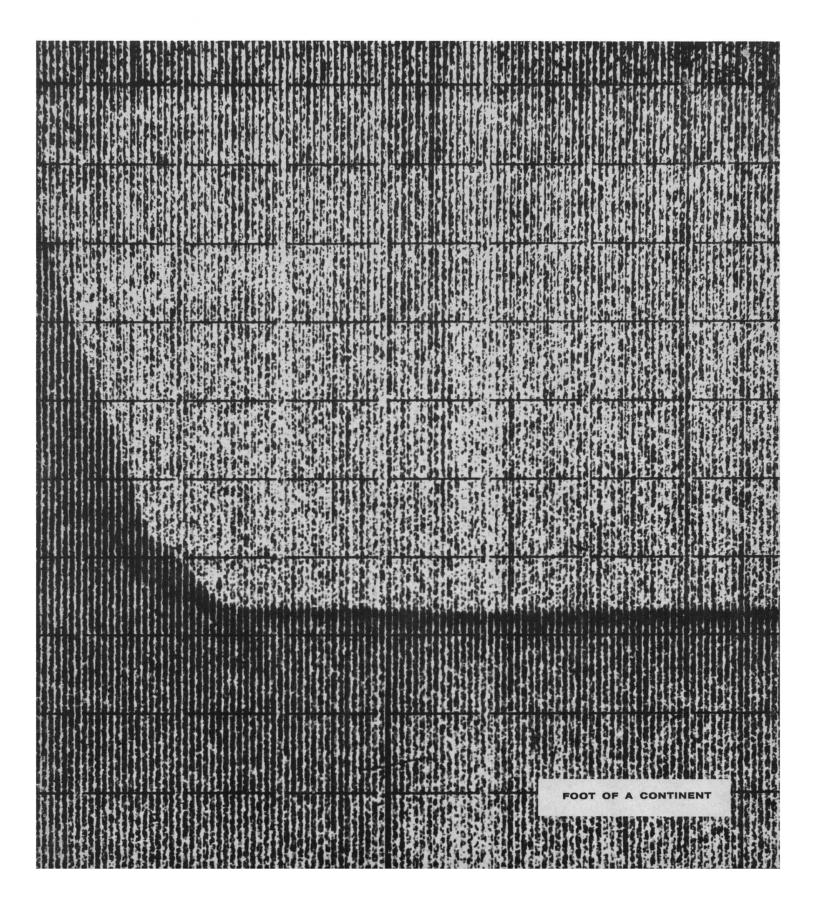
SCIENCE

8 January 1965 Vol. 147, No. 3654



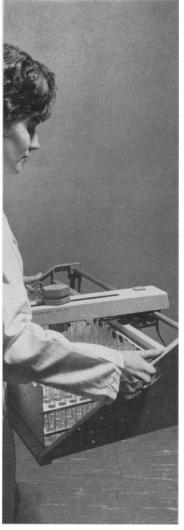


collect confidently

Whatever method of fraction collection you use (time, drop or volumetric), the delivery head of the Beckman 132 Fraction Collector will shut off automatically between tubes---to keep from spilling even a drop of valuable sample. Drip-proof delivery also makes it practical to fill tubes (there are 250 of them) in logical order, from front to back, row by row, for easier identification.

control remotely

The electronic control of this Fraction Collector (an expensive part of any collector) is a separate entity. You can keep it safely out of the way-to avoid damage by accidental spillage when tubes are handled. Equally important, the collector can be cooled completely while the control unit is kept outside the cooling area.



carry handily

Having the control unit separate also allows this Fraction Collector to be carried easily-it has convenient grip-slots on either side.



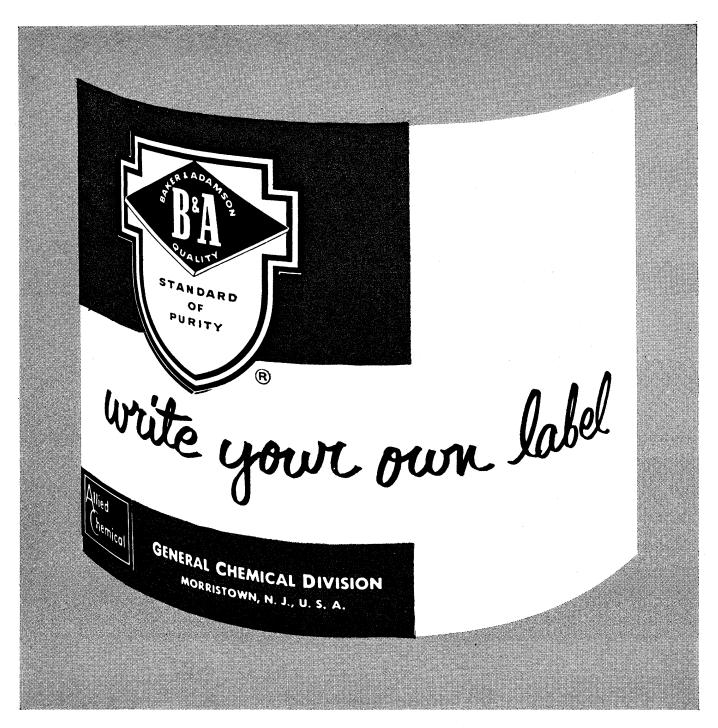
cool completely

This Fraction Collector has a companion Mobile Refrigeration Unit to save you cold room space. The unit holds fractions at 4° C, and cools an external column. Caster-mounted and easy to move, it permits refrigerated chromatographic analyses to be conveniently made anywhere in the laboratory. For more information about the refrigeration unit and the most advanced of Fraction Collectors, write for Data File 132-5.

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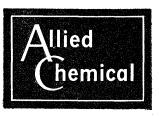
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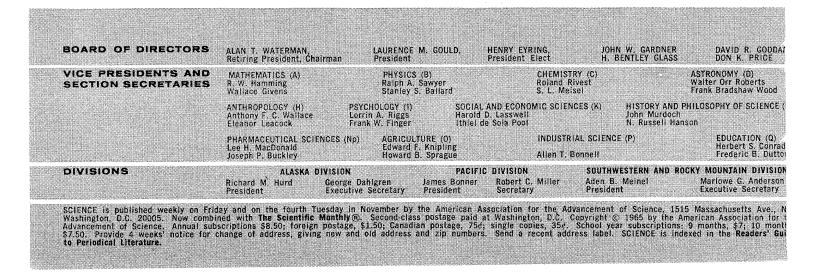
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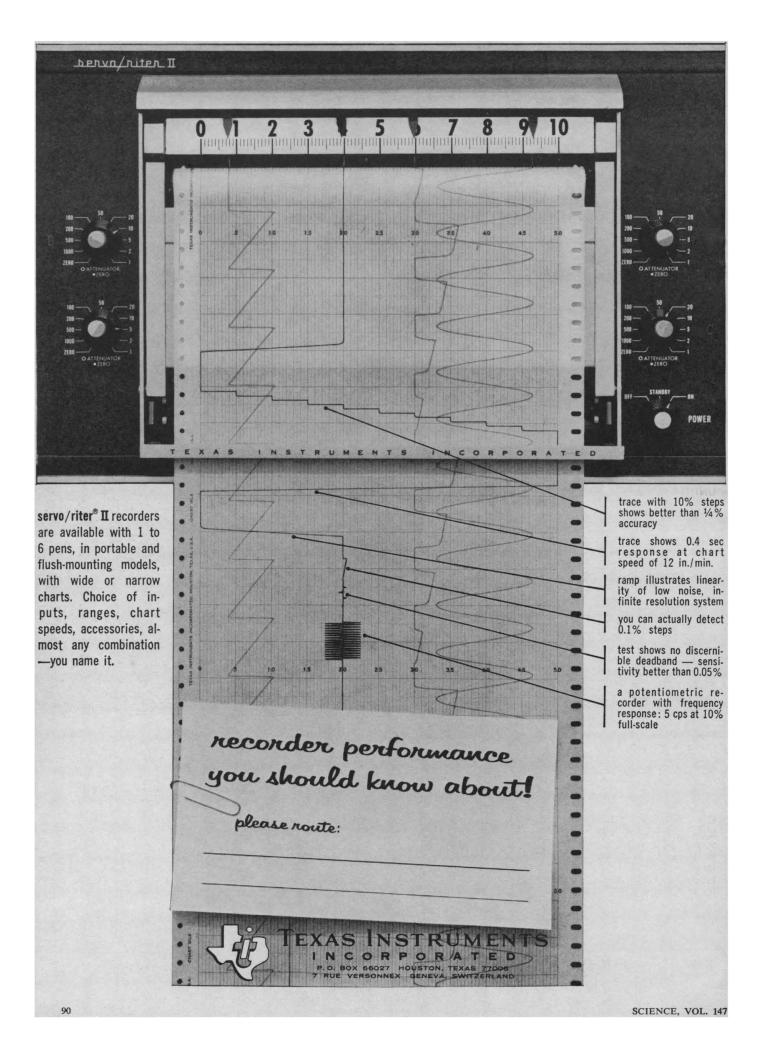
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Trace (made with precision depth recorder) of the foot of the North American continent east of Eleuthera Island, Bahamas. The vertical exaggeration is 12 to 1. The sloping surface (left), with an inclination of 16 degrees, is the foot of the continental slope. The flat surface to the right is that of the Blake-Bahama Abyssal Plain, which occurs here at a depth of 4825 meters. See page 145.

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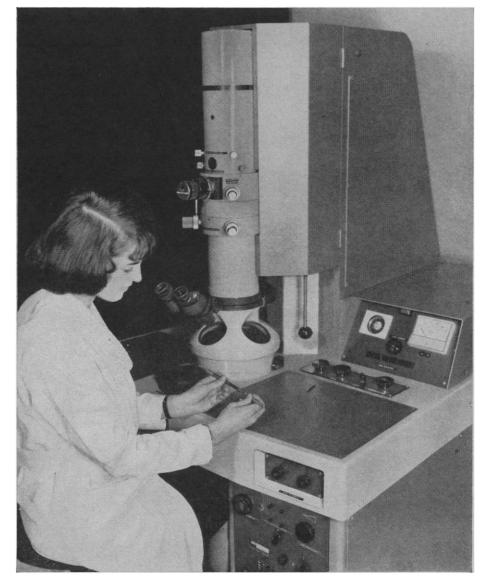
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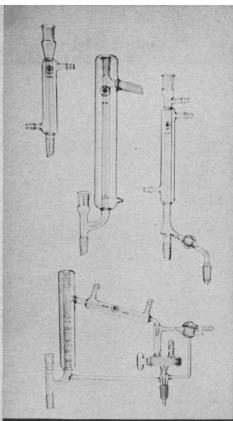
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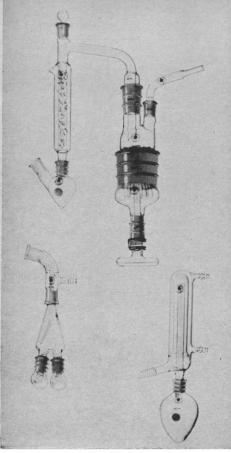


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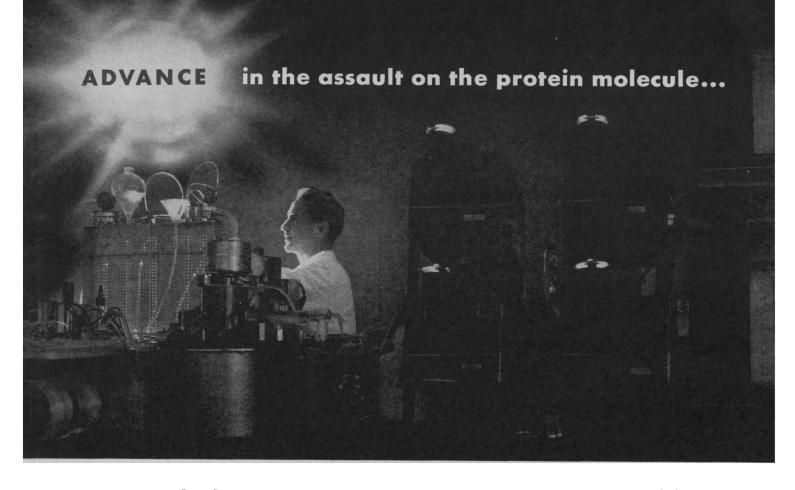
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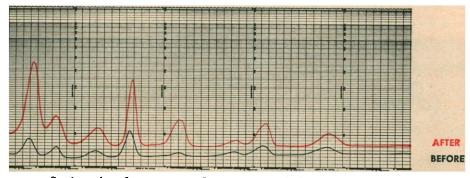
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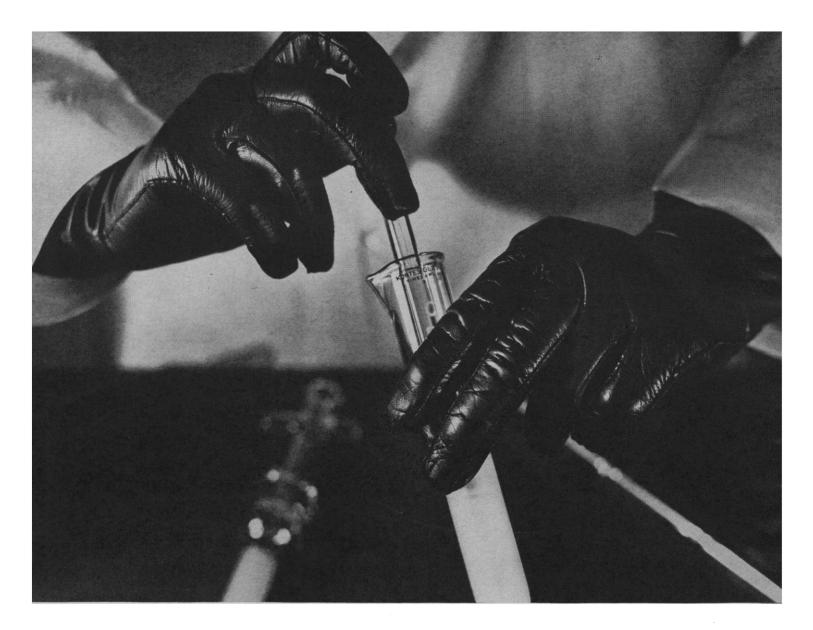
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Section of a chromatogram showing tryptic hydrolyzate of performic acid oxidized bovine pancreatic Ribonuclease before and after alkaline hydrolysis.



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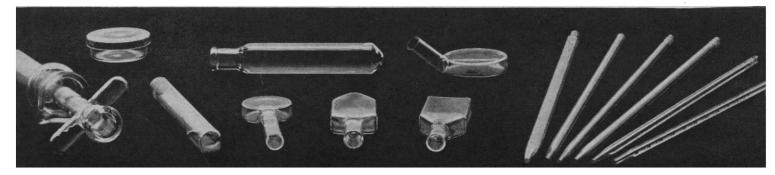
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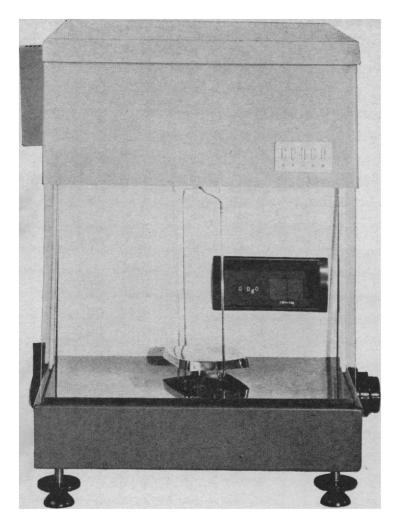
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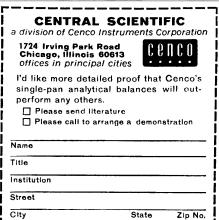
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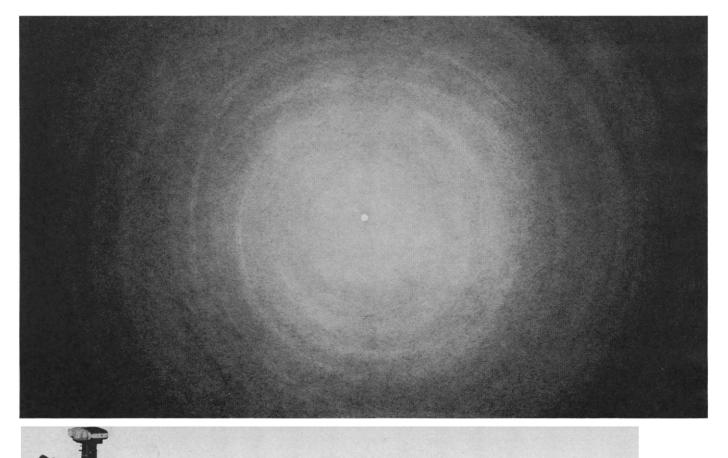
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SCIENCE, VOL. 147

Honeywell Presents "Science All Stars" Sundays 5:00 E.S.T. Starting Jan. 10th



Announcing the 1965 season of the fascinating TV program that explores and explains the sciences

Nominated for an Emmy Award, SCIENCE ALL STARS presents remarkable achievements by gifted teen-agers in every field from anthropology to nuclear physics with on-location participation by the nation's leading scientists

Honeywell's stage for scientific achieve-ment promises to hit new highs in viewer interest as it begins its second season with a fresh new format. SCIENCE ALL STARS' success last year proved that a program ap-pealing to the intellect can attract a siza-ble and influential audience. Thanks to the charm, humor and amazing range of interest of each teen-ager, the program also proved it could be highly entertaining as well as informative. Not unimportantly these teen-

agers and others like them are making im-portant additions to basic knowledge. A new dimension is added in 1965 as SCIENCE ALL STARS takes its cameras and its teen-agers on location to the actual laboratories of the nation's leading scien-tists, educators and government officials.

On the first program of the new series we travel to NASA's famed Huntsville, Ala-bama Space Center where, flanked by the actual Saturn boosters, Dr. Wernher von actual Saturn boosters, Dr. Wernher von Braun discusses propulsion with a young rocketry expert. On the same program a 15-year-old girl will present her project to dis-cover a method of preventing tooth decay. On the second program we travel to San Francisco where Dr. Edward Teller pro-poses to a teen-age physicist that physics, chemistry and math should be taught as one subject

one subject. Other programs will present talented

youngsters with such projects as speeding up the growth rate of plants ... a demon-stration of the vibrations of the nuclei of hydrogen atoms... automated train operation... proving Newton's laws with frictionless devices... a project that com-pletely challenges present-day beliefs about the nature of the surface of Mars. You'll watch as young scientists create amino acids to show how life started ... demonstrate how Carbon 14 is absorbed by plants ... show how to raise germ-free chickens.

Many provocative questions are answered by the noted guests who will appear on "Science All Stars" this season:

- Dr. Wernher von Braun-Director, George C. Marshall Space Flight Center Jan. 10 and 24
- Dr. Edward Teller Professor at Large, Univ. of Calif. January 17.
- Dr. Loren Eiseley Prof. of Anthropology, University of Pennsylvania and world au-thority on origins of man – Feb. 7
- Admiral Horacio Rivero Vice Chief of Naval Operations Feb. 14
- Dr. Konrad Bloch 1964 Winner of Nobel Award for Medicine, Higgins Professor of Bio-chemistry, Harvard University March 7



DR. EDWARD TELLER expresses his belief that while medicine is getting more complicated, physics is getting simpler in an interview with Tam Feeney and Kevin Gladding, Science Fair winners who will demonstrate projects in botany and physics on "Science All Stars".



stration model lucidly describes every step in the lunar landing mission to Rick Bennett, a young rocketry expert.

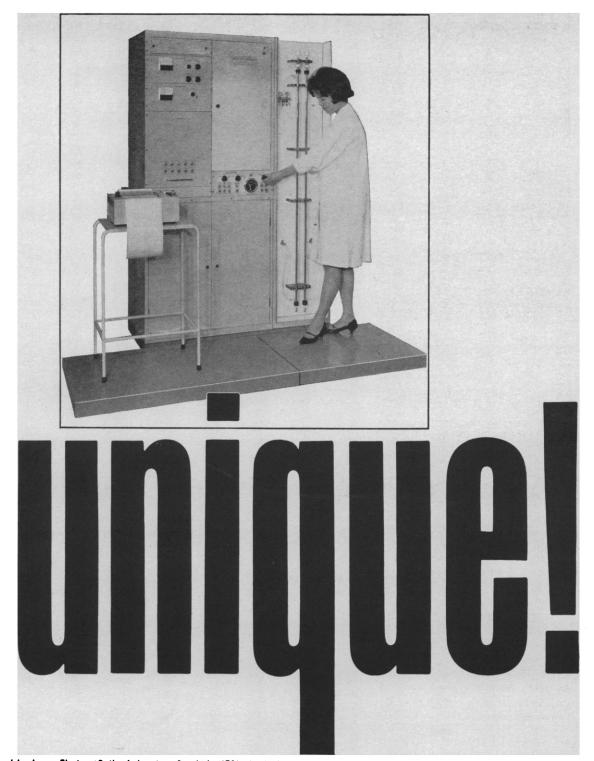
General Bernard Schriever - Commander, Air Force Systems Command – March 21

Dr. William McCorkle - Chief, Advanced Systems Lab., U. S. Army Missile Com-mand – April 4

"Science All Stars" blends the enthusiastic, adventuresome spirit of Science I winners and the mature insights offered by recognized leaders of the scientific community. By emphasizing the inherent excite-ment of scientific exploration, the program

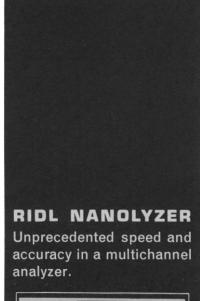
ment of scientific exploration, the program makes science more understandable to the average person and promotes the desira-bility of science as a career. In sponsoring "Science All Stars", Honeywell hopes to stimulate a wider interest among young people in considering science as a life work. You are invited to watch "Science All Stars" Sundays at 5:00 EST on the ABC TV Network starting January 10. (Check your TV listings for local program time.) Your comments will be appreciated. Ad-dress Dr. John Dempsey, Director, Honeywell Research Center, Hop-kins, Minnesota.

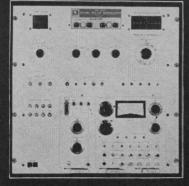
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The JLC-01, manufactured by Japan Electron Optics Laboratory Co., Ltd. (JEOL) is similar to conventional automatic recording liquid column chromatographs — except for one important difference. Heat evolved during the separation process in the column system is measured by a sensitive, stable detector. Consequently, elution of any sample can be observed and be recorded automatically by detecting absorption-adsorption reaction, ion exchange reaction or partition reaction arising at the bottom of the column system. Sensitivity of 0.1 micromole is readily obtainable. ■ The JEOL Universal Automatic Recording Liquid Column Chromatograph provides several unique advantages. Samples previously impossible to detect can now be analyzed. Color reagents are not required permitting non-destructive, economical detection of the sample and fractionation of the eluded sample. Efficient, reliable design and compact construction enable easy, convenient and dependable operation. And, JEOL has established a complete domestic servicing network to assure continuous trouble-free service. ■ Complete technical data on the Universal Automatic Recording Liquid Column Chromatograph as well as an informative paper on the theory of this principle of chromatograph is available. Please write JEOLCO. (U.S.A.) Inc., 461 Riverside Avenue, Medford 55, Massachusetts, phone 396-6241, area code 617.





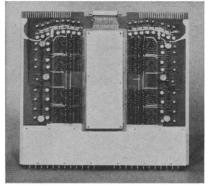


The new RIDL Nanolyzer* offers two principal advantages over other presently available multichannel analyzers: speed and accuracy. It can accept, analyze, and store data seven to fifty times faster than conventional analyzers. It will also store at rates of over 200,000 counts per second with a minimum of distortion when Nal(TI) detectors are used. These benefits are obtained by using several totally new circuit concepts, chief among which are those described at the right.

Of equal importance are the Nanolyzer's convenient operation and the ease of servicing. Its compact packaging has been achieved by using printed circuit boards with Silicon Nand Arithmetic Package (SNAP-LOGIC*) encapsulated circuits. This also contributes to easy maintenance.

The Nanolyzer can be used with all standard readout devices. For more information, please consult your RIDL sales engineer or write for your copy of our 24-page Nanolyzer Brochure.

THIN-FILM MEMORY



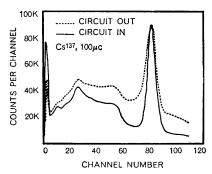
Plug-in circuit board with 128-word thin-film memory plane.

The high-speed, thin-film memory planes used for data storage are the heart of the Nanolyzer. The memory is word-organized with 256 words of 24 bits each. It can store 10⁶ (minus 1) bits of information in each memory location in a 1, 2, 4, 8 BCD code. The memory is located on two identical plug-in circuit boards for simplicity and serviceability. Each plug-in board contains, in addition to a 128word memory plane, all of the select matrix and memory drivers for that memory plane and preamplifiers for each of the 24-bit outputs.

100-MC ADC

The 100-mc Analog-to-Digital Converter uses a radically new technique for pulse-height analysis. By accurately determining when the pulse to be analyzed arrives, a sample of the pulse that is linear and independent of pulse amplitude can be used for analysis. Besides eliminating the annoying linearity problems associated with peak detection, this technique reduces analyzer "open time" to a minimum and provides a time base for subsequent analysis.

PILE-UP REJECTION



Cs¹³⁷ spectra accumulated at high counting rates with and without pileup rejection circuit.

When the ADC is operated at counting rates exceeding 100,000 counts per second, spectrum distortion due to pile-up will severely limit the usefulness of the accumulated data. Therefore, a pile-up rejection circuit has been incorporated in the ADC to minimize spectrum distortion due to pile-up. Pile-up rejection is accomplished by inspection logic which inspects the ADC baseline just before the pulse arrives and rejects the incoming pulse from analysis if the baseline is not at ground due to pile-up or baseline shift. The chart above compares a typical distortion-free curve obtained with the Nanolyzer using pile-up rejection with a curve of poorer resolution obtained from a conventional analyzer without pile-up rejection.

ANTIWALK DISCRIMINATOR

The ADC input circuits use pulsesampling techniques for accurate data analysis at extremely high counting rates. Difficulties of determining the peak are eliminated by the built-in ANTIWALK* discriminator whose output occurs at the input pulse crossover. The discriminator output determines the start of the sampling period, ensuring a "true" sample independent of pulse height.Timeresolution of 5 to 10 nanoseconds, independent of discriminator level, is typical for this circuit. *Registered trademark of RIDL NUCLE-4-266

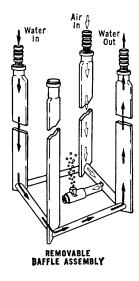


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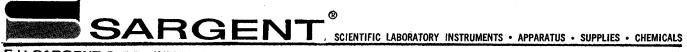
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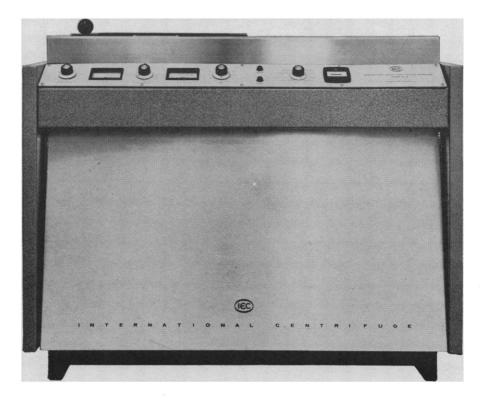
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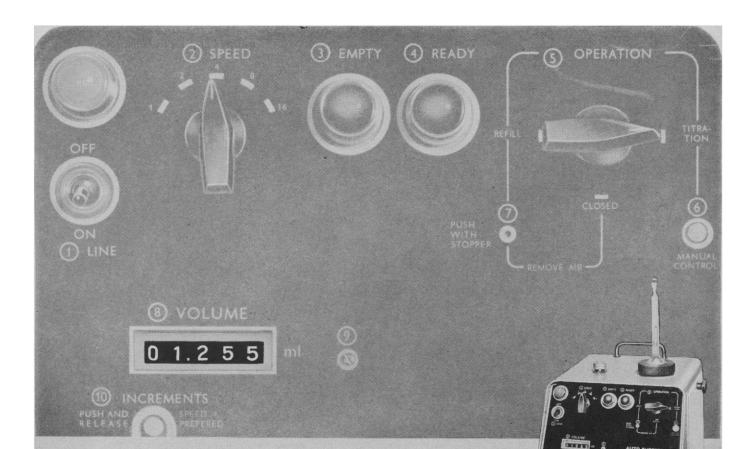
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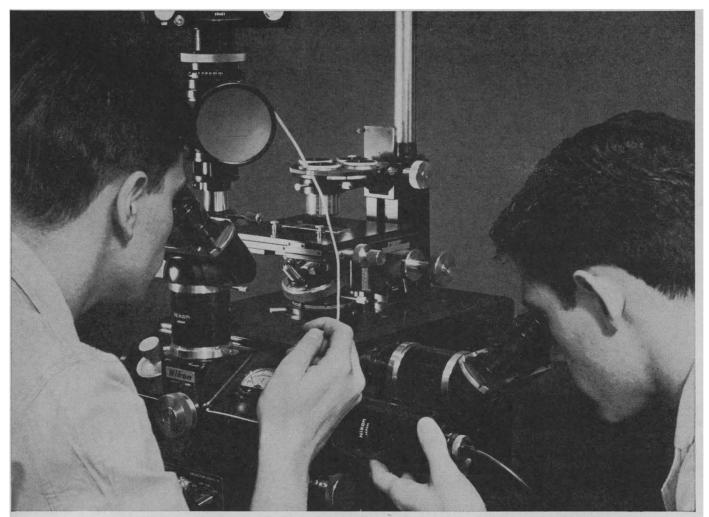
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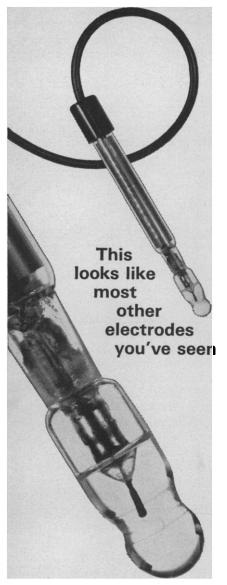
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INTERNATIONAL SUBSIDIARIESI GENEVA, SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND; PARIS, FRANCE; TOKYO, JAPAN; CAPETOWN, SOUTH AFRICA brushed aside amidst the demands of the mob, the establishment, or the great society, depending upon one's view of things. And what concerns me most of all is that certain federal agencies are now in the business of underwriting the financial success of many educational institutions in this country. This fact, I feel certain, will one day rise to haunt us.

Perhaps it is true, as Greenberg suggests, that Fox's proposals simply did not meet certain standards and that he has only himself to blame, but somewhere, somehow, we must make room for the individual in the research world who wishes to pursue his own quiet ways, even while we are establishing priorities for federal research money. I can only echo Kusch's words that there must be something wrong with the system.

I have been disturbed that the scienceunderwriting federal agencies seem, much too often, to rely on the same individuals or institutions, time after time, to carry out research projects. I know, for example, that there are agencies which "suggest" to one of their favorites that a certain research project would be favorably viewed within that agency, but to get the personnel of that agency to admit to such a practice in an appropriations hearing is understandably impossible. I have been trying for the past several years in the Appropriations Committee to force the agencies to broaden the distribution of their research funds. Greenberg's article, if widely read, could be of considerable value in this regard.

GORDON ALLOTT

United States Senate, Washington, D.C.

A Calculus for Journal Publishers

In a recent editorial, "Basic research journals" (13 Nov., p. 869), Wolfle, describing the difficulties associated with the publication of 500 research journals, argues: "If we assume that no individual subscribes to more than five journals . . . 500 journals provide approximately 2.5×10^{11} different combinations to satisfy the individualistic needs of some 2.5×10^{5} scientists." From this he concludes that fewer journals would suffice and many journals should be merged.

I submit that this is a publisher's view and that many scientists see the problem differently. In the first place,

the computation of combinations of 500 things taken 5 at a time is much more sensitive to the 5 than to the 500. Thus, if one assumes that a present subscriber to five journals would continue to receive about 1 percent of the literature as the journals merge, then the combinations available drop very rapidly to 19,900 when the total number of journals reaches 200 and the subscriber takes two.

Quite apart from the combinatorial question, however, is the problem presented to the scientist by the sheer bulk that 1 percent of the journals represents. You may remember Sherlock Holmes's comment that "A man should keep his little brain attic stocked with all the furniture that he is likely to use, and the rest he can put away in the lumber-room of his library, where he can get it if he wants it." It is my own view that most journals should be in libraries and that a scientist needs a much greater choice of printed material to stock his "brain attic." The Physical Review has recently split into two sections in an effort to meet the needs of its subscribers more effectively. Perhaps much more drastic methods should be considered.

There is much to be said for the view that most scientific journals in their present form should be considered archival and be held as reference material in libraries to which scientists have ready if not constant access. The material subscribed to by scientists for their own direct use could then be (i) one or two journals of broad scope and general impact, such as Science, and (ii) expanded abstracts of articles in retrievable form (such as perimeter punched cards) in the research field or fields selected by the subscriber. The scientist could then obtain reprints of the more relevant articles (if, indeed, he did not already have preprints) and could consult others in the library as necessary.

In all of this the principal question remains. Are the added costs (savings) of a proposed system offset by the increases (decreases) in usefulness of the system to the research scientist? This is the kind of criterion that Wolfle should be using.

Finally, let me say that I am aware that 100,000 scientific articles taken 100 at a time yield about 10^{342} combinations. Is it obvious that these are too many?

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Water for North America

The United States currently uses about $1.25 \times 10^{\circ}$ cubic meters $(350 \times 10^{\circ} \text{ gallons})$ of water per day. Consumption is growing, and water shortages are becoming more serious in areal extent as well as severity. One answer is desalination of sea water (*Science*, 18 December). In large-scale projects, in which nuclear reactors were used, fresh water perhaps could be obtained at about 6 cents per cubic meter (22 cents per 1000 gallons) at sea level and at the plant. Distribution of this water to points distant from the sea would entail very large additional expense.

An alternative approach is that of effectively utilizing part of the continent's natural water supplies. For example, in the northwestern section of North America, more than $800 \times 10^{\circ}$ cubic meters of water flow almost unused to the sea each year. Use of the potential supplies would solve most of the continent's water problems for as long as 100 years.^{*} Unit cost of the water, delivered inland, would be a small fraction of that of desalted water even at sea level. Through a series of dams, lifts, tunnels, and canals, water from Canada and the northwestern United States would be conducted to the Great Lakes and to the southwestern United States and Mexico. By this means, the level of the Great Lakes would be regulated and maintained, and the amount of power generated at Niagara Falls and related sites would be increased. The canal conducting the water to the Great Lakes would be navigable, and huge blocks of hydroelectric power would be generated en route.

In the West, large areas in Utah, Nevada, Arizona, New Mexico, and other states, as well as three states in Mexico, could be irrigated. In Mexico alone, eight times more area could be served than will be supplied in Egypt by the Aswan High Dam. The needs of southern California also would be met. In all, 33 states would obtain some form of benefits from the plan. Canada would receive the equivalent of about \$2 billion a year. The cost of the development is estimated at \$100 billion; 20 years would be required for construction, after authorization.

Much of the water would be drawn from the Peace and the Yukon rivers. One of the features of the plan is a large storage lake in the Rocky Mountain Trench, just west of the continental divide; the lake would extend 800 kilometers northwest into Canada from the vicinity of Libby, Montana. A large storage basin is crucial, since most of the river flow of the region occurs during spring and summer. This projected flooding of Canadian territory could prove to be a major point of friction, even though the region is sparsely settled. In any event, past experience suggests that there would be long delays before the necessary international agreements were formalized.

However, many of the benefits for the United States could be obtained in a way not mentioned in the report. A substantial fraction of the flow of the Columbia River could be intercepted, near Hanford, Washington, and at other points, and lifted and caused to flow eastward and also southward through tunnels and canals. Very cheap electric power furnished by huge nuclear reactors could be used. The present NAWAPA concept is grand and imaginative. It is to be hoped that the Canadians will join us in this great project, but alternatives should be studied.—PHILIP H. ABELSON

* A conceptual plan for accomplishing this objective, NAWAPA (North American Water and Power Alliance), has been prepared by the Ralph M. Parsons Company, a large engineering and construction firm. The scheme is presently under study by a Senate subcommittee headed by Senator Moss of Utah.

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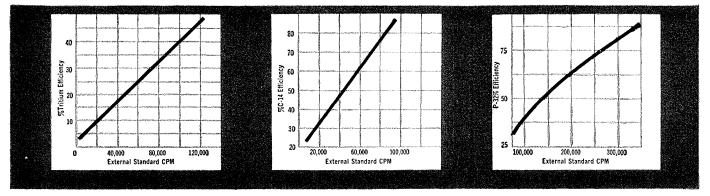
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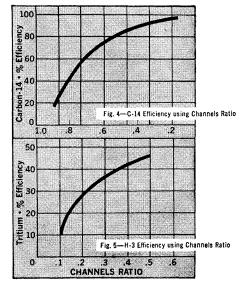
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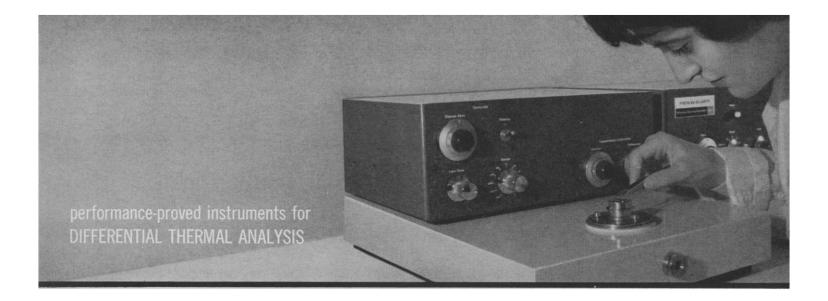
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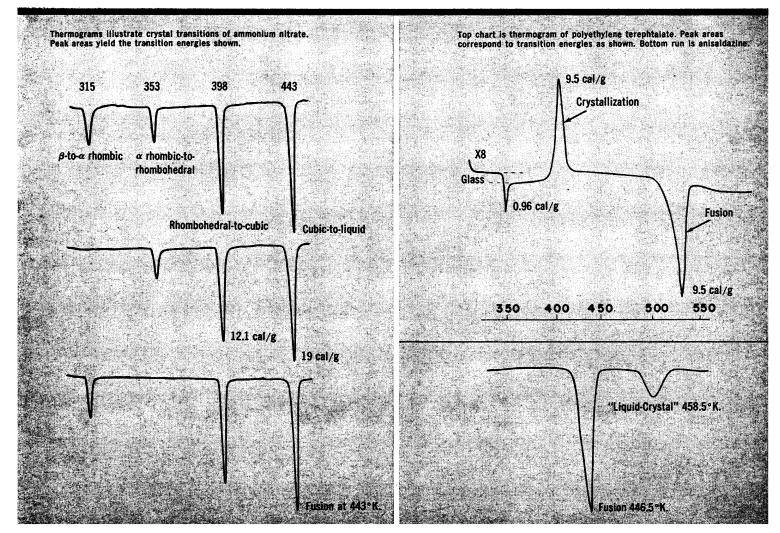
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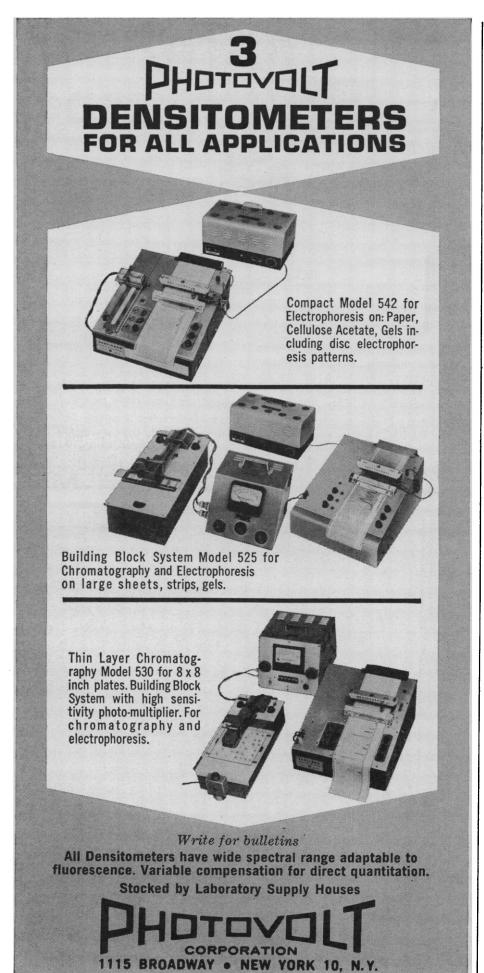
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specific effects-such as muscular degeneration, decalcification of bone and renal deposition of the excess calcium due to immobility, or circulatory decompensations as a function of fluidbalance disturbance-can be predicted on the basis of prior research and physicochemical theory, and when problems of measurement and transmission of measurements of relevant physiological parameters in flight have been solved, the data collected on short orbital flights, for few individuals, and in a context where hardware testing is the primary concern, can be expected to give only a first-approximation answer to questions of the interrelationships between the various states of physiological systems.

Finally, the necessity for return of the voyagers to the full richness of the terrestrial environment, it was seen. raises a fundamental and almost paradoxical question of the degree to which adaptation to the unquestionably strange micro-system of a space vehicle may interfere with readjustment to the earth's surface. Although not made explicit, a foreshadowing of problems of boundary-crossing to a point of physical no return was evident in discussions of the possibility that the human organism may adapt all too well to the alien environment of space.

With this serious question in mind the theme for the third conference, the life-threatening effects of minimum ecological conditions on cardiovascular, renal, and cerebral function, was established by the chairman, W. O. Fenn, of the University of Rochester.

DORIS HOWES CALLOWAY Department of Nutritional Sciences, University of California, Berkeley

Biophysics

With A. Engström presiding, the second General Assembly of the International Organization for Pure and Applied Biophysics (IOPAB) met in Paris, 23 June 1964, during the international meetings of its special commissions on Cell and Membrane Biophysics and on Biophysics of Communication and Control Processes (1). The preliminary steps taken by the first Assembly in Stockholm in 1961 (2, 3) were confirmed, and the following 24 adherents were ratified: Argentina, Austria, Belgium, Brazil, Canada, China (Taiwan), Czechoslovakia,



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SCIENCE, VOL. 147

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Denmark, France, Germany (Deutsche Gesellschaft für Biophysik and the German Academy of Sciences at Berlin), Hungary, India, Israel, Japan, Netherlands, Norway, Rumania, Sweden, Switzerland, United Kingdom, United States, U.S.S.R., and Venezuela.

Adhering bodies are national societies for biophysics or national academies of sciences. The United States adheres through its National Academy of Sciences, which has set up a National Committee for Pure and Applied Biophysics whose members are selected nominees of some five national societies interested in biophysics. They are Thomas F. Anderson, chairman, Max A. Lauffer, Jr., vice-chairman, Edward Ford MacNichol, Jr., Alexander Rich, Robert L. Schoenfeld, Warren K. Sinclair, A. C. Young, and Raymond E. Zirkle. As officers of IOPAB or of its special commissions, A. K. Solomon, Walter A. Rosenblith, and Robley C. Williams are ex officio members.

Much of the real work of IOPAB is to be done by its semiautonomous special commissions, each covering a special branch of biophysics. In Paris the constitutions and memberships of three such commissions were ratified by the General Assembly: Cell and Membrane Biophysics (R. D. Keynes, Cambridge, England, presiding); Biophysics of Communication and Control Processes (W. A. Rosenblith, Cambridge, Massachusetts); and Molecular Biophysics (R. C. Williams, Berkeley, California). The Assembly also authorized the Council to form a special commission on Radiation Biophysics; adhering bodies are being asked to communicate their nominations for membership to the IOPAB's secretary-general.

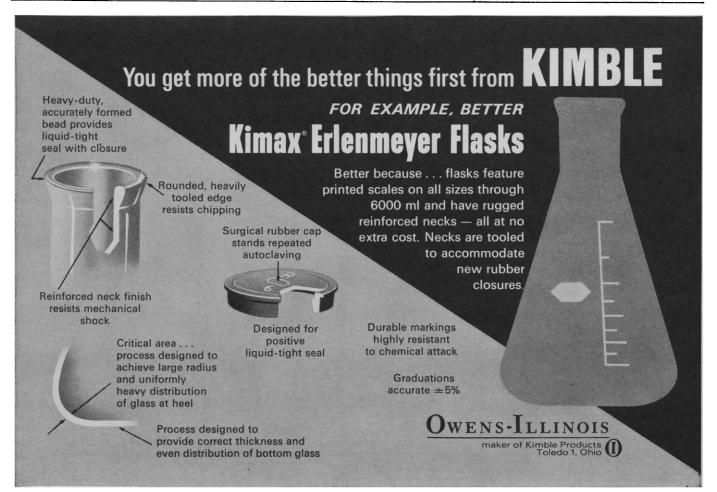
The statutes of IOPAB provide for a second class of commissions, affiliated commissions, to permit the adherence of already-existing international groups in biophysics. A petition for admission of the International Organization of Medical Physics was approved, as was a similar petition by the Institute of Electrical and Electronics Engineers, which becomes affiliated with IOPAB through its relevant professional groups. In addition, IOPAB has relations with various international unions.

The first meeting of IOPAB was held in Cambridge, England, in 1959,

sponsored by the International Union of Pure and Applied Physics. Currently both the International Union of Biochemistry and the International Union of Physiological Sciences have representatives on the special commissions of IOPAB.

Recognizing the difficulties of unifying education in biophysics, the Assembly requested M. Kotani (Japan) to form an *ad hoc* Committee on Educational Studies together with F. Hutchinson (New Haven, Connecticut) and others whom they may wish to co-opt.

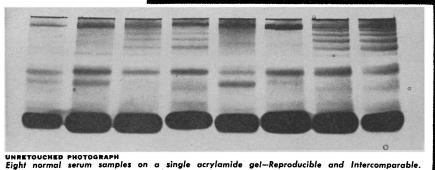
The relative merits of open congresses as opposed to smaller invitational meetings were discussed at some length. Both types of meetings are obviously justifiable. The smaller meetings permit thorough discussions of specific problems by active research workers in closely related fields; open congresses, even though unwieldy, are particularly valuable for educating young scientists and for cross fertilization between scientists in relatively unrelated fields. Fortunately, the structure of IOPAB provides for both types of meeting: the autonomous special commissions can organize the types of meetings



8 JANUARY 1965



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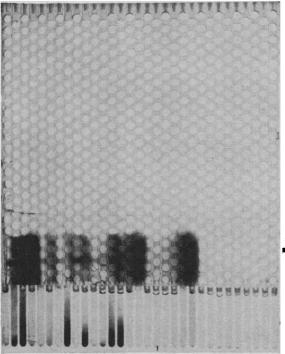
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they deem appropriate at any time, while large, open congresses can comprise both short, contributed papers and educational symposia on topics that have developed to a stage of general interest. The Assembly accepted by acclamation an invitation from the Austrian delegation to hold its next international congress in Vienna in September 1966.

The new officers and council members elected include: John C. Kendrew (U.K.), vice-president, succeeding A. Katchalsky (Israel) who becomes president; and A. Engström (Sweden), retiring president, now honorary vicepresident. Gordon Sutherland (U.K.), retiring honorary vice-president, was thanked by acclamation for his successful efforts in helping to launch the Organization and frame its statutes. A. K. Solomon remains secretary-general until 1967; communications regarding IOPAB should be addressed to him at the Biophysical Laboratory, Harvard Medical School, Boston 15, Massachusetts.

THOMAS F. ANDERSON Institute for Cancer Research, Philadelphia, Pennsylvania 19111

References

- L. D. Harmon and F. M. Snell, Science 146, 276 (1964).
 R. H. Bolt and G. B. B. M. Sutherland, *ibid.* 131, 742 (1960).
 G. B. B. M. Sutherland, Nature 198, 1141 (1963).

Forthcoming Events

Januarv

18-20. Solar Radiation Simulation, intern. conf., Los Angeles, Calif. (H. F. Sander, Inst. of Environmental Science, 34 S. Main St., Mount Prospect, Ill.)

19. American Inst. of Mining, Metallurgical, and Petroleum Engineers, Metallurgical Soc., 7th mechanical working conf., Pittsburgh, Pa. (R. W. Shearman, Secretary, Metallurgical Soc. of AIME, 345 E. 47 St., New York 10017)

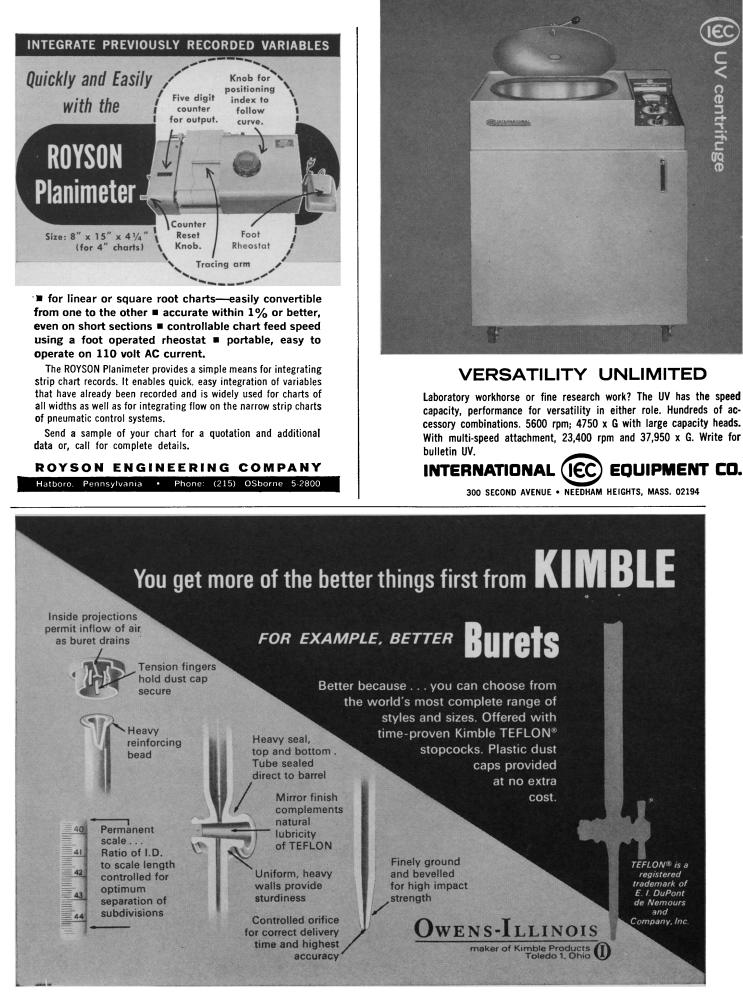
19. Cor Pulmonale, New York Heart Assoc., New York, N.Y. (NYHA, 10 Columbus Circle, New York 10019)

19-20. Die Design and Press Tooling Conf., American Soc. of Tool and Manufacturing Engineers, Hartford, Conn. (M. Zapico, Asst. Conf. Director, ASTME, 10700 Puritan Ave., Detroit 38, Mich.)

20-22. Instrumentation, College Station, Tex. (P. T. Eubank, Chemical Engineering Dept., Texas A&M Univ., College Station) 20-23. National Soc. of Professional

Engineers, New Orleans, La. (P. H. Robbins, 2029 K St., NW, Washington, D.C.) 22. Bibliographical Soc. of America,

New York, N.Y. (Mrs. H. C. Ralph, P.O. Box 397, Grand Central Station, New York 10017)



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22-1. Earthquake Engineering, 3rd world conf., Auckland and Wellington, New Zealand. (Administrative Secretary, Third World Conf. on Earthquake Engineering, P.O. Box 5180, Wellington)

22-23. Blood, annual symp., Detroit, Mich. (W. H. Seegers, Dept. of Physiology and Pharmacology, Wayne State Univ. College of Medicine, Detroit)

22-23. Hydrocarbon Analysis, symp., American Soc. for Testing and Materials, Houston, Tex. (ASTM, 1916 Race St., Philadelphia 3, Pa.)

25-26. Fundamental Phenomena in the Material Sciences, 3rd annual symp., Boston, Mass. (D. B. Fay, Ilikon Corp., Natick Industrial Centre, Natick, Mass.)

25-26. Viruses of Laboratory Rodents, symp., Atlanta, Ga. (R. Holdenried, Natl. Cancer Inst., NIH, Bethesda, Md. 20014)

25-27. American Inst. of Aeronautics and Astronautics, New York, N.Y. (J. Bidwell, AIAA, 1290 Avenue of the Americas, New York 10019) 25-28. American Meteorological Soc.,

annual, New York, N.Y. (K. Spengler, AMS, 45 Beacon St., Boston 8, Mass.)

25-28. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Chicago, Ill. (R. C. Cross, 345 E. 47 St., New York 10017)

25-28. Modern Methods of Analytical Chemistry, 18th annual intern. symp., Baton Rouge, La. (P. W. West, Dept. of Chemistry, Louisiana State Univ., Baton Rouge)

25-28. Cardiovascular Diseases, 2nd natl. conf., Washington, D.C. (C. H. Maxwell, 9650 Wisconsin Ave., NW, Washington, D.C. 20014) 25–29. American Mathematical Soc.,

Denver, Colo. (G. L. Walker, AMS, 190 Hope St., Providence, R.I.)

25-29. American Soc. for Testing and Materials, steel meeting, Mexico City. Mexico. (H. H. Hamilton, Public Relations, ASTM, 1916 Race St., Philadelphia, Pa. 19103)

25-30. American Library Assoc., Washington, D.C. (D. H. Clift, ALA, 50, E. Huron St., Chicago, Ill.)

26. Quasi Stellar Radio Sources, American Inst. of Physics, New York, N.Y. (E. H. Kone, AIP, 335 E. 45 St., New York)

26. Mossbauer Effect Methodology, symp., New York, N.Y. (M. Ress, New England Nuclear Corp., 575 Albany St., Boston, Mass.)

26-29. Canadian Pulp and Paper Assoc., technical, annual, Montreal. (Miss J. M. McKenzie, CPPA, Technical Section, 2280 Sun Life Bldg., Montreal 2)

27-30. American Group Psychotherapy Assoc., annual, San Francisco, Calif. (AGPA, Inc., 1790 Broadway, Room 516, New York, N.Y. 10019)

27-30. American Physical Soc., New York, N.Y. (K. K. Darrow, Pupin Physics Laboratory, Columbia Univ., New York 10027)

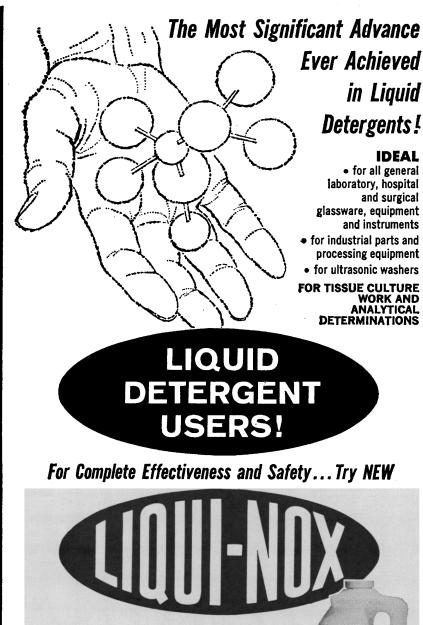
27-30. Electrochemistry, 5th seminar, Karaikudi-3, South India. (M. A. V. Devanathan, Central Electrochemical Research Institute, Karaikudi-3)

27-30. Geological Soc., Southwestern Federation, Austin, Tex. (S. P. Ellison, Jr., Department of Geology, Univ. of Texas, Austin)

27-31. Neurosurgical Soc. of America, San Juan, Puerto Rico. (C. H. Davis, Jr.,



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28-29. Interactions of Man and His Environment, symp., Chicago, Ill. (W. K. Stuckey, Dept. of Public Relations, 1802 Chicago Ave., Northwestern Univ., Evanston, Ill. 60201)

28–29. **Rheology** Soc., winter meeting, Santa Barbara, Calif. (R. S. Porter, California Research Corp., Richmond Laboratory, 576 Standard Ave., Richmond, Calif. 94802)

28-30. American Geophysical Union, southwest regional, Socorro, N.M. (J. B. Franzini, Civil Engineering Dept., Stanford Univ., Stanford, Calif.) 28-30. International Medical Assembly

28-30. International Medical Assembly of Southwest Texas, San Antonio. (S. E. Cockrell, Jr., 202 W. French Pl., San Antonio 12)

28-30. Large-Scale Air-Sea Interaction, symp., Bombay, India. (UNESCO, Office of Oceanography, Pl. de Fontenoy, Paris 7°, France)

28-30. Mathematical Assoc. of America and American Mathematics Soc., Denver, Colo. (H. M. Gehman, MAA, Univ. of Buffalo, Buffalo 14, N.Y.)

28-30. Selected Topics in Cardiology, conf., American College of Cardiology, Gainesville, Fla. (G. L. Scheibler, ACC, 350 Fifth Ave., New York, N.Y. 10001)

350 Fifth Ave., New York, N.Y. 10001) 29-31. Southern **Radiological** Conf., Point Clear, Ala. (M. Eskridge, P.O. Box 4097, Mobile, Ala.)

31-2. Institute of Electrical and Electronics Engineers, New York, N.Y. (C. A. Woodrow, c/o General Electric Co., 1 River Rd., Schenectady 5, N.Y.)

31-5. Institute of Electrical and Electronics Engineers, New York, N.Y. (E. C. Day, IEEE, Box A, Lenox Hill Station, New York 10021)

31-6. International Festival of the Scientific Film, Brussels, Belgium. (Cercle des Sciences. Université Libre de Bruxelles, 22 avenue Paul Heger, Brussels 5)

February

1-2. **Protein** Conf., 19th annual, Rutgers Bureau of Biological Research, New Brunswick, N.J. (J. H. Leathem, Rutgers Univ., New Brunswick)

1-3. Solid Propellant **Rocket** Conf., American Inst. of Aeronautics and Astronautics, Washington, D.C. (D. L. Raymond, AIAA, 1290 Avenue of the Americas, New York 10019)

1-3. Myasthenia Gravis, conf., New York Acad. of Sciences, New York. (NYAS, 2 E. 63 St., New York, N.Y. 10021)

1-4. Information Storage and Retrieval, American Univ., Washington, D.C. (American Univ. Center for Technology and Administration, 2000 G St., NW, Washington 20006)

1-5. Gas Chromatography, conf., Los Angeles, Calif. (H. L. Tallman, Physical Sciences Extension, Room 6532, Engineering Bldg., Univ. of California, Los Angeles 90024)

2-3. American Soc. Tool and Manufacturing Engineers, Die Design and Press Tooling, seminar, Detroit, Mich. (L. S. Fletcher, ASTME, 10700 Puritan St., Detroit 38)

2-4. On-Line Computing, Symp., Los



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Angeles, Calif. (T. Kramer, Engineering Extension, Univ. of California, Los Angeles 90024)

2-4. Society of the **Plastics** Industry, Reinforced Plastics Div. conf., Chicago, Ill. (C. L. Condit, SPI, 250 Park Ave., New York 10017)

3-5. Southwest Chemical Assoc./Chemical Market Research Assoc., joint meeting, Houston, Tex. (H. F. Pfann, Enjay Chemical Co., 60 W. 49 St., New York 10020)

3-5. Military Electronics, Inst. of Electrical and Electronics Engineers, Los Angeles, Calif. (IEEE, 3600 Wilshire Blvd., Los Angeles 90005)

3-5. Institute of Management Science, annual, San Francisco, Calif. (F. L. Weldon, Matson Navigation Co., 215 Market St., San Francisco 5)

3-6. Fatty Acids Seminar, Council of Scientific and Industrial Research, Hyderabad-9, India. (G. Satyanarayana Rao, Council of Scientific and Industrial Research, Regional Research Laboratory, Hyderabad-9)

4-5. American Soc. for Engineering Education, college-industry conf., Pittsburgh, Pa. (L. N. Canjar, Carnegie Inst. of Technology, Pittsburgh)

5. Parenteral Drug Assoc., New York, N.Y. (Parenteral Drug Assoc., Inc., Western Saving Fund Bldg., Broad and Chestnut Sts., Philadelphia, Pa. 19107)

7-11. American Inst. of **Chemical** Engineers, 55th national, Houston, Tex. (AIChE, 345 E. 47 St., New York, N.Y. 10017)

8-10. American Astronautical Soc., annual, Denver, Colo. (Miss G. W. Heath, Flight Safety Foundation, 468 Park Ave. S., New York 10016)

8-11. Managerial Implications of the Emerging **Technology**, Washington, D.C. (P. W. Howerton Center for Technology and Administration, American University, 2000 G St., NW, Washington 20006)

8-12. American Soc. for **Testing and Materials**, spring meeting, Cleveland, Ohio. (ASTM, 1916 Race St., Philadelphia, Pa. 19103)

10-11. Corrosion of Water Supply Systems, 7th sanitary engineering conf., Urbana, Ill. (B. B. Ewing, Univ. of Illinois, Urbana)

10-12. American Educational Research Assoc., annual, Chicago, Ill. (R. A. Dershemer, 1201 16th St., NW, Washington, D.C.)

10–12. National Assoc. Corrosion Engineers, conf., Calgary, Canada. (T. J. Hull, NACE, 980 M&M Bldg., Houston, Tex. 77002)

10-13. National Soc. of College Teachers of Education, annual, Chicago, Ill. (E. J. Clark, Indiana State College, Terre Haute)

10-13. American College of **Radiology**, annual, Philadelphia, Pa. (F. H. Squire, Presbyterian-St. Luke's Hospital, 1753 West Congress St., Chicago, Ill. 60606)

11-13. Biology of Human Variation, conf., New York Acad. of Sciences, New York, N.Y. (NYAS, 2 E. 63 St., New York 10021)

12. Science Programs for General Education and the Preparation of Elementary Teachers, conf., Long Beach, Calif. (A. F. Eiss, National Science Teachers Assoc.,

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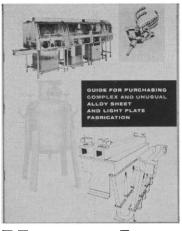


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Cholesterol-7α-T	>2000
Corticosterone-1, 2-T	>30,000
Cortisol-1, 2-T	>30,000
Cytidine-5-T	>10,000
Dehydroepiandrosterone-7α-T	>5000
2'-Deoxycytidine-5-T	>5000
	>5000
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Estradiol-6, 7-T-17 & acetate	>3000
Estrone-6, 7-T	>15,000
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Guanosine-8-T	>2000
L-Histidine-2, 5-T	>5000 >1000
DL-5-Hydroxytryptophan-T (G) 3-lodo-L-tyrosine-5-T	>10,000
DL-Leucine-4, 5-T	>5000
L-Leucine-4, 5-T	>5000
Lithium borohydride-T	>2000
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Sodium acetate-T	>10,000
Sodium borohydride-T	>3000
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Testosterone-1, 2-T	>15,000
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Tetrasodium 2-methyl-1, 4-naph- thaquinol-5, 6, 7-T diphosphate	>50,000
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Thymidine-(nominally 6-T)	>10,000
Thymine-T (G)	>10,000
Thymine-(methyl-T)	>10,000
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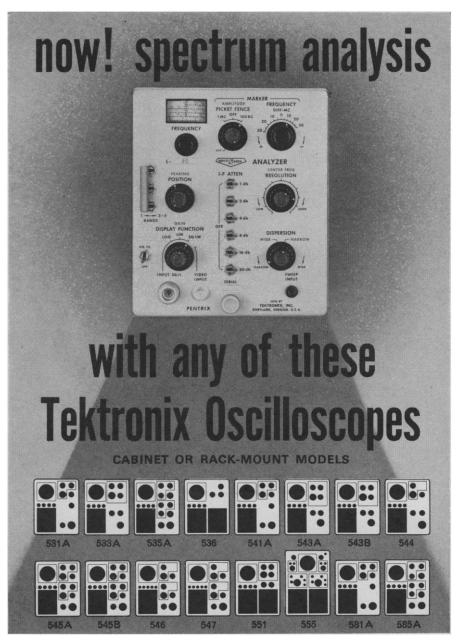
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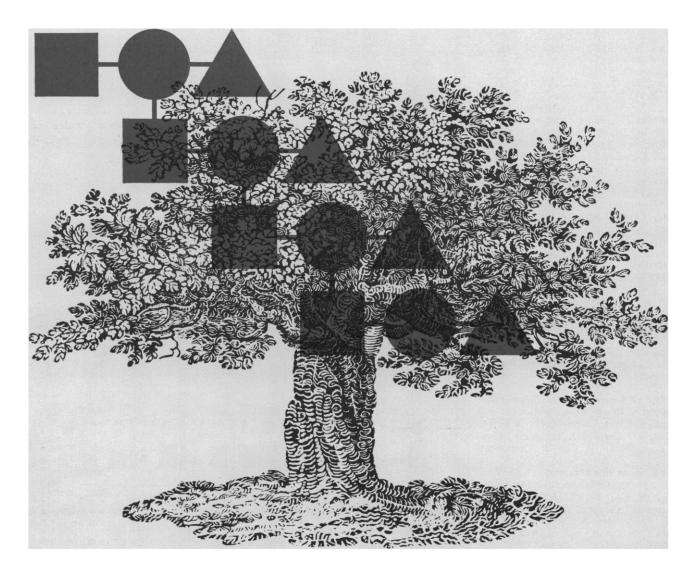
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dimension of the flat side being 8, 15, and 30 mm. This tubing (called Calorex), because of the ease with which it may be fitted to apparatus of various shapes and sizes, should be useful in situations in which the use of a controlled temperature bath is inconvenient or impossible .--- D.J.P. (Brinkmann Instruments, Cantiague Rd., Westbury, N.Y. 11590)

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and potentiometer resistance are compared in a Wheatstone bridge whose error signal is amplified and read by the null meter. When the meter reads a constant null, the thawing plateau has been determined; osmolarity of the sample can be read directly in milliosmols from the potentiometer. Cooling bath is an antifreeze solution controlled down to $-10^{\circ}C \pm 0.5^{\circ}C$. The heat sink for the thermoelectric module is cooled by a blower; water connections are not required. Electrically, the bridge is a-c, amplifier is solid-state. the meter has taut-band suspension. Dimensions: $54 \times 28 \times 33$ cm high. Adapter and tubes for 0.2-ml samples are accessories .- D.J.P. (Fiske Associates, Inc., Bethel, Conn.)

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Betnesda 14, Md. (medical electronics and bio-medical laboratory equipment). Joshua Stern (J.S.), Basic Instrumentation Section, National Bureau of Standards, Washing-ton 25, D.C. (physics, computing, electronics, and nuclear equipment). The information reported here is obtained from manufacturers and from other sources considered to be reliable. Neither Science por





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A Selection of Problems in the Theory of Numbers. Wacław Sierpiński. Translated from the Polish edition by A. Sharma. Pergamon, London; Macmillan, New York, 1964. 126 pp. Illus. \$4.50.

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The Solubility of Nonelectrolytes. Joel H. Hildebrand and Robert L. Scott. Dover, New York, 1964 (reprint, ed. 3, 1950). 502 pp. Illus. Paper, \$2.50.

Space Physics. Harrie Massey. Cambridge Univ. Press, New York, 1964. 245 pp. Illus. Paper, \$2.95; cloth, \$6.50.

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Structure of Molecules and the Chemical Bond. Y. K. Syrkin and M. E. Dyatkina. Translated and revised from the Russian edition (1946) by M. A. Partridge and D. O. Jordan. Dover, New York, 1964 (reprint, 1950 edition). 519 pp. Illus. Paper, \$1.75.

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Techniques of Process Control. Page S. Buckley. Wiley, New York, 1964. 315 pp. Illus. \$15.

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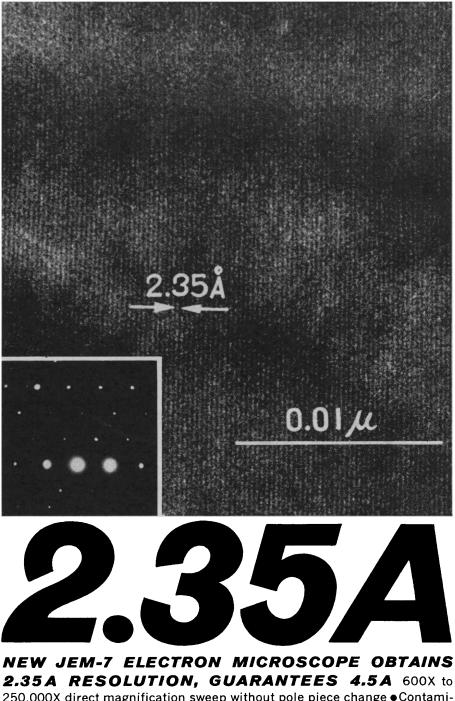
Actions of Hormones on Molecular Processes. Gerald Litwack and David Kritchevsky, Eds. Wiley, New York, 1964. 595 pp. Illus. \$17. 19 papers; contributors: James Ashmore, James A. Buzard, Lucinda Carr, Warren D. Davidson, Robert E. Davies, Ralph I. Dorfman, M. Feigelson, P. Feigelson, Edward H. Frieden, Jean Himms Hagen, Paul B. Hagen, Irwin J. Kopin, David Kritchevsky, Shutsung Liao, Gerald Litwack, W. H. McShan, Charles A. Nichol, J. F. Perdue, Steven Price, Thomas R. Riggs, Fred Rosen, J. R. Tata, Gordon M. Tomkins, H. G. Williams-Ashman, Albert I. Winegrad, Ira G. Wool, and K. Lemone Yielding.

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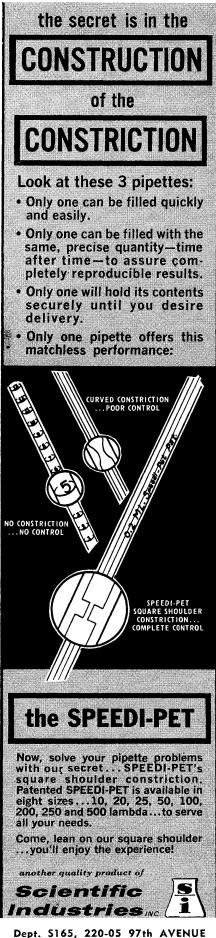
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nacées. Robert Goutarel. Hermann, Paris, 1964. 289 pp. Illus. Paper, F. 48.

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Blood Coagulation, Hemorrhage, and Thrombosis. Methods of study. Leandro M. Tocantins and Louis A. Kazal, Eds. Grune and Stratton, New York, ed. 2, 1964. 560 pp. Illus. \$17.50. 130 papers.

Body Fluids and the Acid-Base Balance. A learning program for students of the biological and medical sciences. Halvor N. Christensen. Saunders, Philadelphia, Pa., 1964. 518 pp. Illus. Paper, \$6.50.

Bone Biodynamics. A symposium (Detroit, Mich.), March 1963. Harold M. Frost, Ed. Little, Brown, Boston, 1964. 703 pp. Illus. \$18. The symposium was intended to stimulate a greater diversity and volume of research in the basic orthopaedic sciences, in part by bringing together representatives of a number of disciplines who, in composite, had a broad biological interest. The papers were contributed by: Charles H. Bachman, C. Andrew Bassett, Göran C. H. Bauer, Robert D. Becker, David A. Cameron, D. Harold Copp, James F. Danielli, Honor B. Fell, Sylvia Fitton-Jackson, Boy Frame, Harold M. Frost, C. Howard Hatcher, Webster S. S. Jee, Lent C. Johnson, Jenifer Jowsey, J. Lee Kavanau, James MacGregor, Franklin C. McLean, C. Leslie Mitchell, William F. Neuman, B. E. Christopher Nordin, Homer A. Paschall, Robert D. Ray, John M. Reiner, Robert A. Robinson, Alfred S. Romer, Robert E. Rowland, Tawfik Y. Sabet, Elias D. Sedlin, Richmond Smith, Joseph Trueta, Marshall R. Urist, Charles L. Wadkins, Mackenzie Walser, Paul Weiss, Ira G. Wool, and Richard W. Young.

Can Psychopathology Be Measured? Ann. N.Y. Acad. Sciences 105, art. 15. Harold E. Whipple, Ed. New York Academy of Sciences, New York, 1964. 114 pp. Illus. Paper, \$4.

Cellules Vivantes et Populations Cellulaires. Dynamique et structure moléculaire. A. Policard. Masson, Paris, 1964. 196 pp. Illus. F. 26.

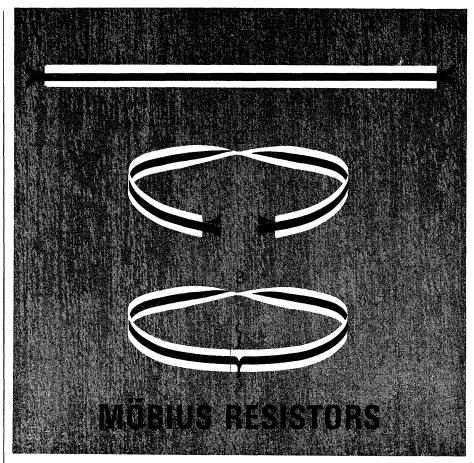
Cerebral Infarction. Alan Barham Carter. Pergamon, London; Macmillan, New York, 1964. 225 pp. Illus. \$9.50.

Clinical Aspects of Adrenal Function. Ivor H. Mills. Davis, Philadelphia, Pa., 1964. 256 pp. Illus. \$9.50.

Clinical Endocrinology and its Physiologic Basis. Arthur Grollman. Lippincott, Philadelphia, Pa., 1964. 454 pp. Illus. \$18.50.

Diagnostic Classification in Child Psychiatry (Psychiat. Res. Rep. No. 18). Richard L. Jenkins and Jonathan O. Cole,

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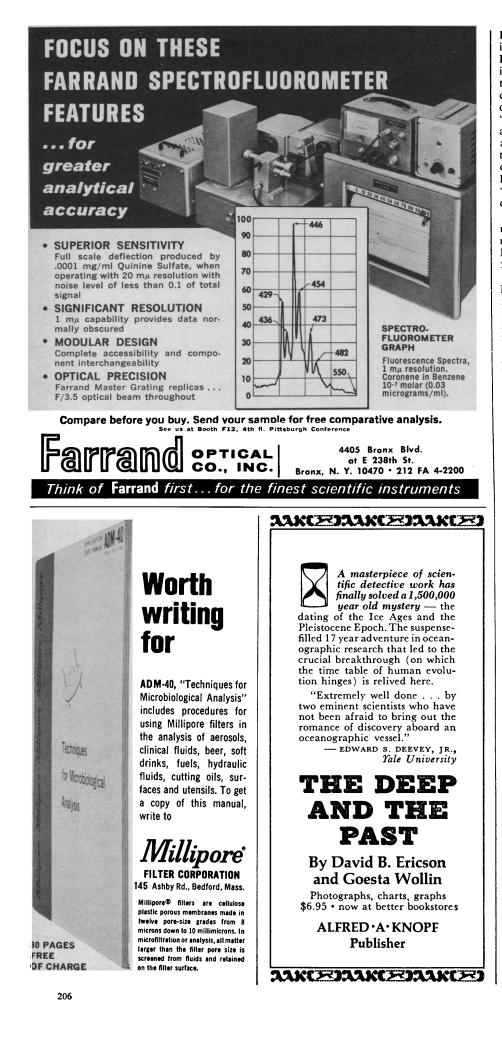
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Eds. American Psychiatric Assoc., Washington, D.C., 1964. 162 pp. Paper, \$3. Four papers: "Reflections on classification in child psychiatry as related to the activities of the Committee on Child Psychiatry of the Group for the Advancement of Psychiatry" by William S. Langford; "A progress report on a factor analytic approach to classification in child psychiatry" by Ralph Mason Dreger; "A descriptive typology of children's psychiatric disorders: II: A behavioral classification" by Barbara Fish and Theodore Shapiro; "Diagnoses, dynamics, and treatment in child psychiatry" by Richard L. Jenkins.

Dictionary of Herpetology. A brief and meaningful definition of words and terms used in herpetology. James A. Peters. Hafner, New York, 1964. 404 pp. Illus. \$11.50.

Early Treatment of Cleft Lip and Palate. An international symposium (Zurich, Switzerland), April 1964. Rudolf Hotz, Ed. Huber, Berne, Switzerland, 1964. 244 pp. Illus. Paper, DM. 28.50. Twentynine papers on the progress made during the last 10 years in the treatment of oral clefts and an evaluation of the applicability of new therapeutic methods. Contributors from the United States were: M. B. Collito, Thomas D. Cronin, T. M. Graber, Robert M. McCormack, Sheldon W. Rosenstein, Orion H. Stuteville, and J. Daniel Subtelny.

Fifth International Congress on Animal Reproduction and Artificial Insemination. Trento, Italy, September 1964. *Proceedings*, vols. 1–6. General Secretariat of the Congress, Trento, Italy, 1964. vol. 1, 72 pp.; vol. 2, 466 pp.; vol. 3, 596 pp.; vol. 4, 727 pp.; vol. 5, 283 pp.; vol. 6, 230 pp. Illus. Paper, \$24.

Electronics in the Medical Specialties. Ann. N.Y. Acad. Sciences 118, art. 1. Harold E. Whipple, Ed. New York Academy of Sciences, New York, 1964. 133 pp. Illus. Paper, \$4.

Folia Primatologica (vol. 1, Nos. 3 and 4, pp. 137-259, 1963). Karger, Basel, Switzerland, 1964. Illus. Paper, \$15.50 per volume. Seven papers: "Etude électroencéphalographique de deux cynomorphes de l'ouest africain" by J. Bert and H. Collomb; "Relations between the lengths of the main parts of the foot skeleton in primates" by A. H. Schultz; "Ein angeborener Unterkiefer-Defekt bei Procolobus badius badius (Kerr, 1792)" by H.-J. Kuhn: "Lebensbild von Megaladapis edwardsi (Grandidier): Ein Rekonstruktionsversuch" by H. Zapfe; "On color vision in gibbon and orang-utan" by J. Tigges; "Feeding, activity and social behavior of the tree shrew, *Tupaia glis*, in a large outdoor enclosure" by J. G. Vandenbergh; and "Das Serumeiweissbild der Primaten unter besonderer Berucksichtigung der Haptoglobine und Transferrine" by V. Lange and J. Schmitt.

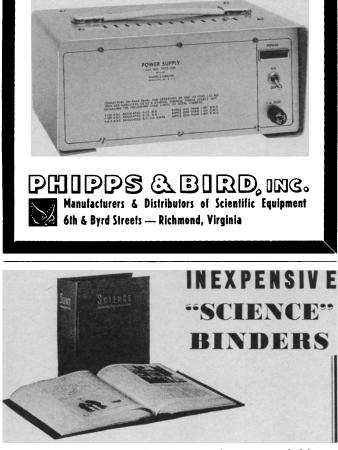
Genetik: Grundlagen, Ergebnisse, und Probleme in Einzeldarstellungen. vol. 4, Plasmatische Vererbung. Rudolf Hagemann. Fischer, Jena, East Germany, 1964. 280 pp. Illus. Paper, DM. 34.40.

The Hemophilias. An international symposium (Washington, D.C.), December 1963. Kenneth M. Brinkhous, Ed. Univ. of North Carolina Press, Chapel Hill, 1964. 438 pp. Illus. \$7.50. Contains 45

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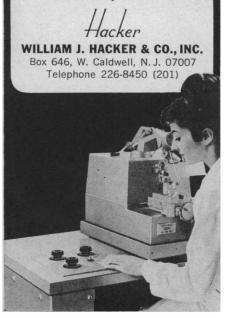
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papers and discussions presented at the symposium which was devoted to the fundamental biologic alterations existing in the hemophilic diseases as well as to current problems in the management of these disorders.

High School Biology: Special Materials. pts. 1 and 2. pt. 1, Text (unpaged); pt. 2, Student (unpaged); Teacher's manual (667 pp.). Produced at a 1964 summer writing conference. Biological Sciences Curricu-lum Study, Boulder, Colo., ed. 2, 1964. Illus. Paper, \$6 set.

Immunology for Students of Medicine. J. H. Humphrey and R. G. White. Davis, Philadelphia, ed. 2, 1964. 508 pp. Illus. \$8.95.

Introduction to Molecular Pharmacology. William C. Holland, Richard L. Klein, and Arthur H. Briggs. Macmillan, New York, 1964. 256 pp. Illus. \$7.50.

The Lemming Cycle at Baker Lake, Northwest Territories, 1959 to 1962 (Technical Paper No. 15). Charles J. Krebs. Arctic Inst. of North America, Montreal, Canada, 1964. 104 pp. Illus. Paper, \$2.

Macromolecular Structure of Ribonucleic Acids. A. S. Spirin. Translated from the Russian by Scripta Technica. Jacob A. Stekol, Translation Ed. Reinhold, New York; Chapman and Hall, London, 1964. 222 pp. Illus. \$10.

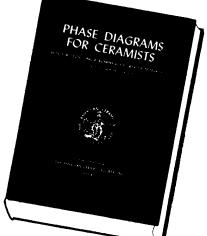
Mammalian Cytogenetics and Related Problems in Radiobiology. Proceedings of a symposium (São Paulo and Rio de Janeiro, Brazil), October 1962. C. Pavan, C. Chagas, O. Frota-Pessoa, and L. R. Caldas, Eds. Pergamon, London; Macmillan, New York, 1964. 445 pp. Illus. \$15. Twenty-seven papers.

New Perspectives in Biology. Proceedings of a symposium (Rehovoth, Israel), June 1963. Michael Sela, Ed. Elsevier, New York, 1964. 303 pp. Illus. \$14.50. Twenty-two papers presented at a symposium held at the Weizmann Institute of Science to coincide with the inauguration of the Ullmann Institute of Life Sciences.

Newcastle Disease Virus: An Evolving Pathogen. Proceedings of an international symposium (Madison, Wis.), July 1963. Robert Paul Hanson, Ed. Univ. of Wisconsin Press, Madison, 1964. 366 pp. Illus. \$7.50. The symposium was sponsored by the Univ. of Wisconsin and the American Assoc. of Avian Pathologists. Information gathered during the last three decades is presented in the 20 papers which are grouped in the following sections: Historical Perspective (2 papers); Recognition of Newcastle Disease as a New Disease (4 papers); Nature of Newcastle Disease Virus (3 papers); Properties of Newcastle Disease Virus (4 papers); Pathogenicity of Newcastle Disease Virus (3 papers); and Newcastle Disease Virus as a Myxovirus (4 papers).

Plant Virology. M. K. Corbett and H. D. Sisler, Eds. Univ. of Florida Press, Gainesville, 1964. Twenty-one papers contributed by Ellen M. Ball, F. C. Bawden, R. H. E. Bradley, L. Broadbent, D. L. D. Casper, M. K. Corbett, Robert W. Fulton, C. E. Hall, B. D. Harrison, F. O. Holmes, C. A. Knight, Frank Lanni, Max A. Lauffer, Robert A. Manaker, Karl Maramorosch, W. C. Price, D. A. Roberts, A. F. Ross, H. D. Sisler, Kenneth M. Smith, R. L. Steere, and William N. Takahashi.

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Die Polarographie in der Chemotherapie, Biochemie, und Biologie. A symposium (Jenaer, Germany), September 1962. Hermann Berg, Ed. Akademie Verlag, Berlin, 1964. 529 pp. Illus.

Principles of Clinical Psychology. Luciano L'Abate. Grune and Stratton, New York, 1964. 327 pp. Illus. \$8.75.

Problems of Cooley's Anemia. Ann. N.Y. Acad. Sciences **119**, art. 2. Harold E. Whipple, Ed. New York Academy of Sciences, New York, 1964. 482 pp. Illus. Paper, \$8.

The Protura. A revision of the species of the world, with keys for determination. S. L. Tuxen. Hermann, Paris, 1964. 360 pp. Illus. F. 54.

The Psychoanalytic Study of the Child. vol. 19. Ruth S. Eissler, Anna Freud, Heinz Hartmann, and Marianne Kris, Eds. International Universities Press, New York, 1964. 493 pp. Illus. \$10. Twenty-two papers. Contributors: Heinz Hartmann; Jeanne Lampl-de Groot; Anneliese F. Korner; Andrew Peto; Dorothy Burlingham; Selma Fraiberg and David A. Freedman; Augusta Alpert and Isidor Bernstein; M. Laufer; Humberto Nagera; Jose Barchilon; Mary E. Bergen; Arthur H. Schmale, Jr.; Robert A. Furman; Marion J. Barnes; Marjorie McDonald; Samuel Kaplan; Edith Buxbaum; Manuel Furer; and Melitta Sperling.

Pulmonary Physiology in Clinical Practice. William R. Pace, Jr. Davis, Philadelphia, Pa., 1965. 149 pp. Illus. Paper, \$2.95.

Research Progress in Organic-Biological and Medicinal Chemistry. vol. 1. Ulisse Gallo and Leonida Santamaria. Società Editoriale Farmaceutica, Milano, Italy, 1964. 599 pp. Illus. \$19. A collection of review articles by Italian scientists pub-lished to celebrate the first centenary of Bollettino Chimico Farmaceutico. The papers are: "Acid-soluble nucleotides of fungi" by A. Ballio; "Aspects of tryptophan metabolism in man" by C. A. Benassi; "Advances in physiopharmacology of synthetic curarimimetics" by D. Bovet and V. Rosnati; "Absorption, distribution, and excretion of vitamin B_{12} " by V. Capraro and A. Cresseri; "Ether derivatives of steroid hormones" by A. Ercoli, R. Gardi, and G. Bruni; "Italian contributions to the knowledge of alkaloids of South American plants" by G. B. Marini-Bettolo; "The constitution of echinulin" by A. Quilico; "The photodynamic substances and their mechanism of action" by L. Santamaria and G. Prino; "A new family of antibiotics: The rifamycins" by P. Sensi; "Studies on analeptics" by I. Setnikar; and "Chemistry and pharmacology of azetidines" by E. Testa, A. Wittgens, G. Maffii, and G. Bianchi.

Treatise on Invertebrate Paleontology. Raymond C. Moore, Ed. pt. K, Mollusca 3: Cephalopoda General Features, Endoceratoidea, Actinoceratoidea, Nautiloidea, Bactritoidea. Curt Teichert, Bernhard Kummel, W. C. Sweet, H. B. Stenzel, W. M. Furnish, Brian F. Glenister, H. K. Erben, R. C. Moore, and D. E. Nodine Zeller. Geological Society of America, New York; Univ. of Kansas Press, Lawrence, 1964. 547 pp. Illus. \$11.50.

Tropical Diseases in Temperate Climates. Kevin M. Cahill. Lippincott, Philadelphia, Pa., 1964. 239 pp. Illus. \$9.50.

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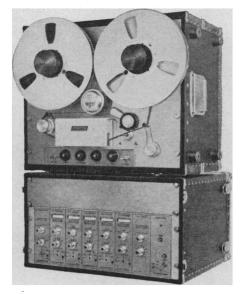
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NEWS AND COMMENT

(Continued from page 136)

(approximately \$2790) for single fellows are available; stipends for married fellows will be N. kr. 22,000, (approximately \$3069) plus additional dependency allowances. Travel allowances are not available to applicants outside Europe. Deadline for applications: 15 February. (Royal Norwegian Council for Scientific and Industrial Research, Gaustadalléen 30, Oslo 3, Norway)

The University of Chicago has announced the availability of graduate traineeships in theoretical statistics: applications to the biomedical sciences, leading to the Master of Science or Ph.D. degree, for the 1965-66 academic vear. Nine-month awards, ranging from \$1800 to \$3000 plus tuition are available through a U.S. Public Health Service graduate training grant. U.S. citizens may apply simultaneously for this award, and for admission to the Department of Statistics. Deadline for applications: 15 February. (P. Meier, Chairman, Department of Statistics, University of Chicago, 1118 East 58 Street, Chicago, Illinois 60637)

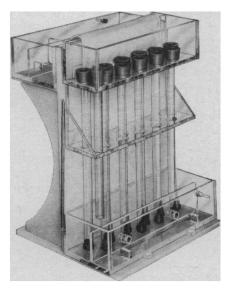
Courses

Wayne State University will conduct a summer Institute for Teachers of Engineering in the fields of experimental stress analysis, 26 July to 3 September. The program will be financed by a grant from the National Science Foundation and is intended for college and institute teachers of engineering, physics, and science. Topics to be covered include basic instrumentation, basic mechanics laws, brittle coatings, strain gage theory and application, photoelasticity, streaming birefringence, photothermoelasticity, x-ray diffraction, the Moire method, mechanical and optical extensometers, and transducers. Participants may apply for stipends of up to \$75 per week, plus dependency and travel allowances. Academic credit up to 6 hours is available, and enrollment will be limited to 30. Deadline for applications: 15 February. (J. Der Hovanesian, Institute Director, Wayne State University, Detroit, Michigan)

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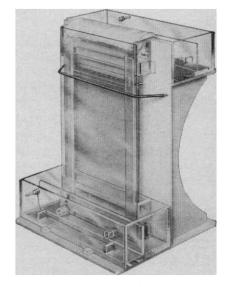
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INSTITUTE FOR SCIENTIFIC INFORMATION 325 Chestnut Street Philadelphia Pa 19106 28 June to 20 August. It will be held at North Carolina State University, Raleigh. Full-time staff members from engineering colleges, universities, and technical institutes engaged in or developing nuclear programs are eligible to apply. Others interested in engineering education may be allowed to participate if space is available. Applicants who wish to be considered must be granted an amount equal to 1 month's salary by their institutions: the AEC will match the grant to a maximum of \$800. Travel allowances are also available. Deadline for applications: 15 February. (Assistant Executive Secretary, American Soc. for Engineering Education, University of Illinois, 1201 West California Street, Urbana 61801)

A Summer Institute in Introductory Biology for College Teachers will be held at the Thompson Biological Laboratory of Williams College, 5 July to 14 August. It will be supported by the National Science Foundation, and is intended for biology teachers who are instructing at the general or introductory level. Topics to be covered include metabolism and energetics; comparative physiology; growth, development, and reproduction; heredity; origin of life, the evolution of biological diversity, adaptation, and speciation; behavior; and population biology and ecology. Participants will receive a stipend of \$450, including dependency and travel allowances. No tuition will be charged; and no credit or degree will be granted. Deadline for applications: 15 February. (Allyn J. Waterman, Biology Department, Williams College, Williamstown, Massachusetts)

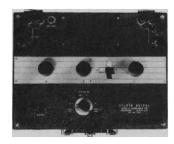
The University of Illinois College of Dentistry has scheduled two courses in "Oral Pathology for Oral Surgeons," and "Medical Aspects of Dental Practice and Hospital Dentistry." The course in oral pathology is scheduled 13-17 March, and will cover the interpretation of microscopic features of oral lesions. Lesions of both soft tissue and bone will be illustrated from a clinical standpoint, which will include etiology, clinical features, and differential diagnosis. Emphasis will be placed on the histopathology, which will be correlated with the clinical appearance of the lesions. Tuition for the course will be \$175. "Medical Aspects of Dental Practice and Hospital Dentistry" is scheduled 31 March to 1 April, and will be limited to 12 students. It will include hospital procedure and operating-room

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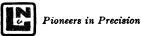
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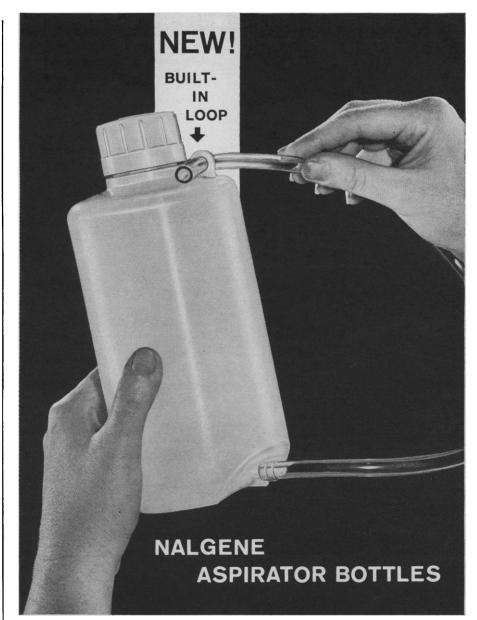
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technique, techniques of taking blood pressure, and venipuncture. Tuition will be \$50. (Division of Postgraduate Education, University of Illinois College of Dentistry, 808 South Wood Street, Chicago 60612)

Purdue University's School of Engineering will sponsor a Summer Institute in Geometronics, 20 June to 14 August. Funded by the National Science Foundation, it is intended mainly for teachers of surveying and mapping in universities, junior colleges, and technical institutes. Each participant will enroll in three of six courses which are to run concurrently. The individual courses will carry 3 hours of graduate credit. The courses are photogrammetry, airphoto interpretation, geodetic control surveying, engineering and geodetic astronomy, electronic surveying, and locating and describing real property. Twenty-four NSF stipends of \$75 per week, plus dependency and travel allowances, are available. Deadline for applications: 15 February. (Kenneth Curtis, School of Civil Engineering, Purdue University, Lafayette, Indiana)

The National Science Foundation will sponsor a Summer Institute in Anthropology for college and junior college teachers at the University of Colorado in 1965. Forty selected participants will receive stipends of \$750, plus NSF dependency and travel allowances. Applicants must be regular, full-time college or junior college teachers with teaching programs including at least one course dealing extensively with anthropological subject matter. Deadline for applications: 15 February. (John Greenway, Summer Institute in Anthropology, Department of Anthro-University of Colorado. pology, Boulder)

A 3-week course, Electronics for Scientists, is scheduled 27 June to 16 July at Princeton University. Registration is open to college teachers and scientists in industrial and government research laboratories working in the fields of chemistry, physics, biology, and other physical sciences, and in medicine, engineering, and psychology. The program will stress individual experimentation leading to a working understanding of electrical measurements and electronic circuitry, as well as practical knowledge of the operation and application of servo systems, operational amplifiers, and digital timing and counting circuits. Tuition and support for



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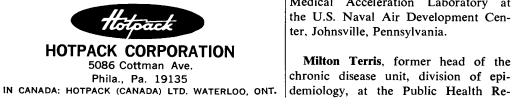
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participants who are college and university teachers will be provided by a grant from the National Science Foundation. Deadline for applications: 8 February. (P. L. Coddington, Administrative Director of Summer Studies, Princeton University, Princeton, New Jersey)

Utah State University will hold a 6week Institute on Animal Behavior, 5 July to 14 August. The Institute is supported by the National Science Foundation and cosponsored by the Ecological Society's section of animal behavior and sociobiology and the American Society of Zoologists. The purpose of the program will be to instruct college professors of zoology, psychology, and other biologically related fields in the fundamentals of animal behavior. Participants will receive stipends of \$450 and travel and dependency allowances. Deadline for applications: 15 February. (A. W. Stokes, Director, Institute of Animal Behavior, Department of Wildlife Resources, Utah State University, Logan)

An Institute in Contemporary Scientific Psychology for college teachers of psychology is scheduled 11 July to 20 August at Beloit College, Wisconsin. Topics to be covered include psychology, including learning; physiological psychology; personality; social psychology: perception; and decision processes. Registration is open to members of psychology departments having six or fewer full-time (or equivalent) teachers, holding a master's degree in psychology or educational psychology. Stipends and travel allowances for participants and dependents are available. Participation will be limited to 30. Deadline for applications: 15 February. (S. B. Stolz, Institute in Contemporary Psychology, Beloit College, Beloit, Wisconsin)

Scientists in the News

Former Naval Commander B. F. Burgess, Jr., has become Director of Research at the Philadelphia General Hospital, Pennsylvania. Burgess was retired from the U.S. Navy on 30 November as director of the Aviation Medical Acceleration Laboratory at the U.S. Naval Air Development Center, Johnsville, Pennsylvania.

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search Institute of the City of New York, has become a professor in the department of preventive medicine at New York Medical College.

Frank K. Pittman, former director of the Atomic Energy Commission's division of reactor development, has received the Commission's Distinguished Service Award. The award is the highest recognition the AEC can bestow on its employees. Pittman, who resigned from the AEC on 21 November, was cited for his "outstanding service and exceptional contributions in the formulation and execution of major programs of the United States Atomic Energy Commission over the past sixteen years."

Emerson Day, director of the Strang Clinic for cancer detection and preventive medicine in New York, has been named president of the New York Academy of Sciences, and of its scientific council.

Bruce H. Sage, professor of chemical engineering at the California Institute of Technology, has been named editor of the Journal of Chemical and Engineering Data, a quarterly publication of the American Chemical Society. He succeeds Rodney N. Hader, who has been acting editor since 1963.

John W. Cahn has become professor of metallurgy at the M.I.T. School of Engineering. Cahn was formerly adjunct lecturer in metallurgical kinetics at Rensselaer Polytechnic Institute, and was chairman of the 1963-64 AAAS Gordon Conference on Physical Metallurgy.

Capt. Patrick Leehey, former head of the acoustics and vibration laboratory at the David Taylor Model Basin, Washington, D.C., has joined the faculty of M.I.T. as an associate professor in the departments of naval architecture and marine engineering and mechanical engineering.

Boris Pregel, president of Canrad Precision Industries, Inc., and chairman of the board of trustees and past president of the New York Academy of Sciences, has been awarded the title of Doctor Honoris Causa by the University of Toulouse, France, for his work in the fields of radioactivity, phosphorescence, and fluorescence. The title is the highest honorary award given to foreigners by the University.

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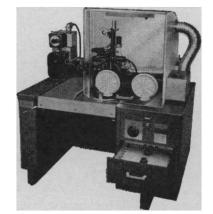


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