SCIENCE

27 October 1961

Vol. 134, No. 3487

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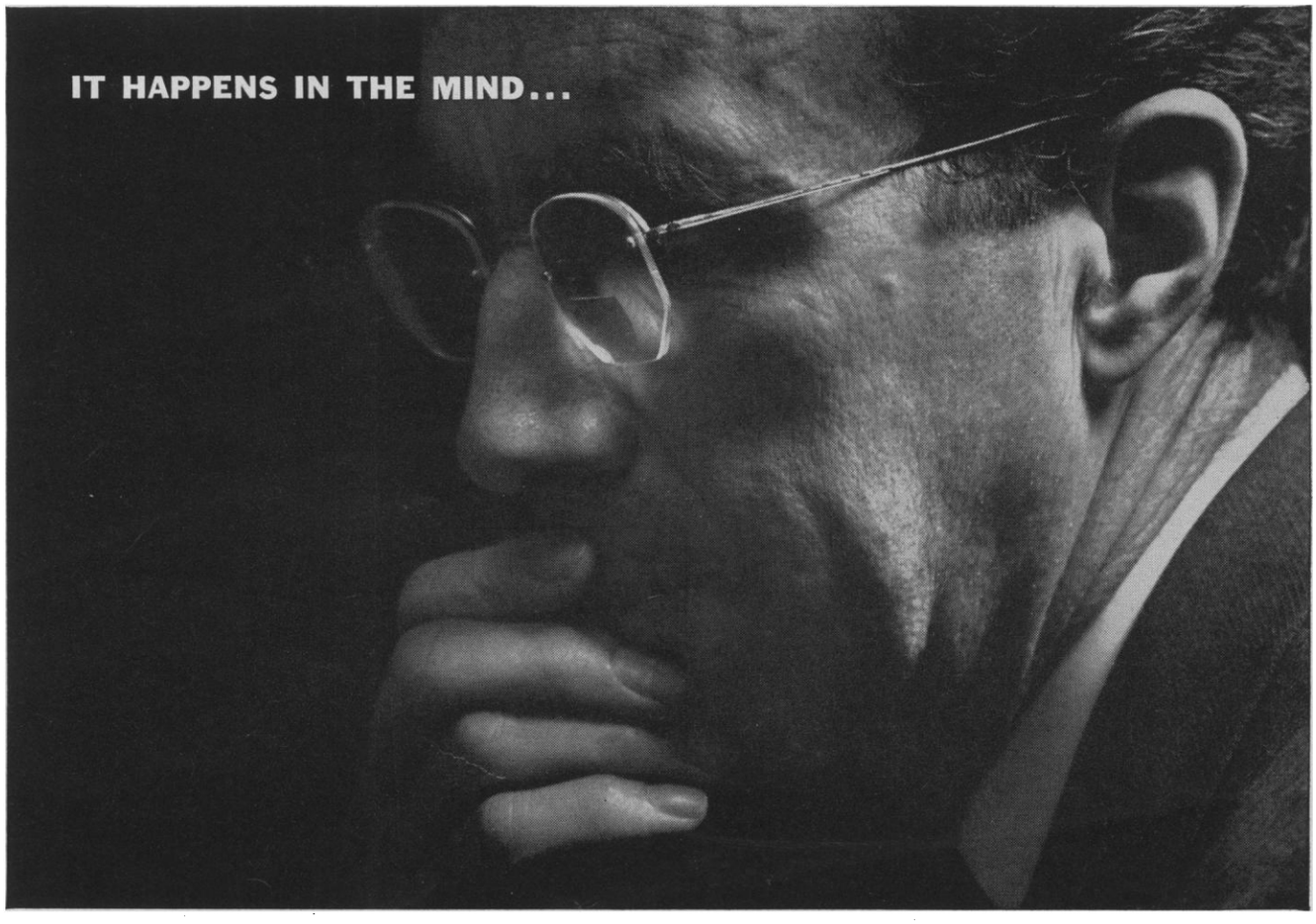

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Cover Hole drilled in an abalone (*Haliotus fulgens*) shell by a large octopus (arm spread, 1.5 meters) (about × 30). See page 1366. [A. O. Flechsig, Scripps Institution of Oceanography]

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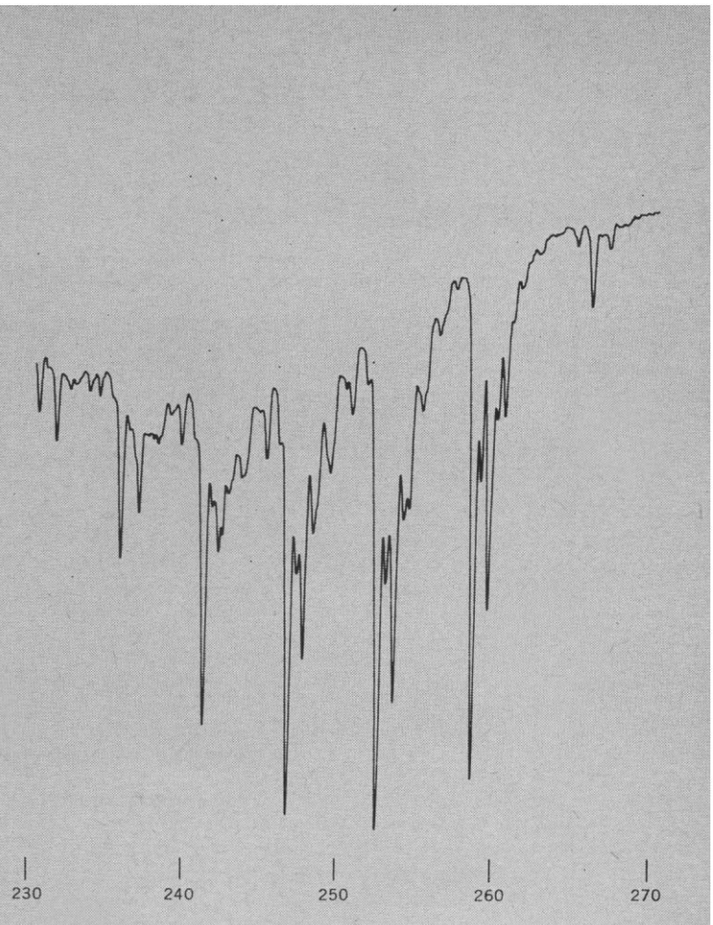

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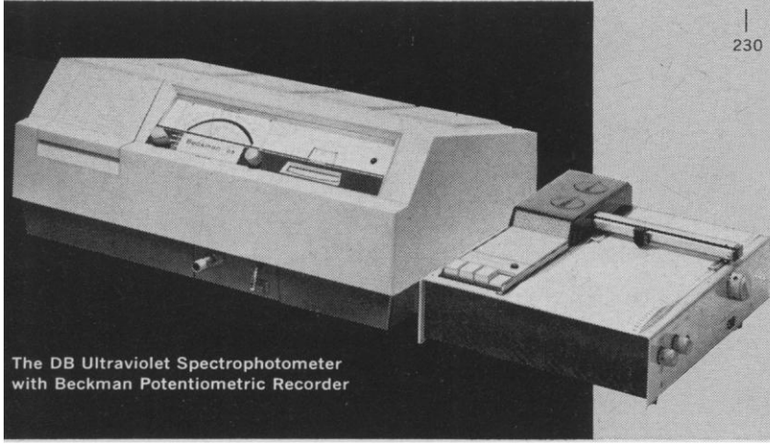

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Program Content

1. The two-session AAAS General Sessions, "Moving Frontiers of Science," Part I—Speakers: Howard A. Meyerhoff and Arthur R. von Hippel; Harrison Brown, presiding. Part II—Speakers: Halton C. Arp and E. W. Fager; Harrison Brown, presiding.
2. The 29th John Wesley Powell Memorial Lecture. Speaker: Glenn T. Seaborg; Paul M. Gross, presiding.
3. On "AAAS Day," the four broad, interdisciplinary symposia—Physics of the Upper Atmosphere; Geochemical Evolution—The First Five Billion Years; Existing Levels of Radioactivity in Man and His Environment; and Water and Climate—arranged by AAAS Sections jointly.
4. The Special Sessions: AAAS Presidential Address and Reception; Joint Address of Sigma Xi and Phi Beta Kappa by Harrison Brown; the Tau Beta Phi Address by John A. Logan; National Geographic Society Illustrated Lecture; and the second George Sarton Memorial Lecture by Joseph Kaplan.
5. The programs of all 18 AAAS Sections (specialized symposia and contributed papers).
6. The programs of the national meetings of the American Astronomical Society, American Society of Criminology, American Nature Study Society, American Society of Naturalists, American Society of Zoologists, Beta Beta Beta Biological Society, Biometric Society (WNAR), National Association of Biology Teachers, Scientific Research Society of America, Society for General Systems Research, Society of Protozoologists, Society of Systematic Zoology, and the Society of the Sigma Xi.
7. The multi-sessioned special programs of the American Astronautical Society (Hugh L. Dryden as dinner speaker), American Physiological Society, American Psychiatric Association, Association of American Geographers, Ecological Society of America, National Science Teachers Association, National Speleological Society —and still others, a total of some 70 to 80 participating organizations.
8. The sessions of the Academy Conference, the Conference on Scientific Communication, and the Conference on Scientific Manpower.
9. The sessions of the AAAS Cooperative Committee on the Teaching of Science and Mathematics, of the AAAS Committee on Science in the Promotion of Human Welfare.
10. Titles of the latest foreign and domestic scientific films to be shown in the AAAS Science Theatre.
11. Exhibitors in the 1961 Annual Exposition of Science and Industry and descriptions of their exhibits.

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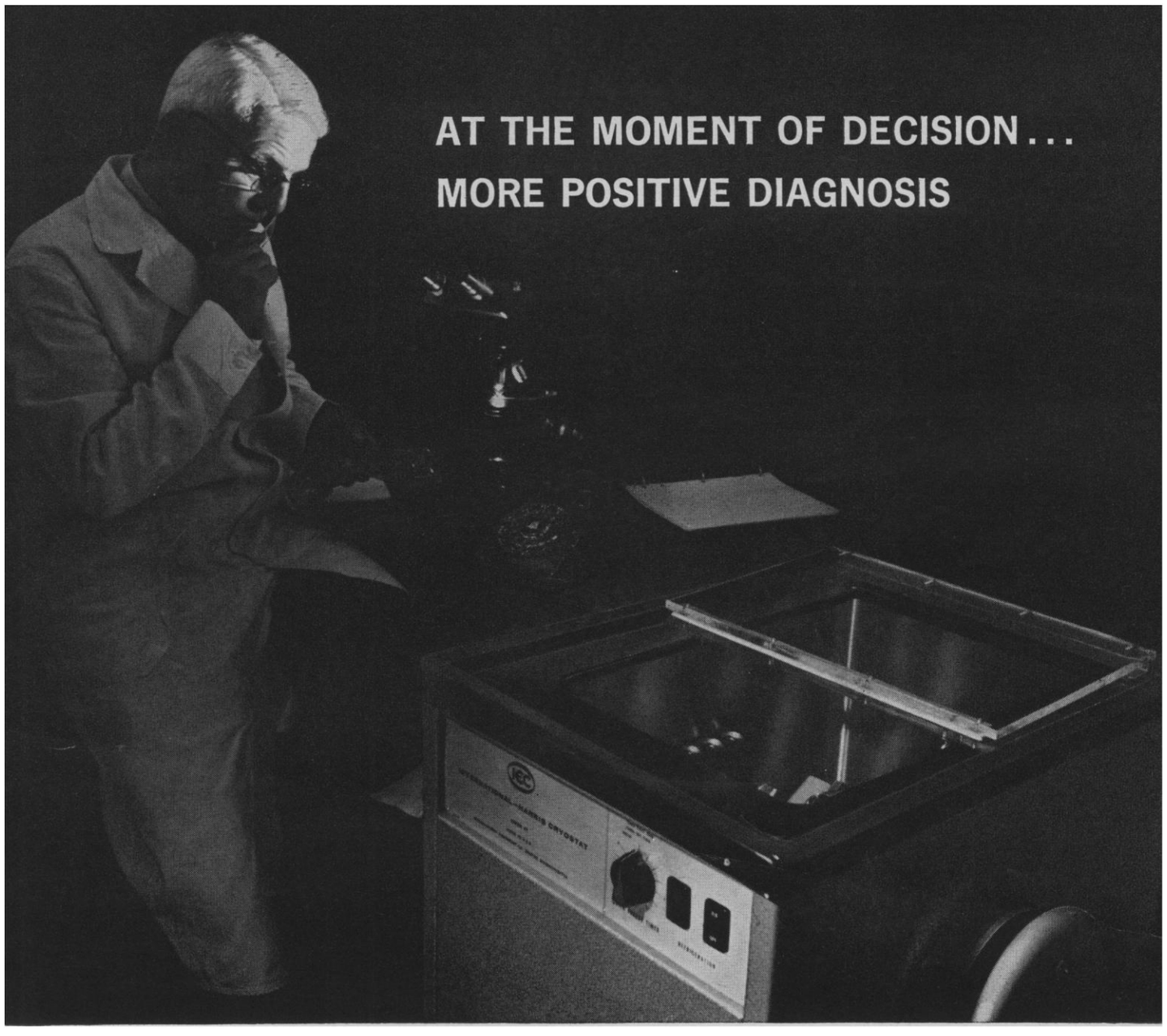

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Editorial correspondence should be addressed to SCIENCE, 1515 Massachusetts Ave., NW, Washington 5, D.C. Manuscripts should be typed with double spacing and submitted in duplicate. The AAAS assumes no responsibility for the safety of manuscripts. Opinions expressed by authors are their own and do not necessarily reflect the opinions of the AAAS or the institutions with which the authors are affiliated. For detailed suggestions on the preparation of manuscripts, see *Science* **125**, 16 (4 Jan. 1957).

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Investment in Education

"Economic growth is generated not only by real capital in the form of tools and machinery, but also by men. And just as technological improvement increases the efficiency of machinery, so education increases the efficiency of manpower. Indeed, recent statistical investigations tend to show that the improvement in the 'human factor' accounts for a major part of economic growth."

The quotation is from one of the working documents for the Conference on Economic Growth and Investment in Education, held last week in Washington by the Organization for Economic Cooperation and Development. If the initials of that organization—OECD—are unfamiliar, the organization itself is very new, having come into being on September 30. But OECD has a longer history as OEEC—the Organization for European Economic Cooperation which was established in 1948 to administer Marshall Plan aid in the economic reconstruction of Europe following World War II.

The change of name and the location of the conference both mark the fact that in OECD Canada and the United States have joined 18 European countries in planning for the economic development not only of the West but also of the less developed regions of the world. The topic selected for the first OECD conference reflects the growing recognition that money spent on education is an investment in a nation's future.

The evidence that education constitutes a profitable form of investment adds a powerful dimension to educational thinking, but does not, let it be immediately agreed, depreciate other values of education. Assistant Secretary of State Philip H. Coombs reminded the delegates that "we can today talk candidly and openly about the practical economic contribution of education without seeming to betray, belittle, or ignore its other vital purposes."

Considering education as a national investment leads directly to the question of how the educational budget can be invested most profitably. How much of the total budget should be devoted to education? How should the educational fraction be divided among elementary, secondary, and higher educational levels? How much should go to technical education? Belgium and Brazil, Germany and Greece must answer such questions in terms of their own individual assets, problems, and aspirations. In the decentralized educational system of the U.S., these questions can also be studied on a state-by-state basis.

The repeatedly recognized fact that economic growth is increasingly dependent on specialized competence in science, technology, and their industrial and social management leads directly to the conclusion that educational planning must pay special attention to the development of these kinds of competence. And this conclusion, in turn, raises several demanding implications for scientific and technical education. The research approach must be more widely applied to education itself. Long-range educational planning is essential, but the planning must allow flexibility to adjust means and details to the changes that take place in science itself. Planning should be cooperative. Economists will carry part of the responsibility, for economic analysis and planning lie in their area of special competence. But scientists, pure and applied, must share the responsibility, for science and its problems, progress, and applications constitute their area of special competence.—D.W.

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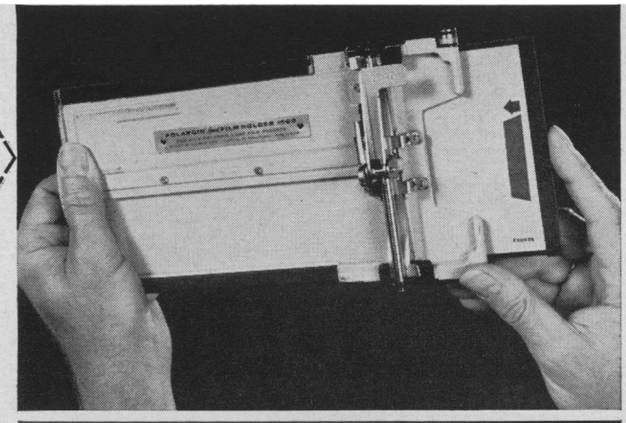

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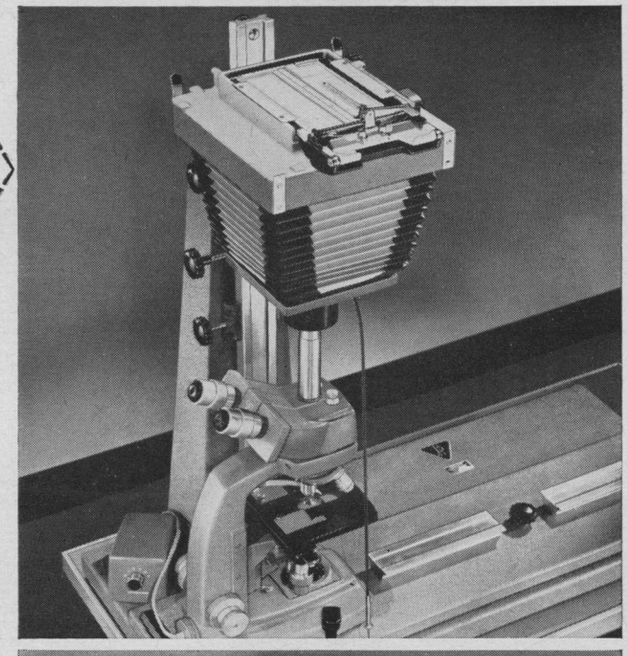

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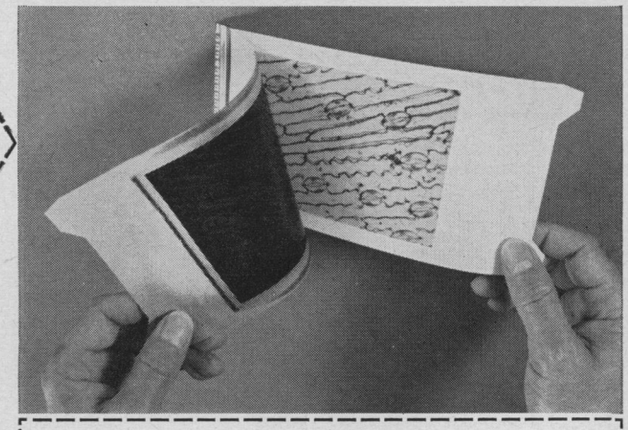

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Program Summary

Chemistry

Program chairman: Essie White Cohn, University of Denver. Program arranged with the assistance of the American Chemical Society, Colorado section, and the Colorado-Wyoming Academy of Science.

Wednesday 27 December

Recent Advances in Carbohydrates: Organic Chemistry Symposium. Part I: Monosaccharides, arranged by Horace S. Isbell, National Bureau of Standards. Condensation, cleavage, and rearrangement reactions, Isbell. Ketopentoses in synthesis of branch-chain sugar acids, Robert J. Ferrier. Biosynthesis of deoxyhexoses, John H. Pazur. Labeling with carbon-14 and tritium, Harriet L. Frush. Gas chromatography, Henry W. Kircher.

Part II: Polysaccharides, arranged by Roy L. Whistler, Purdue University. Properties and uses, Whistler. Digestibility, Theodore E. Friedemann. Enzyme action on, Dexter French.

Extraterrestrial Biochemistry and Biology: Concurrent symposium, see page 1375 for description.

Chemists' mixer arranged by Walter H. Dumke.

Thursday 28 December

Interdisciplinary Symposium in the Earth Sciences: Geochemical Evolution —The First 5 Billion Years, cosponsored by the sections on Geology and Geography (E), Zoological Sciences (F), and Botanical Sciences (G), by the American Geophysical Union, and by the Geological Society of America. Arranged by T. S. Lovering, U.S. Geological Survey.

Part I: Cosmic and Geological Aspects. Origin of the chemical elements, G. R. Burbidge. Origin of the atmosphere of the planets, Harold C. Urey. Role of the primitive environment in shaping the course of the origin of life, Philip H. Abelson. Geochemical evolution of continental crusts, Albert E. J. Engel.

Part II: Minor Elements in the Biosphere and in Surface Waters. Effects of some minor elements on animals and people, William H. Strain. Biochemical cycle of some minor elements in plants, Perry R. Stout. Biochemical cycle of vanadium in plants, Helen Cannon. Implications of the minor element content of some major streams of the world, Walton Durum and Joseph Haffty. Minor elements in some major municipal water supplies in the United States, Charles Durfor. Commentary, T. S. Lovering and Essie White Cohn.

Friday 29 December

Submitted papers I: Organic and biochemistry, arranged by Essie White Cohn.

Submitted papers II: Analytical and physical chemistry, also arranged by Cohn. Walter H. Dumke will preside.

These are concurrent day-long sessions.

Mathematics and Related Programs

Thursday 28 December

Man and the Computer: Invited papers, program cosponsored by the Mathematics Section (A) and the Association for Computing Machinery, arranged by W. F. Cahill, Goddard Space Flight Center, who will preside.

Friday 29 December

Some Educational Implications of the Computer Revolution, by George E. Forsythe, director of the computation center, Stanford University. Speech cosponsored by the Mathematics Section and the Association for Computing Machinery. Wallace Givens will preside.

Teaching Machines and Mathematics Programs: Interaction of Content and Programing Specialists in Developing Self-Instructional Programs. Symposium cosponsored by the AAAS Cooperative Committee on the Teaching of Science and Mathematics and by the sections on Mathematics (A) and Psychology (I). Arranged by Joseph Hammock, Bell Telephone Laboratories, and John R. Mayor, AAAS. Participants: Lewis D. Eigen, John A. Barlow, Norman A. Crowder, Lloyd E. Homme, Jack E. Forbes, Max Beberman, R. Creighton Buck, Robert M. Gagné.

Biology and Mathematics: Symposium cosponsored by the Mathematics Section and the Society for Industrial

and Applied Mathematics, arranged by D. L. Thomsen, Jr., International Business Machines Corp. Irwin W. Sizer will preside. Participants: Wilfred J. Dixon, Jerome Y. Lettvin, Thomsen.

Saturday 30 December

Invited papers: Program arranged by Burton W. Jones, University of Colorado, who will preside.

Recommendations on the Training of Teachers of Mathematics: Symposium cosponsored by the Mathematics Section and the Committee on the Undergraduate Program in Mathematics of the Mathematical Association of America. Arranged by Robert J. Wisner, Michigan State University.

Forthcoming Events

November

10. Nutrition Conf., 7th annual, Detroit, Mich. (J. M. Orten, Dept. of Physiological Chemistry, Wayne State Univ., 1401 Rivard St., Detroit 7)

12–17. Bahamas Conf. on Medical and Biological Problems in Space Flight, Nassau, Bahamas. (I. M. Wechsler, P.O. Box 1454, Nassau)

13–14. Exploding Wire Phenomenon, 2nd intern. conf., Boston, Mass. (W. G. Chace, Thermal Radiation Laboratory, CRZCM, Geophysics Research Directorate, Air Force Cambridge Research Laboratories, Bedford, Mass.)

13–16. Magnetism and Magnetic Materials, 7th annual intern. conf., Phoenix, Ariz. (P. B. Myers, Motorola, Inc., 5005 E. McDowell Rd., Phoenix 10)

13–17. American Public Health Assoc., 89th annual, New York, N.Y. (APHA, 1790 Broadway, New York)

13–17. Gulf and Caribbean Fisheries Inst., 14th annual, Miami Beach, Fla. (J. B. Higman, Marine Laboratory, Univ. of Miami, 1 Rickenbacker Causeway, Virginia Key, Miami 49)

13–18. European Conf. on the Control of Communicable Eye Diseases, Istanbul, Turkey. (World Health Organization, Palais des Nations, Geneva, Switzerland)

14–16. American Meteorological Soc., Tallahassee, Fla. (Executive Secretary, AMS, 45 Beacon St., Boston 8, Mass.)

14–16. Electronics Research and Engineering, 15th annual, Boston, Mass. (L. Winner, 152 W. 42 St., New York 36)

14–18. Puerto Rico Medical Assoc., Santurce. (J. A. Sanchez, P.O. Box 9111, Santurce)

15–17. Eastern Analytical Symp., New York, N.Y. (A. Rekus, EAS, Research Dept., Baltimore Gas & Electric Co., Pratt St., Baltimore, Md.)

15–18. Action for Mental Health, 11th annual, Miami Beach, Fla. (H. Milt, Natl. Assoc. for Mental Health, 10 Columbus Circle, New York 19)

15–18. Society of Naval Architects and Marine Engineers, annual, New York, N.Y. (W. N. Landers, SNAME, 74 Trinity Pl., New York 6)

16–18. American Psychiatric Assoc., Milwaukee, Wis. (J. D. McGucken, 756 N. Milwaukee St., Milwaukee 2)

16–18. Etiology of Myocardial Infarction, intern. symp. (by invitation), Detroit, Mich. (T. N. James, Section on Cardiovascular Research, Henry Ford Hospital, Detroit)

16–18. Southern Thoracic Surgical Assoc., Memphis, Tenn. (H. H. Seiler, 517 Bayshore, Blvd., Tampa 6, Fla.)

16–19. American Anthropological Assoc., Philadelphia, Pa. (S. T. Boggs, 1530 P St., NW, Washington, D.C.)

17–18. Southern Soc. for Pediatric Research, Atlanta, Ga. (W. G. Thurman, Dept. of Pediatrics, Emory Univ. School of Medicine, Atlanta)

17–31. National Soc. for Crippled Children and Adults, annual conv., Denver, Colo. (NSCCA, 2023 W. Ogden Ave., Chicago 12, Ill.)

19–22. International College of Surgeons, Western regional, San Francisco, Calif. (W. F. James, 1516 Lake Shore Drive, Chicago 10, Ill.)

22–27. Automation and Instrumentation, 5th conf., Milan, Italy. (Federezione delle Societa Scientifiche e Techniche di Milano, via S. Tomaso 3, Milan)

22–1. Radioisotopes in Animal Biology and the Medical Sciences, conf., Mexico City, D.F. (International Atomic Energy Agency, 11 Kärntner Ring, Vienna 1, Austria)

23–25. Central Assoc. of Science and Mathematics Teachers, Chicago, Ill. (J. Kennedy, Indiana State Teachers College, Terre Haute)

24–25. American Soc. of Animal Production, Chicago, Ill. (C. E. Terrill, Animal Husbandry Research Div., U.S. Dept. of Agriculture, Beltsville, Md.)

24–25. National Council for Geographic Education, Philadelphia, Pa. (L. Kennamer, Dept. of Geography, Univ. of Texas, Austin)

25–26. American College of Chest Physicians, annual interim session, Denver, Colo. (M. Kornfeld, ACCP, 112 E. Chestnut St., Chicago 11, Ill.)

26. Medical Aspects of Sports, 3rd natl. conf., Denver, Colo. (F. V. Hein, AMA Committee on the Medical Aspects of Sports, 535 N. Dearborn St., Chicago 10, Ill.)

26–1. American Soc. of Mechanical Engineers, winter, New York, N.Y. (L. S. Dennegar, ASME, 29 W. 39 St., New York, N.Y.)

26–1. Radiological Soc. of North America, annual, Chicago, Ill. (R. P. Barden, 713 E. Genesee St., Syracuse 2, N.Y.)

27–28. Agricultural Meteorology, 4th conf., St. Louis, Mo. (K. C. Spengler, American Meteorological Soc., 45 Beacon St., Boston 8, Mass.)

27–29. American Soc. of Hematology, annual, Los Angeles, Calif. (J. W. Rebuck, ASH, Henry Ford Hospital, Detroit 2, Mich.)

27–30. American Medical Assoc., Denver, Colo. (F. J. L. Blasingame, 535 N. Dearborn, Chicago 10, Ill.)