# SCIENCE

7 April 1961

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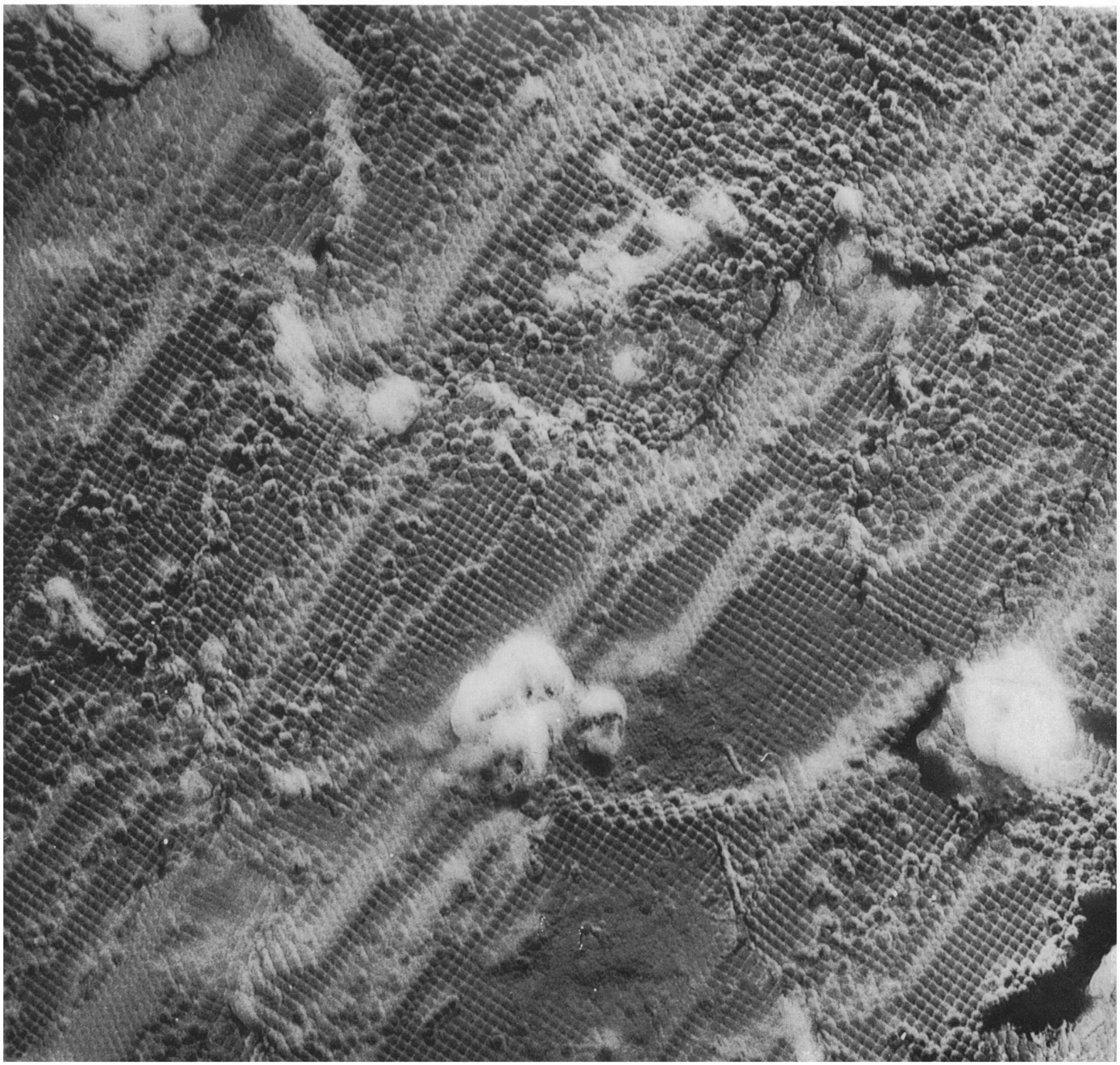
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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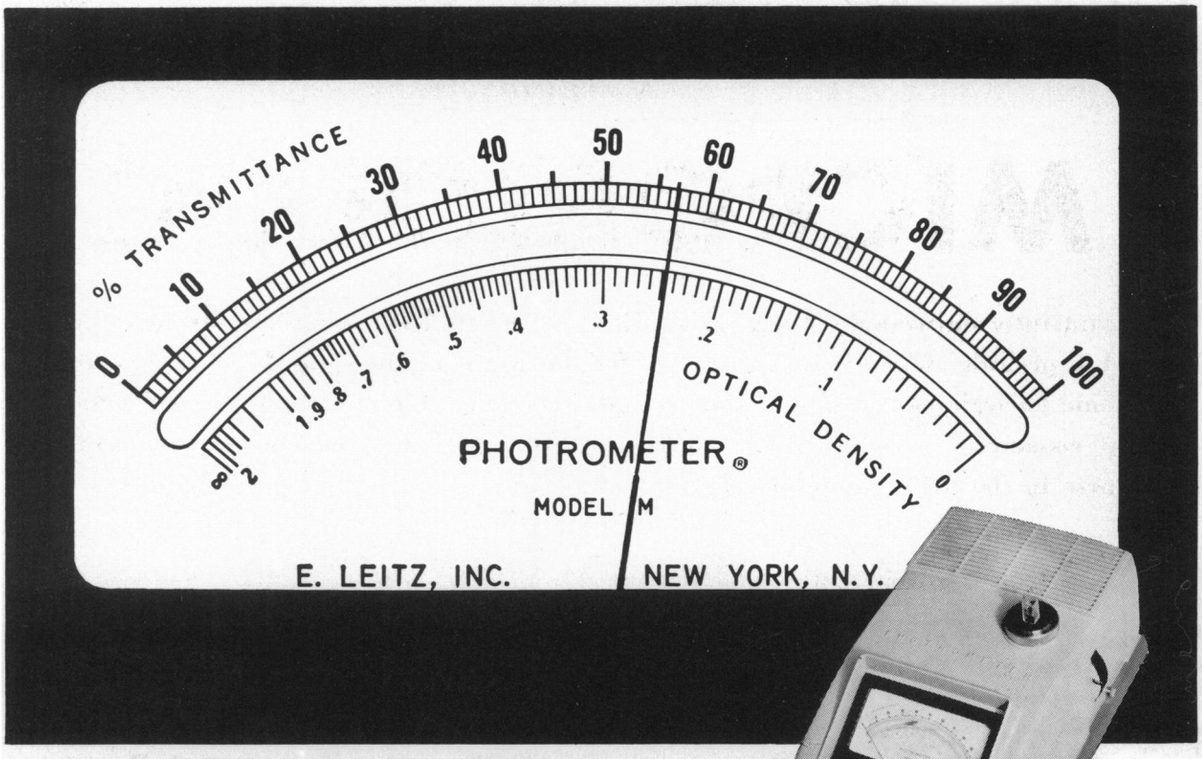


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# SCIENCE



**Cover**

Replica of a fractured, frozen crystal of poliovirus, showing various planes within the crystal (electron microscope, × 100,000). See page 1059. [R. L. Steere and F. L. Schaffer, *Biochmimica et Biophysica Acta* **28**, 241 (1958); Virus Laboratory, University of California, Berkeley]

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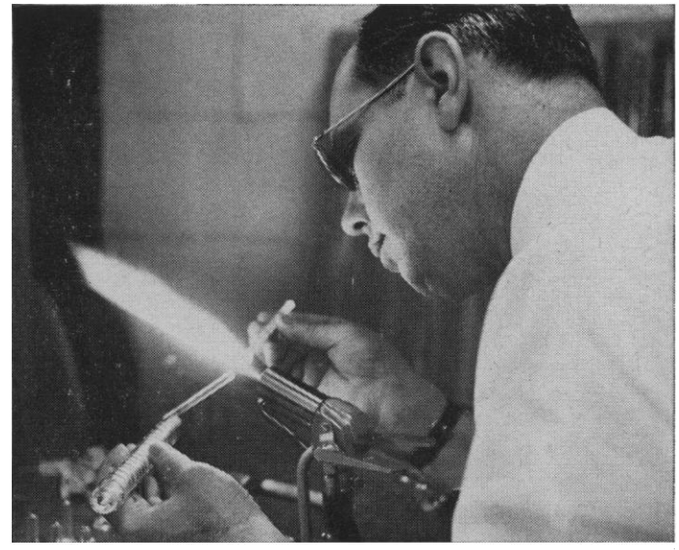

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# Letters

## Criteria for Research Grants

Where large sums are dispensed for research, selection of a basis for judging applications becomes of the utmost importance. Ernest M. Allen, chief, division of research grants, National Institutes of Health, is certainly to be commended for publishing these criteria, as applied by NIH [*Science* **132**, 1532 (1960)].

Obviously, these criteria will be effective in eliminating ill-considered, thoroughly weak applications. But how would the strong, unconventional approach fare—the application in support of research that breaks away from precedents to blaze new paths?

To answer this question, it may be of interest to examine how some of the research projects of the past, which are today considered milestones of medical progress, would have fared had they been submitted to a National Institutes of Health of their respective times and judged by the accepted authorities of their day, organized as study committees and judging the applications by the criteria published by Allen.

To take a few examples: If William Harvey, whose brilliant studies led to the understanding of blood circulation, had applied to an NIH of his time for a grant to explore this subject, it would no doubt have been rejected under Allen's shortcoming No. 3 ("The problem is more complex than the investigator appears to realize").

Prior to the work of Albert von Haller, it was believed that the nerves were tubes which pumped "nerve fluid" into the muscles, thereby causing them to bulge and contract. Von Haller disproved this and introduced the modern concept of irritability and response to stimuli. An application for support from von Haller to an NIH of his time would apparently have been rejected under Allen's shortcoming No. 21 ("The investigator is spreading himself too thin; he will be more productive if he concentrates on fewer projects"), for von Haller was ranging widely between poetry and plant physiology.

Any support for William Beaumont's pioneering studies on gastric function would have been precluded under shortcomings Nos. 13 and 15 ("Controls are either inadequately conceived or inadequately described," and, "The number of observations is unsuitable"), for Beaumont worked with a single subject, a fur trader who had a permanent opening in his stomach as a result of an accident with a musket.

If A. L. Lavoisier had applied for a grant from NIH to extend his quantitative combustion studies to human metabolism, he would have been turned down under shortcoming No. 24 ("It appears that other responsibilities would prevent devotion of sufficient time and attention to this research"), for Lavoisier earned his living as a tax collector.

If Louis Pasteur had applied for a grant to an NIH for support for his work on bacterial vaccines, he would have been turned down under shortcoming No. 17 ("The investigator does not have adequate experience or training . . . for *this* research"), for he was a chemist and had no training in medicine or physiology.

The criteria now being applied in the National Institutes of Health, according to Allen, would have resulted in refusal to support those investigations which became milestones of progress in medicine.

Is this the kind of thinking that should guide us today?

JOHAN BJORKSTEN
*American Institute of Chemists, New York, New York*

## The Author as Indexer

As a newcomer to specialized fields of information handling, I certainly profited from Helen L. Brownson's comprehensive summary, "Research on handling scientific information" [*Science* **132**, 1922 (1960)]. The amount of effort going into development of systems for indexing documents through text analysis is impressive. Many of the systems are to be fully automated, the need for human judgments thus being eliminated.

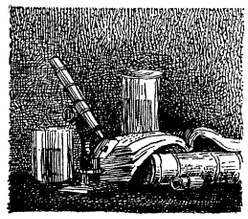
Inclusive as the summary was, one very important aspect does appear to have been overlooked—namely, the author's role. Since the greatest authority on any item of literature is the author, is he not the one best able to classify the item properly? Would it not also simplify the whole matter of information handling if each author provided the necessary index terms with his manuscript? I am sure an author would readily accept this slight extra burden in order to make certain that the fruit of his labor attains its maximum usefulness.

For classification to be performed by the author, only the development of suitable standard systems of indexing would be required. From standard instructions the author could easily supply the index terms directly in coded form, providing further simplification.

JOHN R. CLARK
*Sandy Hook Marine Laboratory, Highlands, New Jersey*

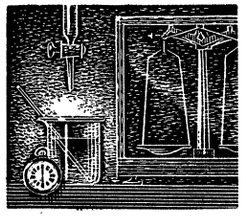
# *IT HAPPENED THIS MONTH...*

*a glance at yesterday in relation to today*



IN APRIL—(1799)—Medical and Physical Journal (London) reviews[1] an essay by Citizen Fourcroy on a newly discovered and controversial substance called "oxygen"—the very name of which, he feels, will draw upon him "numerous groups of men, animated by different opinions and passions, but alike enemies to this [concept]." Fourcroy believes that the animal system may be impaired either by excess or deficiency of this important vivefying principle. Its use, either internally or externally in particular diseases excites the "action of life". Therefore, remedies may be classified as oxygenating or deoxygenating. The former increase the activity of the whole system, heat, circulation, force, and motion; the latter, on the contrary, diminish all these natural effects.

*Although physiological chemists are still animated by different opinions and passions, they are now quite likely to agree on the following: (1) molecular oxygen receives electrons from a chain of respiratory catalysts, (2) this chain involves DPN and flavin adenine dinucleotide (FAD), (3) the electron transport is coupled to the synthesis of ATP, thereby providing energy required for "the action of life", (4) Schwarz BioResearch is an excellent commercial source for ATP, DPN, FAD, and other important cofactors (ADP, cocarboxylase, adenylic acid, guanosine diphosphate, guanosine triphosphate, etc.).*



IN APRIL—(1925)—Harvard investigators report[2] their estimations of the minimum molecular weight of 14 proteins. They point out, however, that present analytical techniques do not permit placing too great confidence in any single set of determinations. In some instances (e.g., the histidine and the tryptophane content of casein) different procedures have yielded significantly different results. "Only when different methods have led different investigators to essentially the same conclusion can we proceed to the furthest implications of the result."

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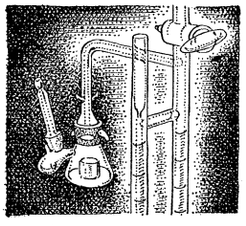

IN APRIL—(1949)—There is described[3] the preparation of a stable beef brain powder with good hexokinase and phosphohexokinase activity. This powder phosphorylates glucose, fructose, mannose, and their 6-phosphates, but not galactose, ribose, or gluconic acid. Sodium salts inhibit phosphorylation of glucose, but not of fructose or fructose-6-phosphate. The ratio of glucose to fructose-phosphorylating activity varies in different brain extracts. It is suggested hereby that there exist two separate hexokinases which are specific for glucose and fructose.

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1. Review: On the application of pneumatic chemistry to the cure of diseases. Med. and Phy. J. *1*:145 (Apr.) 1799. 2. Cohn, E. J.; Hendry, J. L., and Prentiss, A. M.: Studies in the physical chemistry of the proteins. V. The molecular weights of the proteins. Part 1. The minimal molecular weight of certain proteins. J. Biol. Chem. *63*:721 (Apr.) 1925. 3. Wiebelhaus, V. D., and Lardy, H. A.: Phosphorylation of hexoses by brain hexokinases. Arch. Biochem. *21*:321 (Apr.) 1949.

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SCIENCE



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# Equal but Separate

President Kennedy's program of federal aid to education, including a bill granting almost $2.3 billion to the states over three years for public school construction or teachers' salaries or both, poses the problem of how many good things the Administration can do at one time. Were the bill to include a provision barring funds from schools practicing racial discrimination, federal aid to education could be used to help enforce the Supreme Court's desegregation decree of 1955. But the bill must first get through Congress, and since such a provision would effectively kill the bill, it has not been included. The number of good things that can be done at one time is limited, but the Administration's course of action does make a little work for its conscience and for the consciences of all persons who advocate both federal aid to education and racial integration.

One of the bitter truths about education is that opportunities are not equal for all students. Difference in level of income is a familiar source of inequality. Parents with the necessary money have the option of sending their children to private schools. They also have the option of choosing one public school over another by the simple expedient of moving to the school district served by the better school. At the college level, the student simply by attendance receives a special kind of subsidy, since tuition even at private colleges generally does not cover full costs to the institution. These examples of inequality in opportunity resulting from differences in income are not offered as an argument that we must accordingly suffer inequalities to result from differences in race, but simply as a reminder that we live in an imperfect world.

In an imperfect world, of course, the way to get things done is to force one's opponents to accept something about which they are unenthusiastic as the price for something about which they feel strongly. This procedure is sound enough, and it would be nice if federal aid to education could be made to carry a civil rights burden. Unfortunately, pragmatism cuts both ways, and in the present case it is those who favor both federal aid and integration who face an unpleasant choice. They must choose between no federal aid or federal aid with some of it going to segregated schools. The reason is simply that the liberal Southerners in Congress, whose votes the Administration needs, dislike civil rights more than they favor federal aid to education. In fact, an amendment barring assistance to segregated schools, to be introduced while the conservative Southerners tactfully wait outside, is one of the tactics to defeat the bill promised by its opponents.

The deficiencies in education in the United States are serious in the extreme. In the matter of public school construction alone, the U.S. Office of Education puts the need at around 140,000 new classrooms, with no expectation that the property tax, the present mainstay of school financing, can even begin to meet this need. In the alternatives of no federal aid or federal aid with some of it going to racially segregated schools, the choice must be for the first alternative. Desegregation in this context is a side issue. To say this, however, is not to deny that the issue of civil rights is equally important, but simply to recognize that it must be dealt with separately. And balm for governmental and private consciences is available in the form of a more vigorous pursuit of desegregation by other means.—J.T.

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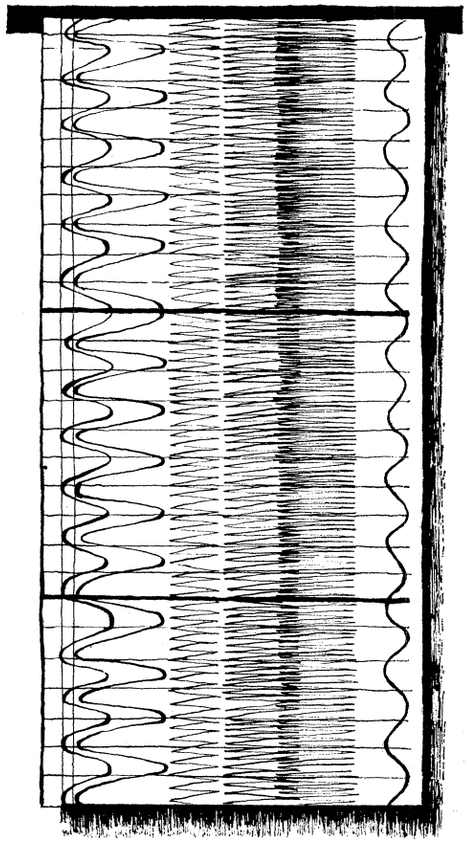

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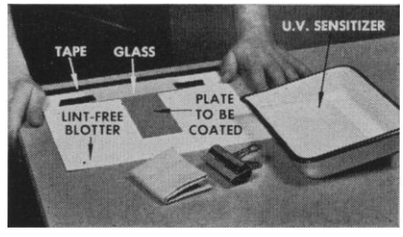



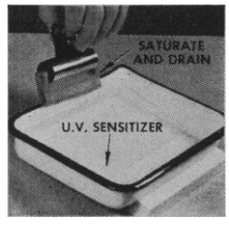


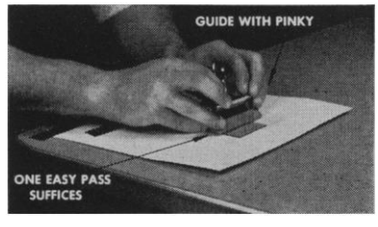


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# Meetings

## Forthcoming Events

### April

*27–5.* American Psychiatric Assoc., annual, Philadelphia, Pa. (D. Blain, 1700 18 St., NW, Washington 6)

*28–30.* American Psychosomatic Soc., 18th annual, Atlantic City, N.J. (M. F. Reiser, 265 Nassau Road, Roosevelt, N.Y.)

*30–4.* Aero/Space Instrumentation Symp., 7th annual, Dallas, Tex. (W. J. Gabriel, Route 3, Box 36, Fort Worth, Tex.)

*30–4.* Electrochemical Soc., Indianapolis, Ind. (R. K. Shannon, 1860 Broadway, New York 23)

*30–6.* Conference on Internal Medicine, Nassau, Bahamas. (Bahamas Conferences, P.O. Box 1454, Nassau)

### May

*1–3.* American Oil Chemists' Soc., St. Louis, Mo. (K. F. Mattil, Swift and Co., U.S. Yards, Chicago 9, Ill.)

*2–3.* American Pediatric Soc., Atlantic City, N.J. (C. M. Riley, Denver General Hospital, Denver 4, Colo.)

*2–3.* Association of American Physicians, Atlantic City, N.J. (P. B. Beeson, Yale Univ. School of Medicine, New Haven 11, Conn.)

*2–5.* Criticality Control in Chemical and Metallurgical Plant, intern. symp., OEEC, Karlsruhe, Germany. (European Nuclear Energy Agency, 38, Boulevard Suchet, Paris 16, France)

*2–6.* American Assoc. on Mental Deficiency, Cincinnati, Ohio. (N. A. Dayton, Mansfield Training School, Mansfield Depot, Conn.)

*3–5.* Nuclear Applications in Space Conf., Gatlinburg, Tenn. (J. J. Harford, American Rocket Soc., 500 Fifth Ave., New York, N.Y.)

*3–6.* American Goiter Assoc., Philadelphia, Pa. (J. C. McClintock, 702 Madison Ave., Albany 8, N.Y.)

*3–6.* Midwestern Psychological Assoc., Chicago, Ill. (I. E. Farber, Dept. of Psychology, State Univ. of Iowa, Iowa City)

*3–7.* Student American Medical Assoc., Chicago, Ill. (R. F. Staudacher, 430 N. Michigan Ave., Chicago 11)

*4–5.* Canadian Operational Research Soc., 3rd annual, Ottawa. (J. R. Walter, CORS, 800 Bay St., Toronto, Ont.)

*4–5.* Human Factors in Electronics, 2nd natl. symp., Arlington, Va. (H. P. Birmingham, Human Engineering Development Section, U.S. Naval Research Laboratory, Washington 25)

*4–5.* Society for Pediatric Research, Atlantic City, N.J. (C. D. West, Children's Hospital, Cincinnati 29, Ohio)

*4–6.* American Ethnological Soc., Columbus, Ohio. (Miss N. F. S. Woodbury, Arizona State Museum, Univ. of Arizona, Tucson)

*4–6.* American Philosophical Assoc., western division, St. Louis, Mo. (L. E. Hahn, Washington Univ., St. Louis 30, Mo.)

*4–6.* American Soc. of Human Genetics, Atlantic City, N.J. (W. J. Schull, 1133 E. Catherine St., Ann Arbor, Mich.)

*4–6.* New York State Psychological Assoc., annual, Rochester. (H. P. Iker, Strong Memorial Hospital, Room R-201, 260 Crittenden Blvd., Rochester 20)

*4–6.* Pediatric Surgery, symp., New York, N.Y. (Office of the Associate Dean, New York Univ. Post-Graduate Medical School, 550 First Ave., New York 16)

*4–6.* Society for American Archaeology, Columbus, Ohio. (J. B. Wheat, Univ. of Colorado Museum, Boulder)

*4–7.* Hypertension Symp. (by Hahnemann Medical College), Philadelphia, Pa. (Hahnemann Medical College and Hospital, 235 N. 15 St., Philadelphia 2)

*5–6.* Population Assoc. of America, New York, N.Y. (K. B. Mayer, Dept. of Sociology and Anthropology, Brown Univ., Providence 12, R.I.)

*5–7.* American Soc. of Internal Medicine, Miami Beach, Fla. (G. T. Bates, 350 Post St., San Francisco 8, Calif.)

*5–7.* Wisconsin Acad. of Sciences, Arts, and Letters, 91st annual, Waukesha. (T. J. McLauglin, Secretary, 2865 N. Prospect Ave., Milwaukee, Wis.)

*5–8.* American Psychoanalytic Assoc., Chicago, Ill. (Mrs. H. Fischer, 1 E. 57 St., New York 22)

*6–7.* Academy of Psychoanalysis, an-

nual, Chicago, Ill. (J. H. Merin, 49 E. 78 St., New York 21)

*6–9.* Circuit Theory, 5th midwestern symp., Urbana, Ill. (M. E. Van Valkenburg, Dept. of Electrical Engineering, Univ. of Illinois, Urbana)

*7–10.* American Inst. of Chemical Engineers, Cleveland, Ohio. (J. F. Van Antwerpen, AIChE, 25 W. 45 St., New York 36)

*7–11.* Institute of Food Technologists, New York, N.Y. (C. S. Lawrence, 176 W. Adams St., Chicago 3, Ill.)

*7–12.* Medical Library Assoc., Inc., Seattle, Wash. (Miss R. J. Mann, Mayo Clinic Library, Rochester, Minn.)

*7–12.* Society of American Bacteriologists, 62nd annual, Kansas City, Mo. (E. M. Foster, 311 Bacteriology, Univ. of Wisconsin. Madison 6)

*7–12.* Society of Motion Picture and Television Engineers, Toronto, Canada. (SMPTE, 55 W. 42 St., New York 36)

*8–9.* Titrimetric Methods of Analysis, symp., Cornwall, Ontario, Canada. [J. R. McCallum, Courtaulds (Canada) Ltd., Cornwall]

*8–10.* Aerospace Electronics Conf., 13th annual natl., Dayton, Ohio. (R. G. Stimmel, Institute of Radio Engineers, 1 E. 79 St., New York 21)

*8–10.* Instrument Soc. of America, Power Instrumentation Symp., 4th natl., Chicago, Ill. (H. A. Van Wassen, Duquesne Light Co., Pittsburgh 19, Pa.)

*8–10.* Mathematical Theories of Biological Phenomena, symp., New York, N.Y. (N. Rashevsky, Committee on Mathematical Biology, 5741 Drexel Ave., Chicago 37, Ill.)

*8–12.* American College of Physicians, 42nd annual, Miami Beach, Fla. (ACP, 4200 Pine St., Philadelphia 4, Pa.)

*8–12.* American Psychiatric Assoc., 117th annual, Chicago, Ill. (C. H. H. Branch, 156 Westminster Ave., Salt Lake City, Utah)

*9–11.* Western Joint Computer Conf., Los Angeles, Calif. (W. F. Bauer, 8433 Fallbrook Ave., Canoga Park, Calif.)

*10–12.* Production Engineering Conf., Toronto, Canada. (R. B. Larson, 5701 Carnegie Ave., Cleveland 3, Ohio)

*10–13.* National Science Fair—International, 12th, Kansas City, Mo. (Science Service, 1719 N Street, NW, Washington 6, D.C.)

*11–13.* Acoustical Soc. of America, Philadelphia, Pa. (W. Waterfall, 335 E. 45 St., New York 17)

*11–13.* American Inst. of Industrial Engineers, annual, Detroit, Mich. (W. J. Jaffe, Newark College of Engineering, 367 High St., Newark 2, N.J.)

*11–13.* American Radium Soc., Colorado Springs, Colo. (C. G. Stetson, 350 Engle St., Englewood, N.J.)

*15–16.* Co-ordination Compounds, symp., Hamilton, Ontario, Canada. (R. J. Gillespie, McMaster Univ., Hamilton)

*15–17.* Institute of Radio Engineers, natl. symp., Washington, D.C. (G. Shapiro, National Bureau of Standards, Washington 25)

*15–17.* Radiation Research Soc., annual, Washington, D.C. (E. L. Powers, Div. of Biological and Medical Research, Argonne National Laboratory, Argonne, Ill.)

*15–18.* Society of Aeronautical Weight Engineers, Akron, Ohio. (D. B. Block, 4004 Oxford Ave., NW, Masillon, Ohio)

*15–18.* Spectroscopy, 12th annual symp., Chicago, Ill. (W. Ashby, Continental Can Co., Inc., 7622 S. Racine Ave., Chicago 20, Ill.)

*15–20.* Conference on Nuclear Electronics, Belgrade, Yugoslavia. (J. Burt, International Atomic Energy Agency, United Nations, New York, N.Y.)

*16–18.* Western Conf. on Anesthesiology, biennial, Portland, Ore. (J. O. Branford, 2307 NW Overton St., Portland 9, Ore.)

*17–20.* American College of Cardiology, New York, N.Y. (P. Reichert, 350 Fifth Ave., Empire State Bldg., New York 1)

*18–20.* Host Tumor Interactions, intern. symp., Detroit, Mich. (M. J. Brennan, Oncology Div., Henry Ford Hospital, Detroit 2)

*22–24.* American Thoracic Soc., Cincinnati, Ohio. (F. W. Webster, 1790 Broadway, New York 19)

*22–24.* Global Communications, 5th natl. symp., Chicago, Ill. (R. D. Slayton, 5555 Touhy Ave., Skokie, Ill.)

*22–24.* Telemetering Conf., natl., Chicago, Ill. (J. Becker, AC Spark Plug Division, General Motors Corp., Milwaukee 1, Wis.)

*22–25.* American Urological Assoc., Los Angeles, Calif. (W. P. Didusch, 1120 N. Charles St., Baltimore 1, Md.)

*(See issue of 17 March for comprehensive list)*