat, Main Administration of the Polish Orthopedic and Traumatological Soc., Warsaw, ul. Kopernik 43)

Hungarian **Optical** Conf., 2nd, Budapest. (Hungarian Soc. of Optics, Acoustics, and Film Techniques, Szabadsag ter 17, Budapest 5)

International Terminological Commission, Linguistics section, Intern. Committee of Slavists, Bautzen, East Germany. (German Acad. of Sciences, East Berlin)

Photon-detectors, intern. measurements conf., Budapest, Hungary. (Thomas Kemény Permanent Committee of Intern. Measurements Conf., P.O. Box 3, Budapest 5)

Spring 1963

Vitamins, intern. conf. of the Czechoslovak Medical Soc., Prague. (M. Bohdal, Secretary, Inst. for Research on Human Nutrition, Prague-Krc)

May–June 1963

Methods of Concentrating Elements, conf., Moscow, U.S.S.R. (Request invitation cards from Orgkomitet, Moskva, v 334, Vorob'yevskoye shosse, 47a, GEOKhI AN SSSR)

June 1963

4–7. **Silicate Industry**, 7th conf., Budapest, Hungary. (Conference Committee, Szilikátipar, Tudományos Egyesület, Technicka Háza, Szabadsag ter 17, Budapest 5)

10–12. **Sports Medicine**, 1st European congr., Prague, Czechoslovakia. (Congress Secretariat, Salmonovska 5, Prague 2)

10–14. Czechoslovak **Radiology** Congr., Karlovy Vary, Czechoslovakia. (Joseph Roesch, V. Borcove 2, Prague 6)

June (no dates given)

Hygienists, Epidemiologists, Microbiologists, and Infectionists, 4th Belorussian congr. (Academy of Sciences of the U.S.S.R., Lenin Prospekt, Moscow)

Ophthalmologists, 3rd all-Union conf., Novosibirsk, U.S.S.R. (Academy of Sciences of the U.S.S.R., Lenin Prospekt, Moscow)

Pediatrics, 12th section conf., Czechoslovak Medical Soc., Brno. (Z. Brunecky, First Pediatric Clinic, Brno)

June–July 1963

Steel, biennial conf., Moscow, U.S.S.R. (Academy of Sciences of the U.S.S.R., Lenin Prospekt, Moscow)

July 1963

6–11. **Materials and Structures**, Intern. Union Symp. on Measurement of Dynamic Stresses and Vibrations in Building, Budapest, Hungary. (Hungarian Acad. of Sciences, Akademia-utca 2, Budapest 5)

22–27. **Molecular Spectroscopy**, intern. meeting, Budapest, Hungary. (Hungarian Acad. of Sciences, Akademia-utca 2, Budapest 5)

August 1963

5–12. **Peat**, 2nd intern. congr., Leningrad, U.S.S.R. (Executive Committee, Presidium of Organization Bureau, Gorky St. 11, Moscow)

20–23. **Pharmacology**, 2nd intern., Prague, Czechoslovakia. (Z. Votava, Research Inst. for Pharmacy and Biochemistry, Prague)

25–29. **Nephrology**, 2nd intern. congr., Prague, Czechoslovakia. (V. Fencl, Inst. of Cardiovascular Research, Budejovicka 800, Prague 4-Krc)

27–31. **Scientific and Applied Photography**, 4th Hungarian conf., Budapest. (Alfred Polster, Hungarian Soc. for Optics, Acoustics and Cinematography, Szabadság ter 17, Budapest 5)

August–September

Microelements of the Far East, 2nd conf., Vladivostok, U.S.S.R. (Academy of Sciences of the U.S.S.R., Lenin Prospekt, Moscow)

Summer 1963

International Technical and Scientific Organization for Soaring Flight, world congr., Poland. (Polish Acad. of Sciences, Palace of Culture and Sciences, Warsaw)

September 1963

1–2. **Metallurgical** Congr., 30th, Prague, Czechoslovakia. (Czechoslovak Acad. of Sciences, Národní Tr. 3, Prague 1)

2–5. Non-Classical **Shell Problems**, symp., Warsaw, Poland. (Secretariat, Intern. Assoc. for Shell Structures Symp., Wspolna 32/46, P.O. Box 155, Warsaw 1)

6–9. **Physicians of Serbia**, 4th congr., Vrnjacka Banja, Yugoslavia. (Yugoslav Acad. of Sciences and Arts, Zrinski trg 11, Zagreb 1)

10–13. **Testing and Research Laboratories** for Materials and Structures, permanent commission, 17th meeting, Warsaw, Poland. (Polish Acad. of Sciences, Palace of Culture and Science, Warsaw)

15–21. **Slavists**, 5th intern. congr., Sofia, Bulgaria. (Bulgarian Acad. of Sciences, 7th November St. 1, Sofia)

16–21. **Postmagmatic Ore Formation** Problems, conf., Prague, Czechoslovakia. (M. Shtemprok, Central Geological Inst., Malostranske namesti. 19, Prague 1)

23–27. **Industrial Chemistry**, intern. assoc., 3th congr., Belgrade, Yugoslavia. (Yugoslav Acad. of Sciences and Arts, Zrinski trg. 11, Zagreb 1)

25–27. **Nitro-Compounds**, intern. symp., Warsaw, Poland. (T. Urbanski, Inst. of Technology, Politechnika, Koszykowa 75, Warsaw 10)

September 1963 (no dates given)

Czechoslovak Medical Soc., 21st intern. postgraduate medical course, Karlovy Vary. (J. Charvát, Secretary, Czechoslovak Soc. of Physical Medicine, Albertov 7, Prague 2)

Czechoslovak Ophthalmological Soc., 27th congr., Prague. (Emil Dienstbier, First Ophthalmological Clinic of the Faculty of General Medicine, Charles University, U nemocnice 2 (499), Prague 2)

Cardiology, intern. congr., Budapest, Hungary. (G. Gottsegen, National Inst. of Cardiology, Magyvard ter 1, Budapest 9)

Carpatho-Balkan Geological Assoc., 6th congr., Warsaw and Krakow, Poland. (Secretary General, Instytut Geologiczny, Grzegorzecka 81, Krakow)

October 1963 (no dates given)

Surgery Section, Czechoslovak Medical Soc., congr., Czechoslovakia. (Secretary of the Surgery Section, Soholska 31, Prague 2)

Electronic Calculating Machines, 4th colloquium, Magdeburg, East Germany. (Mathematics Inst., Technische Hochschule Otto von Guericke, Boleslav-Beirut-Platz 5, Postschiessfach 124, Magdeburg)

Statistical Quality Control, 8th colloquium, Madgeburg, East Germany. (East German Acad. of Sciences, Mohrenstrasse 39, Berlin W. 8)

Microwire and Resistance Measuring Instruments, 2nd scientific technical conf., Kishinev, Moldavian S.S.R. (Moldavian Acad., Kishinev)

Pure and Applied Physics, intern. union, 11th general assembly, Warsaw, Poland. (Polish Acad. of Sciences, Dworkowa 3, Warsaw 12)

October 1963 (no dates gives)

Medicine (Labor), 8th natl. symp., Mariansk Lazne, Czechoslovakia. (Frantisek Nuzl, Div. of Occupational Diseases and Industrial Toxicology, SFN, Plzen, Marxova 13)

October–November 1963

Technical and Scientific Films, 3rd intern. festival, Budapest, Hungary. (Hungarian Soc. of Mechanical Engineers, Szabadsag ter 17, Budapest 5)

Autumn 1963

Radiation Chemistry, 3rd all-union conf., U.S.S.R. (Academy of Sciences of the U.S.S.R., Lenin Prospekt, Moscow)

November 1963

21–23. **Forensic Physicians**, 10th conf., Prague, Czechoslovakia. (Czechoslovak Acad. of Sciences, Narodni Tr. 3, Prague 1)

1963 (no dates given)

Inquiries on the following meetings should be addressed to the Academy of Sciences of the U.S.S.R., Lenin Prospekt, Moscow.

Roentgenology and Radiology, 2nd conf., Sofia, Bulgaria. (Bulgarian Acad. of Sciences, Dept. of Biological and Medicinal Sciences, 7th November St. 1, Sofia)

Crystallochemistry, 5th conf., U.S.S.R.

Heat and Mass Transfer, Minsk, U.S.S.R.

Microminiaturization of **Radio and Electronic Equipment**, 2nd conf., U.S.S.R.

Vibrations of Mechanical Systems, 4th conf., probably Riga, U.S.S.R.

Inorganic Chemistry, 5th Ukrainian Repub. conf., U.S.S.R.

Lithological conf., 6th all-union, U.S.S.R.

Medicinal Plant Resources, all-union conf., U.S.S.R.

Manufacturing Methods: Physical Properties, and Electron Structure of Refractory Metals, Compounds, and Alloys, 5th all-union, U.S.S.R.

Nuclear Fission, Physics Conf., U.S.S.R.

Noble Metals Analysis, 6th all-union conf., Krasnoyarks, U.S.S.R.

Young Biologists, 4th all-union scientific conf., Kiev, U.S.S.R.

High Energy **Particle Accelerators** and Instrumentation, 3rd conf., Moscow.

International Medico-Athletic Federation, 14th congr., Prague, Czechoslovakia. (Czechoslovak Acad. of Sciences, Narodní Tr. 3. Prague 1)

Spring 1964

Easter. Applied **Psychology**, intern. assoc., 15th congr., Dubrovnik, Yugoslavia. (Z. Bujas, Marulićev trg 19, Zagreb, Yugoslavia)

May 1964

6–10. **East German Geographic Soc.**, 7th meeting, Leipzig, East Germany. (The Society, Georgie Dimitroff Platz 1, Leipzig Cl)

May–June 1964

Telecommunications Union, 3rd assembly of the consultative committee, Moscow, U.S.S.R. (Academy of Sciences of the U.S.S.R., Lenin Prospekt, Moscow)

June 1964

Balkan Medical Week, 7th, Sofia, Bulgaria. (Bulgarian Acad. of Sciences, 7 November St. 1, Sofia)

Forthcoming Events

February

18–20. American **Standards** Assoc., natl. conf., New York, N.Y. (ASA, 10 E. 40 St., New York 16)

18–20. **Biophysical** Soc., annual, New York, N.Y. (A. Mauro, Rockefeller Inst., New York)

18–20. **Electrochemistry**, 1st Australian conf., part II, Hobart, Tasmania. (J. N. Baxter, Chemistry Dept., Univ. of Tasmania, Hobart)

18–25. Expert Committee on **Food Additives**, FOA/WHO, Rome, Italy. (Intern. Agency Liaison Branch, Office of the Director General, Food and Agriculture Organization, Viale delle Terme di Caracalla, Rome)

19–22. **Radiochemistry**, inter-American conf., Montevideo, Uruguay. (Pan American Union, Washington 6)

20–22. Fundamental **Cancer** Research, annual symp., Houston, Tex. (L. Dmochowski, Section of Virology and Electron Microscopy, M. D. Anderson Hospital, Houston 25)

20–22. **Solid-State Circuits**, intern. conf., Philadelphia, Pa. (F. J. Witt, Bell Telephone Laboratories, Inc., Murray Hill, N.J.)

20–23. National Assoc. for Research in **Science Teaching**, Washington, D.C. (J. D. Novak, Biological Science Dept., Purdue Univ., Lafayette, Ind.)

20–24. Diseases of the **Chest**, intern. congr., New Delhi, India. (M. Kornfeld, American College of Chest Physicians, 112 E. Chestnut St., Chicago 11, Ill.)

21–22. American Soc. for **Quality Control**, regional conf., Las Vegas, Nev. (S. R. Wood, Dept. 61, Bldg. 160, Aerojet-General Corp., Azusa, Calif.)

22–23. American **Psychopathological** Assoc., annual, New York, N.Y. (F. A. Freyhan, c/o St. Elizabeths Hospital, Washington 20, D.C.)

23–28. American Soc. for **Testing** and **Materials**, Atlantic City, N.J. (H. H. Hamilton, 1916 Race St., Philadelphia 3, Pa.)

24–25. Unit Processes in **Hydrometallurgy**, symp., Dallas, Tex. (F. T. David, Colorado School of Mines, Golden)

24–27. **Diffusion**, intern. conf., Palm Springs, Calif. (O. H. Miller, School of Pharmacy, Univ. of Southern California, Los Angeles 7)

24–28. American Inst. of **Mining, Metallurgical, and Petroleum Engineers**, annual, Dallas, Tex. (E. Kirkendall, AIME, 345 E. 47 St., New York 17)

25–27. Advanced **Marine Engineering** Concepts for Increased Reliability, symp., Ann Arbor, Mich. (G. L. West, Jr., Dept. of Marine and Nuclear Engineering, Univ. of Michigan, Ann Arbor)

25–1. **Environmental Engineering**, natl. conf., Atlanta, Ga. (W. H. Wisely, American Soc. of Civil Engineers, 345 E. 47 St., New York, N.Y.)

26–27. **Dairy Engineering**, natl. conf., East Lansing, Mich. (C. W. Hall, Dept. of Agricultural Engineering, Michigan State Univ., East Lansing)

26–1. Society of **Plastics Engineers**, annual technical conf., Los Angeles, Calif. (G. P. Kovach, Foster Grant Co., 289 N. Main St., Leominster, Mass.)

27–3. American College of **Cardiology**, Los Angeles, Calif. (P. Reichert, 350 Fifth Ave., New York 1, N.Y.)

28–2. Experimental Aspects of **NMR Spectroscopy**, Pittsburgh, Pa. (W. A. Straub, Applied Research Laboratory, U.S. Steel Corp., Monroeville, Pa.)

March

1–3. **Developing Brain and Binding Sites** of Brain Biogenic Amines, intern. symp., Galesburg, Ill. (H. E. Himwich, Research Div., Galesburg State Research Hospital, Galesburg)

2–6. Canadian Assoc. of **Radiologists**, annual, Quebec, Canada. (J. L. Léger, 1555 Summerhill Ave., Montreal 25, P.Q., Canada)

4–6. Association of **Iron and Steel Engineers**, western meeting, Los Angeles, Calif. (T. J. Ess, 1010 Empire Bldg., Pittsburgh 22, Pa.)

4–6. **Wildlife Management** Inst., Detroit, Mich. (C. R. Gutermuth, 709 Wire Bldg., Washington 5)

4–8. **Analytical Chemistry and Applied Spectroscopy**, 14th annual, Pittsburgh, Pa. (W. A. Straub, Applied Research Laboratory, U.S. Steel Corp., Monroeville, Pa.)

4–9. **Astronautics**, 3rd Inter-American symp., São Paulo, Brazil. (Symp. Secretariat, Sociedade Interplanetaria Brasileira, Caixa Postal 6450, São Paulo)

5–7. **Plant Engineering and Maintenance**, 4th southeastern seminar, Charlotte, N.C. (A. Brown, Service Engineering Associates, Inc., P.O. Box 2665, Atlanta, Ga.)

5–8. Committee on **Textile Materials**,

New York, N.Y. (American Soc. for Testing and Materials, 1916 Race St., Philadelphia 3, Pa.)

5–9. Application of **Radioisotopes in Hydrology**, symp., Tokyo, Japan. (IAEA, 11 Kärntner Ring, Vienna 1, Austria)

6. American Assoc. of **Psychiatric Clinics for Children**, annual, Washington, D.C. (American Psychiatric Assoc., 1700 18th St., NW, Washington 9)

6–9. American **Orthopsychiatric** Assoc., annual, Washington, D.C. (American Psychiatric Assoc., 1700 18th St., NW, Washington 9)

7–9. German Soc. of **Endocrinology**, 10th symp., Vienna, Austria. (H. Nowakowski, Deutsche Gesellschaft für Endokrinologie, c/o II. Medizinische Universitätsklinik, Hamburg-Eppendorf, Germany)

9. **Linguistics**, 8th annual, New York, N.Y. (L. Pap, State Univ. College, New Paltz, N.Y.)

10–13. American Inst. of **Chemical Engineers**, New Orleans, La. (J. Henry, 345 E. 47th St., New York, N.Y.)

10–20. **Nutrition** Problems in Latin America, 5th U.N. Food and Agriculture Organization conf., Lima, Peru. (Intern. Agency Liaison Branch, Office of the Director General, Viale della Terme di Caracalla, Rome, Italy)

11–16. Numerical **Weather Forecasting**, World Meteorological Organization/International Union of Geodesy and Geophysics, intern. symp., Oslo, Norway. (World Meteorological Organization, Geneva, Switzerland)

12–13. Ecological Implications of Changes in the Amount of **Carbon Dioxide** in the Atmosphere, New York, N.Y. (Conservation Foundation, 30 E. 40 St., New York 16)

14. Assoc. of **Vitamin Chemists**, Chicago, Ill. (H. C. Spruth, Abbott Laboratories, 14th and Sheridan, North Chicago)

14–15. Advanced **Air-Cooled Reactor**, symp., London, England. (Secretary, British Nuclear Energy Soc., 1–7 Great George St., London, S.W.1)

14–15. Central **Neuropsychiatric Hospital** Assoc., annual, Chicago, Ill. (American Psychiatric Assoc., 1700 18th St., NW, Washington 9)

14–15. **Psychotherapy Teaching**, Philadelphia, Pa. (Temple Univ. Medical Center, Broad and Ontario Sts., Philadelphia 40)

15–16. Pacific **Computer** Conf., Pasadena, Calif. (E. Schubert, Systems Div., Beckman Instruments, 2400 Harbor Blvd., Fullerton, Calif.)

17–24. **Military Medicine and Pharmacy**, 17th intern. congr., Caracas, Venezuela. (Organizing Committee, c/o Direción del Servico de Sanidad Militar, Hospital Central de las Fuerzas Armadas Urbanización San Martin, Caracas).

18–22. American Soc. for **Metals**, western metal exposition and congr., Los Angeles, Calif. (W. J. Hilty, ASM, Metals Park, Ohio)

18–22. **Driving Simulation** as a Research Tool, Columbus, Ohio. (B. W. Stephens, U.S. Dept. of Commerce, Bureau of Public Roads, Washington 25)

18–28. International **Astronomical** Union, 20th symp., Canberra and Sydney, Australia. (D. H. Sadler, c/o Royal Greenwich Obesrvatory, Hertsmonceux Castle, Hailsham, Sussex, England)

19–21. **Bionics**, 2nd symp., Dayton, Ohio. (Lt. Col. L. M. Butsch, Jr., Aeronautical Systems Division, ASRNEB-3, Wright-Patterson AFB, Ohio)

20–22. **Bone Dynamics**, intern. symp., Detroit, Mich. (H. M. Frost, Dept. of Orthopaedic Surgery, Henry Ford Hospital, Detroit 2)

20–29. **Quantitative Spectroscopy** at Elevated Temperatures and Selected Applications in Space Science. Pasadena, Calif. (D. L. Wennersten, Air Force Office of Scientific Research, Washington 25)

21–24. International Assoc. for **Dental Research**, 41st annual, Pittsburgh, Pa. (J. Muhler, 1120 W. Michigan St., Indianapolis 2, Ind.)

21–24. International College of **Applied Nutrition**, Pasadena, Calif. (D. C. Collins, 7046 Hollywood Blvd., Suite 503, Los Angeles 28, Calif.)

24–28. Institute of **Radio Engineers**, intern. convention. New York, N.Y. (G. W. Bailey, 1 E. 79 St., New York)

25–27. High Frequency **Communication**, convention. London, England. (Secretary, Institution of Electrical Engineers, Savoy Pl., London, W.C.2)

25–28. American Assoc. of **Petroleum Geologists**, 48th annual, Houston, Tex. (J. M. Parker, Kirby Petroleum Co., 518 Patterson Bldg., Denver 2, Colo.)

25–28. Society of Economic **Paleontologists and Mineralogists**, Houston, Tex. (L. C. Pray, Ohio Oil Co., Box 269, Littleton, Colo.)

27–28. **Drugs and Animal Behaviour**, symp. (by invitation only). London, England. (Ciba Foundation, 41 Portland Pl., London, W.1)

27–29. **Photochemistry**, intern. symp., Rochester, N.Y. (W. H. Wyatt, Air Force Office of Scientific Research, Washington 25)

28–29. Evolution of the **Atherosclerotic Plaque**, intern. symp., Chicago, Ill. (Miss M. Brookes, Chicago Heart Assoc., 22 W. Madison St., Chicago 2)

28–30. Natl. Soc. for **Programmed Instruction**, annual, San Antonio, Tex. (NSPI, Trinity University, 715 Stadium Dr., San Antonio 12, Texas)

29–31. American Ethnological Soc., Ithaca, N.Y. (E. Friedl, Queens College, Flushing 67, N.Y.)

29–31. American Soc. of **Internal Medicine**, annual, Denver, Colo. (ASIM, 3410 Geary Blvd., San Francisco 18, Calif.)

31–4. National **Science Teachers** Assoc., natl. convention, Philadelphia, Pa. (R. H. Carleton, NSTA, 1201 16th St., NW, Washington 6)

31–5. American *Chemical* Soc., natl., Los Angeles, Calif. (A. T. Winstead, National Meetings Dept., ACS, 1155 16th St., NW, Washington 6)

31–5. National Assoc. of **Recreational Therapists**, annual, Norman, Okla. (American Psychiatric Assoc., 1700 18th St., NW, Washington 9)

April

1–2. **Process Automation**, 5th symp., Santa Monica, Calif. (D. Kader, P.O. Box 1065, Canoga Park, Calif.)

1–27. World **Meteorological** Organization, 4th congr., Geneva, Switzerland. (WMO, Secretariat, Geneva)

3–5. American Soc. of **Internal Medicine**, annual, Atlantic City, N.J. (ASIM, 3410 Geary Blvd., San Francisco 18, Calif.)

3–5. **Streamflow Regulation** for Quality Control, symp., Cincinnati, Ohio. (J. E. McLean, Field Operations Section, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Pkwy., Cincinnati 26)

4–5. Agricultural **Meteorology**, 5th natl. conf., Lakeland, Fla. (American Meteorological Soc., 45 Beacon St., Boston 8, Mass.)

7–13. Panamerican **Diabetic** Congr., 2nd, Chicago, Ill. (Diabetic Inst. of America, Inc., Suite 1646, Chicago 2, Ill.)

8–10. **Feedback Mechanisms in the Nervous System**, Villahermosa, Mexico. (E. Eidelberg, Div. of Neurobiology, St. Joseph's Hospital, 350 W. Thomas Rd., Phoenix, Ariz.)

10–11. Engineering Aspects of **Magnetohydrodynamics**, 4th symp., Berkeley, Calif. (G. S. Janes, Avco-Everett Research Laboratory, Everett 49, Mass.)

11–13. Natural **Radiation** Environment, intern. symp., Houston, Tex. (J. A. S. Adams, Dept. of Geology, Rice Univ., P.O. Box 1892, Houston 1)

14–18. **Electrochemical** Soc., Pittsburgh, Pa. (ES, 30 E. 42 St., New York 17)

15–16. American Soc. for **Artificial Internal Organs**, annual, Atlantic City, N.J. (B. K. Kusserow, Medical College of Vermont, Burlington)

16–18. **Optical Masers**, intern. symp., New York, N.Y. (L. Bergstein. Symp. Committee, Polytechnic Inst. of Brooklyn, 55 Johnson St., Brooklyn 1, N.Y.)

16–19. USAF **Aerospace Fluids and Lubricants** Conf. (unclassified), San Antonio, Tex. (J. Harmon, Southwest Research Inst., 8500 Culebra Rd., San Antonio)

16–20. British Inst. of **Radio Engineers**, Southampton, England. (BIRE, 9 Bedford Sq., London W.C.1, England)

16–20. Federation of American Societies for **Experimental Biology**, annual, Atlantic City, N.J. (M. O. Lee, 9650 Wisconsin Ave., NW, Washington 14)

16–24. **Forensic Immunology, Medicine, Pathology, and Toxicology**, 3rd intern. meeting, London, England. (I. Sunshine, 2121 Adelbert Rd., Cleveland, Ohio)

17–19. Institute of **Environmental Sciences**, technical meeting and equipment exposition, Los Angeles, Calif. (Natl. Office, P.O. Box 191, Mt. Prospect, Ill.)

17–19. **Nonlinear Magnetics**, intern. conf., Washington, D.C. (Inst. of Radio Engineers, 1 E. 79 St., New York 21)

17–19. **Plastics**, joint congr. of West Germany, Switzerland, and Austria, Vienna. (Wirtschaftsförderungsinstitut der Bundeskammer der gewerblichen Wirtschaft, 3 Hoher Markt, Vienna 1, Austria)

17–20. American **Astronomical** Soc., meeting, Tucson, Ariz. (P. M. Routly, 265 Fitz Randolph Rd., Princeton, N.J.)

17–20. American **Geophysical** Union, annual, Washington, D.C. (AGU, 1515 Massachusetts Ave., NW, Washington 5)