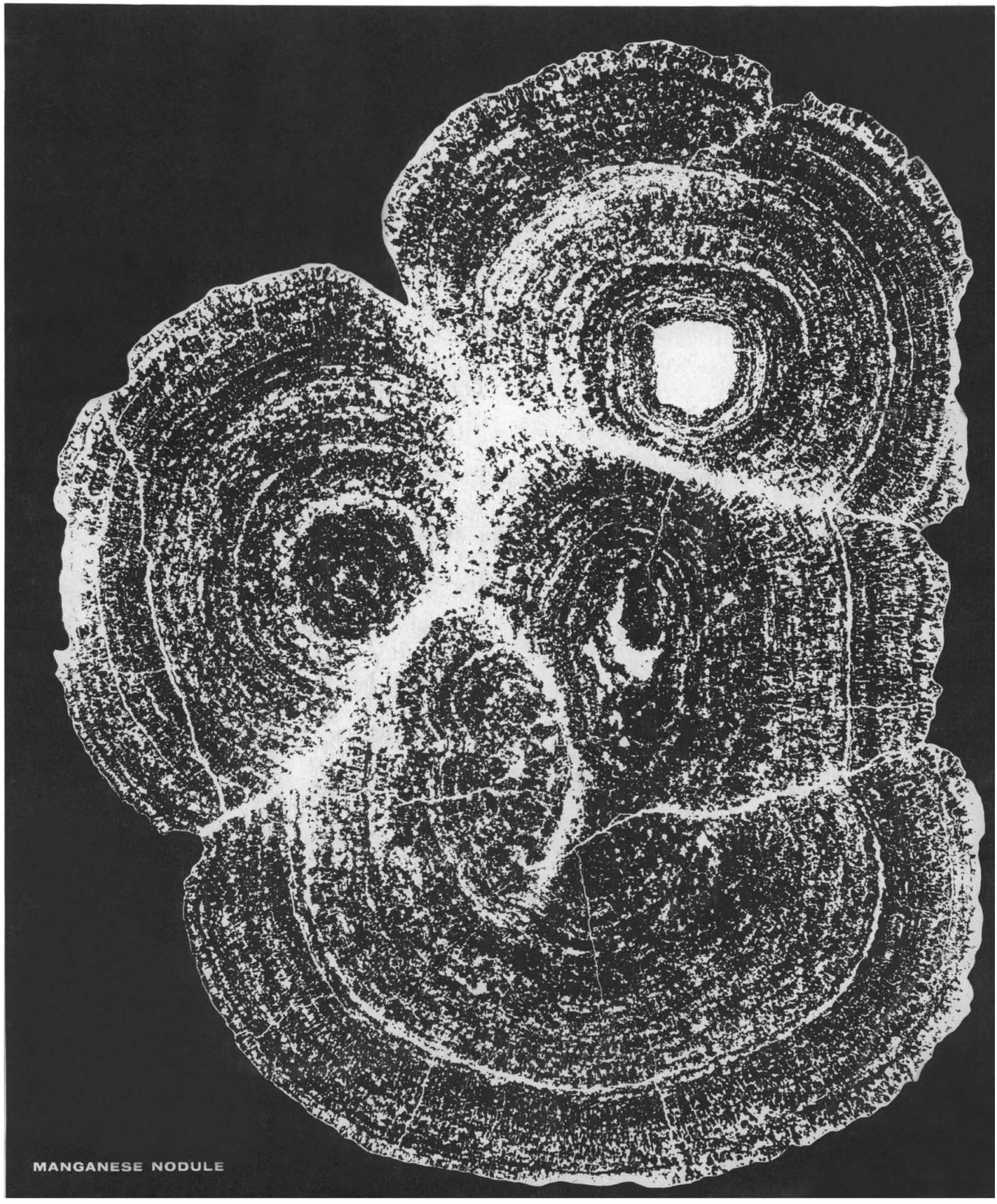
SCIENCE

25 August 1967

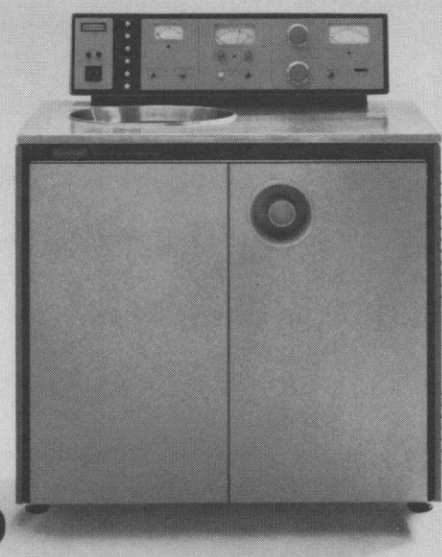
Vol. 157, No. 3791

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

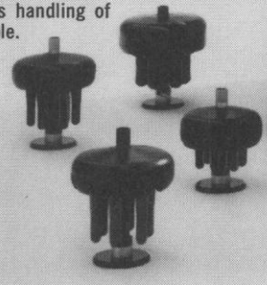


MANGANESE NODULE

The ten new shapes in ultracentrifugation



New swinging bucket rotors—four of them—shaped to hold six buckets, to carry six samples to forces as high as 420,000 *g*. Buckets are designed to hook onto the body of the rotor—a convenience that also minimizes handling of the sample.

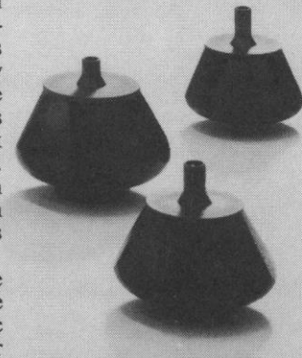


New B-14 and B-15 Rotors—The squat round shape identifies them as the rotors that bring large scale zonal capabilities to the standard preparative ultracentrifuge. Internal compartments are sector-shaped to minimize convective disturbances.

New Beckman Model L2-65B—with a crisp new external design reflecting the many innovations inside. As a result of those innovations the new L2-65B provides such remarkable control over experimental conditions that better band resolution and peak movement can be demonstrated. With its new rotors, the L2-65B can also do more work faster, so it is an investment in economy as well as in excellence.

Features of the L2-65B include infrared radiometric temperature control, independent electronic overspeed control, removable rotor stabilizer, solid state circuitry throughout, 65,000 rpm drive and large, extra-strength rotor chamber. Counting the nine new rotors shown here, the new Model L2-65B can handle twenty-three Beckman rotors to serve an unprecedented range of applications.

Whatever the scope of your work—traditional preparative, density gradient, large scale zonal—Beckman can offer you the instrument and the rotors. To get more information, call your local Spinco Division representative or write for Data File L2-65B.



New high-performance fixed angle rotors—three of them. The multi-planed sides readily distinguish these rotors from their predecessors. The new design enables them to operate on a higher level of force and capacity than has ever been attained before.

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SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Thin section of a deep-sea manganese nodule of possible biochemical origin. The nodule was dredged from the Natal Basin at a depth of 5400 meters off the southeast coast of the Republic of South Africa by the research vessel *Anton Brüun* during cruise No. 7 of the International Indian Oceon Expedition (September 1964). This is but one of the many resources, both food and mineral, which were the subjects of a recent symposium on the Indian Ocean (about × 4). See page 962. [Collected by Richard H. Benson, Smithsonian Institution; prepared and photographed by Raymond C. Gutschick, University of Notre Dame]

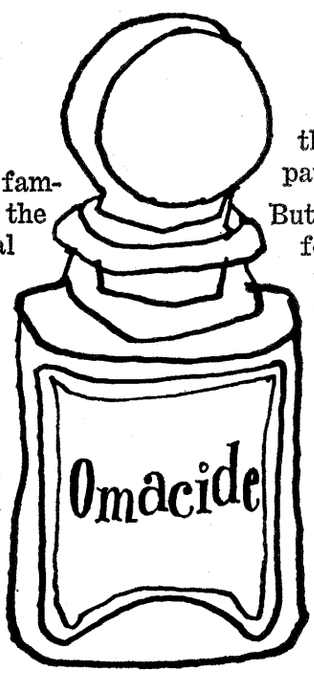
Omacide is a biocidal maniac.

And we planned it that way.

Our Omadine® biocides and our related family of Omacide™ biocides are probably the most potent antibacterial and anti-fungal agents commercially available today.

Both are merciless. In minute quantities they will attack virtually every form of bacteria or fungi going, or coming (most especially coming) that might be inclined to plague your product or process. (And, considering the increasingly resistant strains of microorganisms that are certain to emerge that's saying a lot.)

What's more, their toxicity is very low; they are odorless; and they are readily compatible with a broad range of other chemicals.



But we wouldn't want you to take our word for it. We want you to find out for yourself what biocidal maniacs like our Omadine and Omacide broad spectrum antibacterial/antifungal agents can do for you.

So, why not drop us a line, telling us about your particular problem or application. We'll get back to you in a hurry with the whole story.

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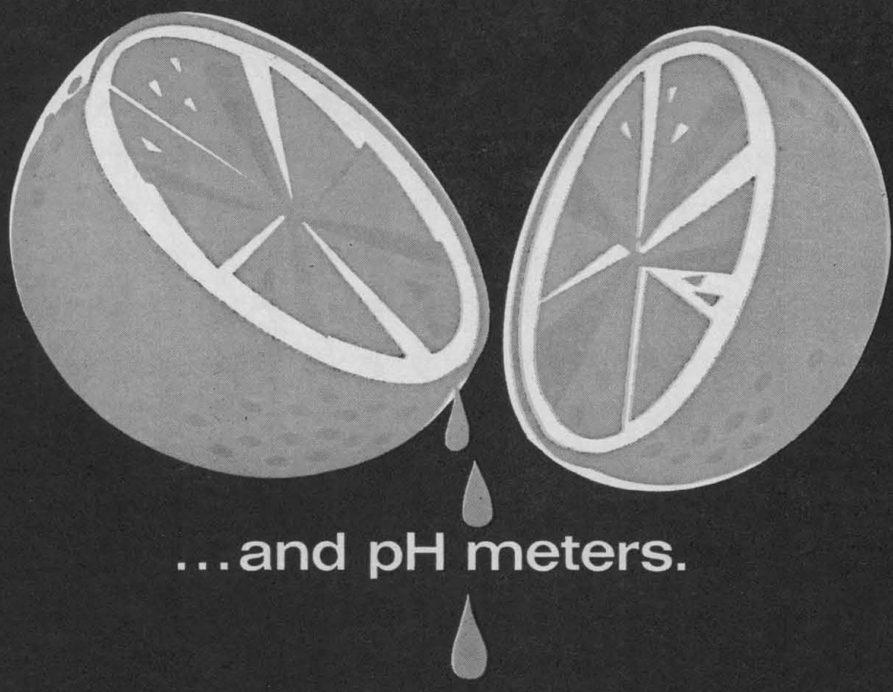
1935

A very good year for grapefruit



...and pH meters.

In 1935 we put grapefruit to the acid test with the world's first commercially practical pH meter. It was developed by Dr. Arnold O. Beckman and used to measure the acidity of California citrus products.

For more than thirty years, Beckman research has contributed major "Firsts" in the field of electrochemical measurement. Over 100,000 superb quality Beckman pH Meters have been used in laboratories throughout the world... covering a vast range of specialized applications... from grapefruit juice to NASA spacecraft.

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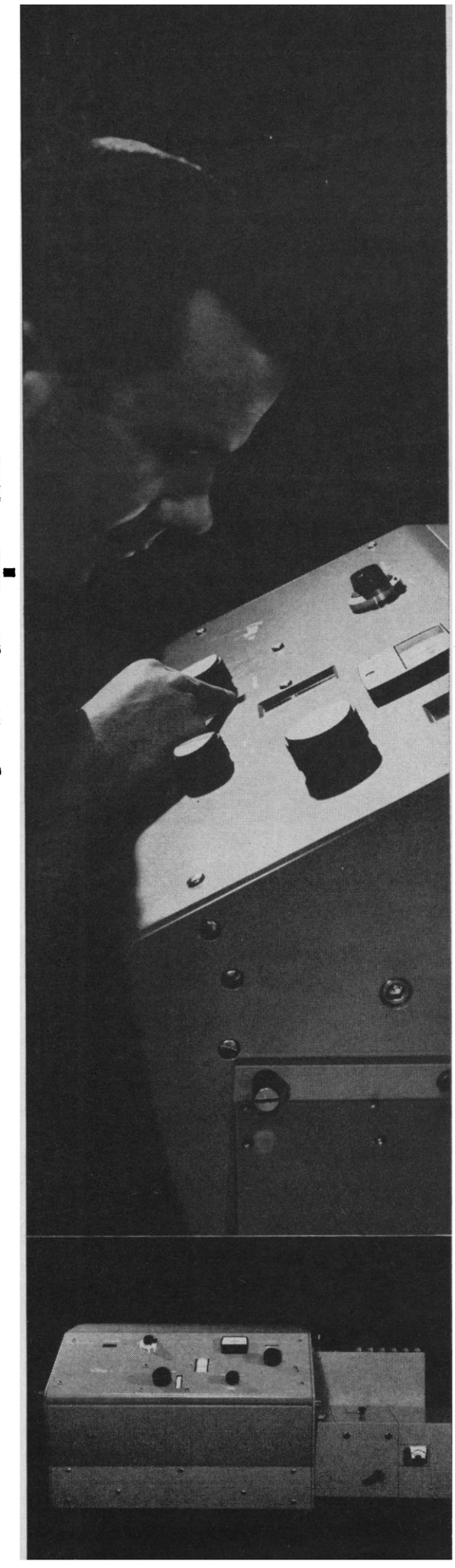

THE MOST ACCURATE MANUAL SPECTRO-PHOTOMETER ON THE MARKET IS THE NEW CARY MODEL 16.

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The CARY 16's unique beam geometry allows normal sample handling down to one-half milliliter. With beam masking, samples can be reduced to micro-volume. Moreover, beam reduction by 8 produces a reduction of signal-to-noise of only 2. Result: retention of extremely high accuracy.

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August, 1967

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News about instruments, apparatus and reagent chemicals that make your work quicker, surer, safer and easier.

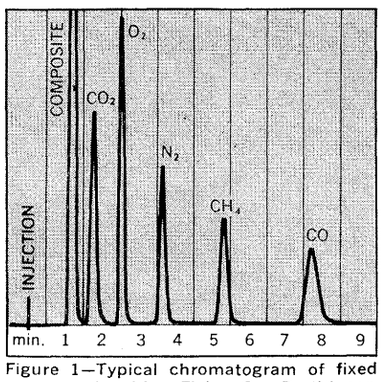


Figure 1—Typical chromatogram of fixed gases made with a Fisher Gas Partitioner.

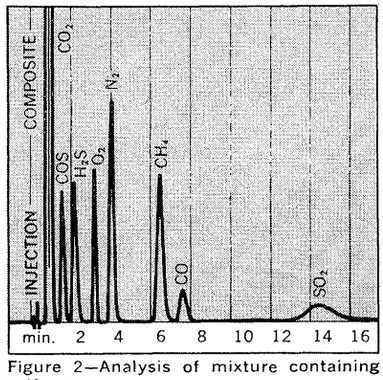


Figure 2—Analysis of mixture containing sulfur gases.

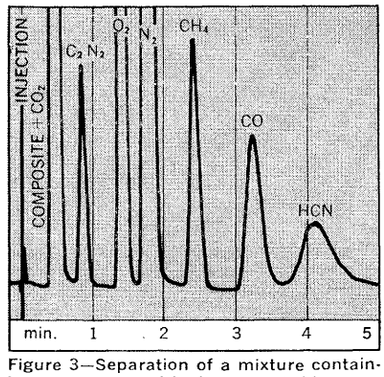
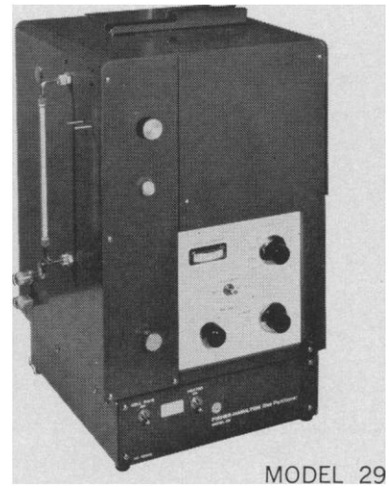
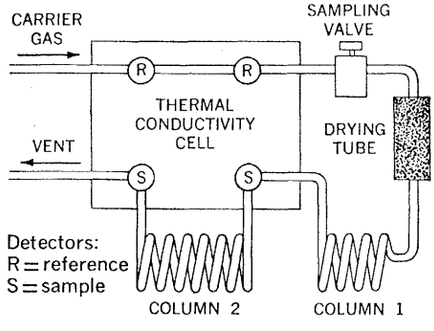


Figure 3—Separation of a mixture containing cyanogen and hydrogen cyanide.





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Fisher's Dual-Column Chromatographs simplify gas analysis

The complete chromatographic analysis of gaseous mixtures containing both fixed gases and hydrocarbons involves the use of both adsorption and partition-type columns. Many hydrocarbons are irreversibly adsorbed on GSC columns, whereas GLC columns do not normally yield complete resolution of the fixed-gas constituents. Consequently, the gas analysis often requires that two separate runs be made on the chromatograph with a column change in between.

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Behind the control panel built into the new Olympus Photomax is a photographic control center that guarantees you a perfect record of your visual observations. Perfectly exposed. Perfectly focused. And rendered with absolutely accurate color balance.

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The Photomax control center continuously monitors image brightness, automatically controls the built-in electromagnetic shutter for exposure times from 1/100 second to five minutes—*and compensates automatically for reciprocity failure in black and white film.*

And it monitors color temperature, too, over a range of 2854°-6000° Kelvin, to match any and every color film.

The inclined binocular body adjusts automatically to maintain constant optical tube length for all interpupillary distances, ensuring parfocality with the film plane at all times. Eyepieces with built-in camera finder masks are available for the Photomax; wide-field, high-eye point 10X eyepieces with diopter adjustment are standard.

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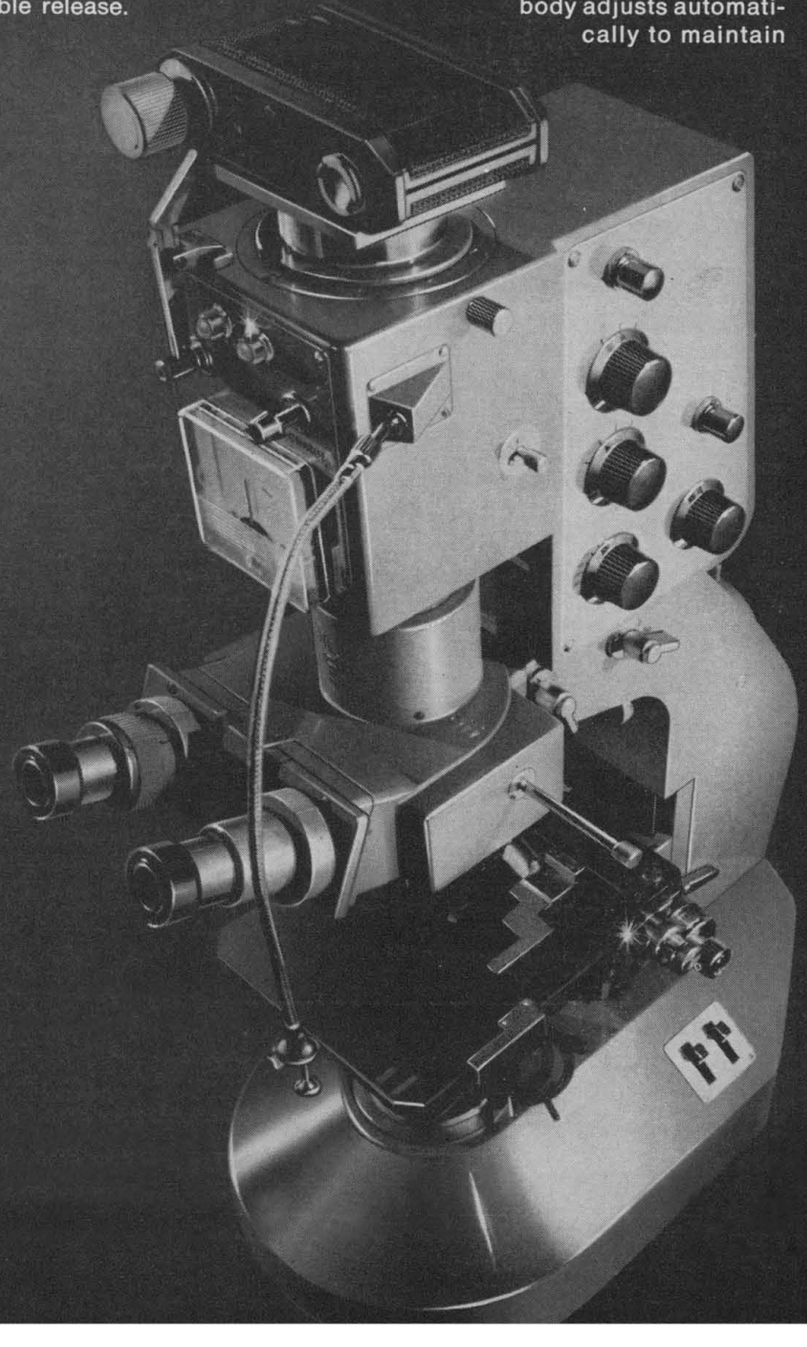
Complete information on the Olympus Photomax—or on other Olympus microscopes to suit your particular application—is yours for the asking.



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New hp Model 3410A AC Microvoltmeter measures low level repetitive signals obscured by noise—3 μV to 3 V full scale—accuracy ±3%. RMS noise voltages up to 20 dB above full scale *do not affect* readings. Sensitivity, low cost and ease of operation are the 3410A's contribution.

This new microvoltmeter uses an hp designed phase-locked synchronous detector to separate effects of noise from signal. The detector is an electronic gate controlled by an oscillator phase-locked to the input signal. No external reference is required to lock to the input signal. Simply adjust front panel tuning control within 1% of signal frequency and phase-lock circuits *lock-on and track* input signal with ±5% variation in the 5 Hz to 600 kHz frequency range. Phase-lock circuits track 0.5%/sec change in signal frequency without a change in voltmeter accuracy. Input impedance is 10 MΩ shunted by 20 pF.

The new Model 3410A has two outputs on the rear panel. One is a dc recorder output for monitoring long term drifting ac voltage amplitudes. The other is an output for driving an electronic counter to make precise frequency measurements.

For full specifications on the new hp Model 3410A AC Voltmeter, call your hp field engineer. Or, write to Hewlett-Packard, Palo Alto, California 94304, Tel. (415) 326-7000; Europe: 54 Route des Acacias, Geneva. Price: hp Model 3410A, $800.00.

097/11

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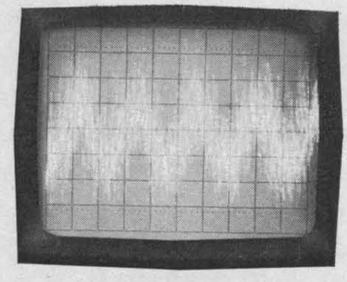
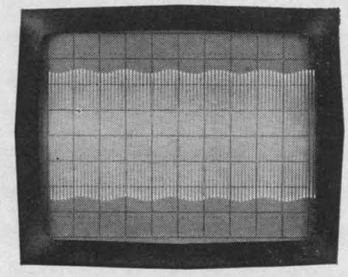
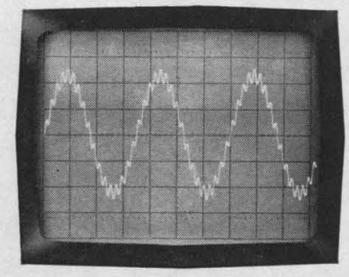


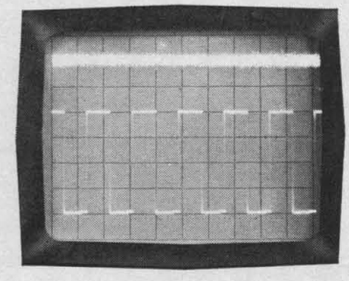
Measure 1 μV, 500 kHz signal out of 40 dB noise.



Measure 10 mV, 5 Hz amplitude modulating 1 V, 400 Hz.

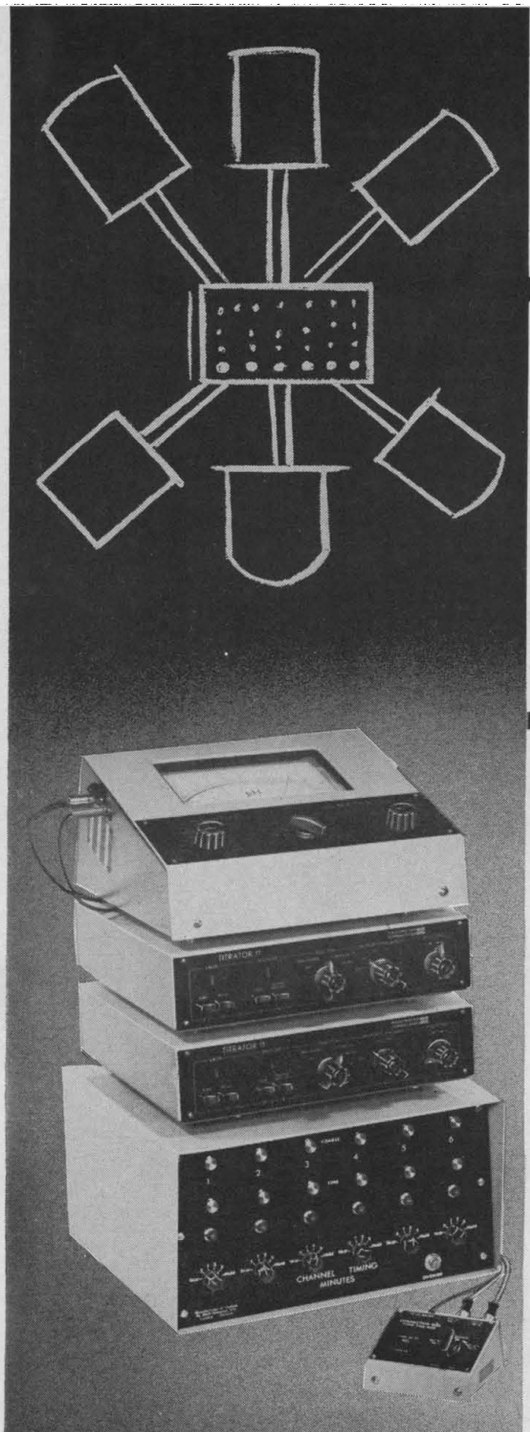


Measure 300 nanovolts, 10 kHz. signal superimposed on 10 μV, 1 kHz



Measure frequency of signal in noise up to 560 kHz by using square wave output, i.e. as a counter preamplifier.

program automatic pH control of simultaneous operations



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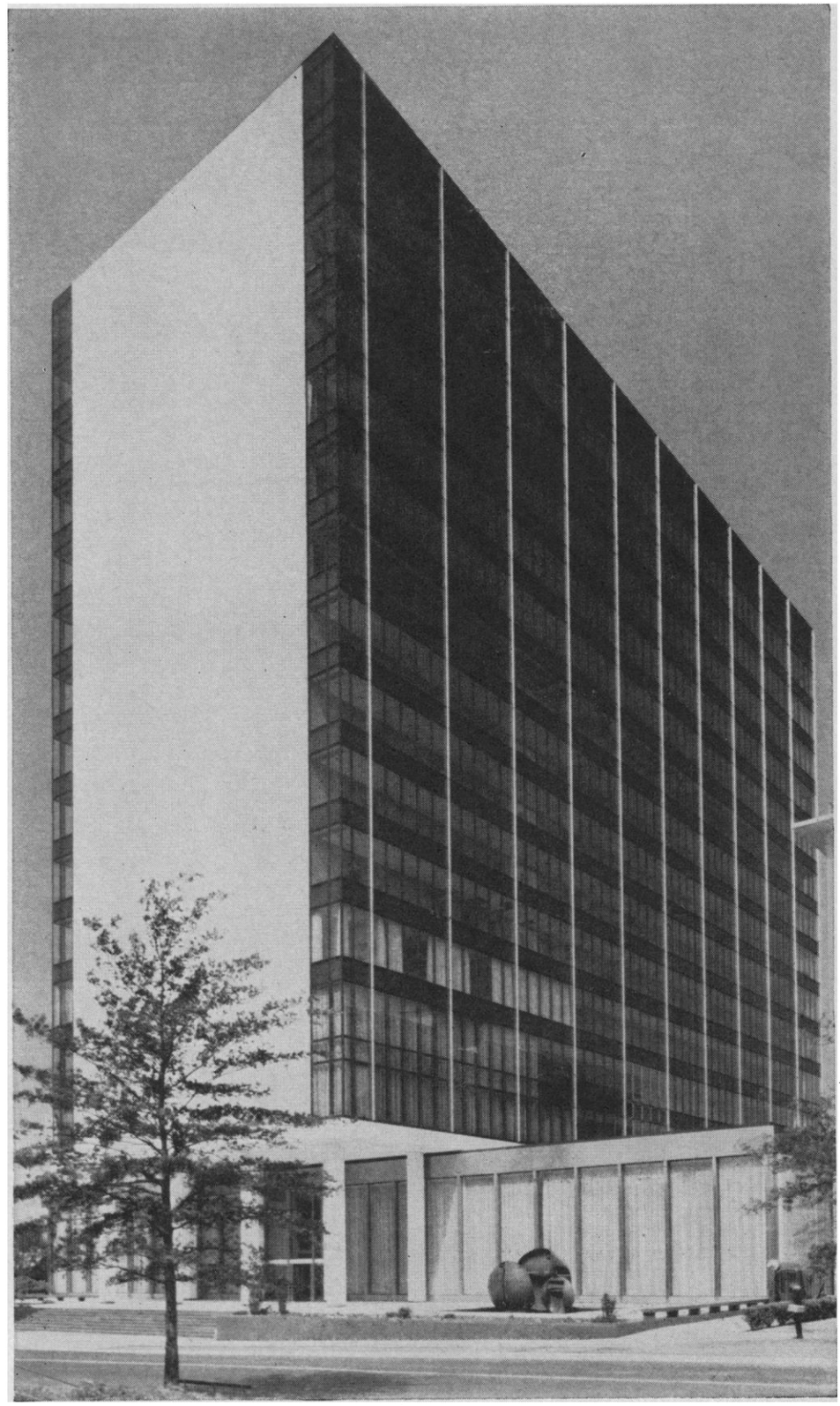

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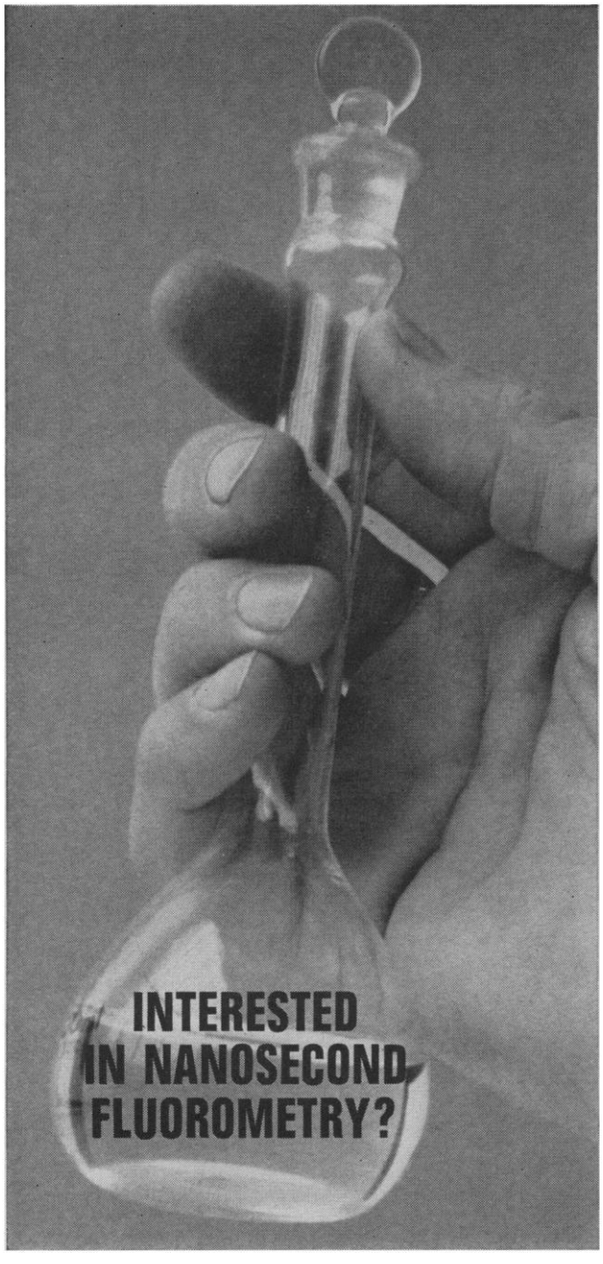

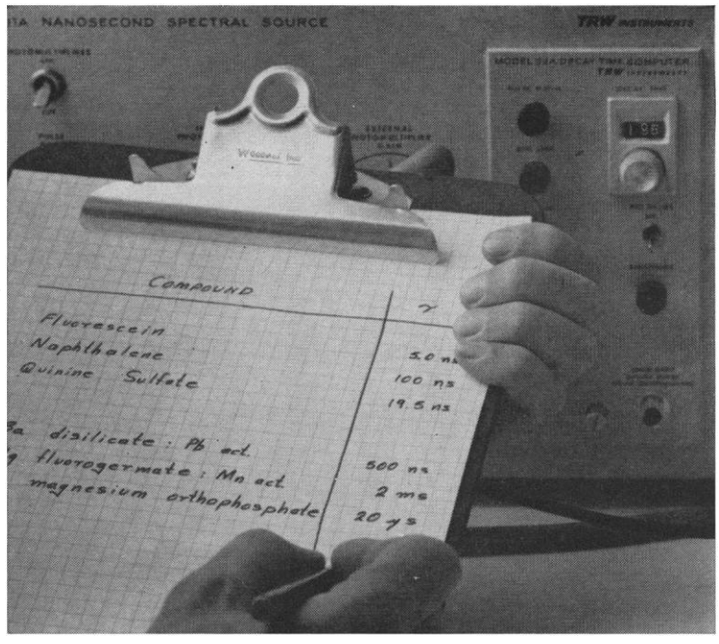

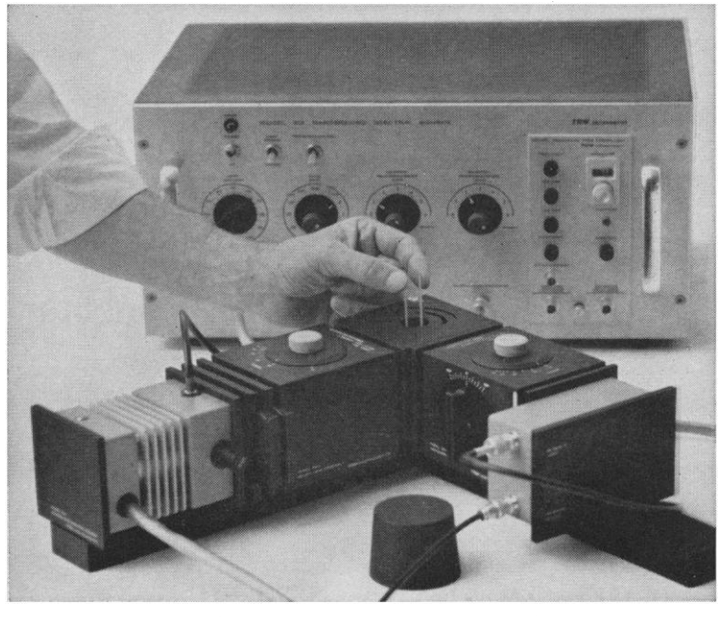

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Naphthalene
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Magnesium fluorogermate: Mn

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Computer manufacturers who worry about what the customer needs, worry a great deal about peripherals. DIGITAL has one of the largest lines of peripherals in the industry. Write, and we'll send you a free "Small Computer Handbook" and tell you all about our peripherals.

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Thanks for the memory, PDP-8.

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animal bedding

AB-SORB-DRI animal bedding is an all-wood animal bedding made from selected hardwood cut into uniform-sized square wooden particles, heat-treated to approximately 800° F for ten minutes, and then screened, aspirated and packed into completely sealed bags free of sewing holes which can permit contamination. The heat treatment reduces the moisture content from 45% to 4% ± 2% (and, consequently, increases the product's moisture-absorbing capacity) and significantly reduces its microbiological population. The screening and aspiration result in a uniform particle size (maximum 8 mesh, minimum 30 mesh) and freedom from dust (no particles smaller than 500 microns). Since the small AB-SORB-DRI bedding particles won't pile up, animals can't be hidden by it or mound it under water bottles. AB-SORB-DRI animal bedding absorbs 1.5 times its own weight and is an effective natural waste and odor absorbent with no additives of any kind. It stays drier longer and has a longer cage life because movement of the animals constantly exposes new, dry surfaces. And since AB-SORB-DRI doesn't mat or pack and resists sticking to cages, it can be easily removed from cages without time-consuming scraping. AB-SORB-DRI also does not clog vacuum systems.

AB-SORB-DRI was specifically developed (U.S. Pat. 3,256,857)—and is specifically manufactured—as an animal bedding. Since it is not a waste by-product of some other process, its constant availability and uniformity are assured. Manufacture at two separate locations provides further assurance of constant supply.

Write for detailed specifications and prices.

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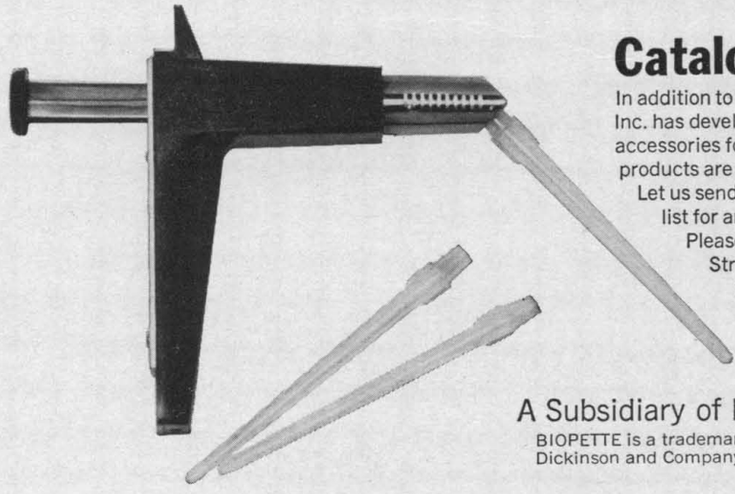

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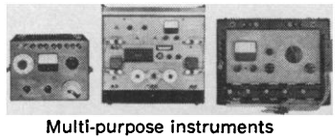

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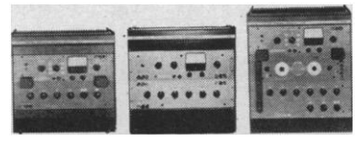

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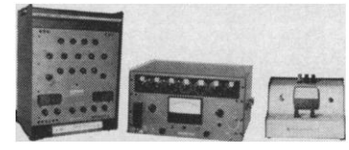

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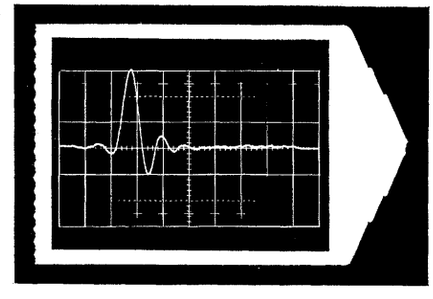

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coucang? Can it be that, in the latter half of the 20th century, we are still on Aristotle's *Scala Naturae*?

CHARLES A. REED
Departments of Anthropology and Biological Sciences, University of Illinois at Chicago Circle, Chicago

I have noted that in the recent literature on immunology there is a tendency to replace the word antigenic by immunogenic. May I suggest that this is a mistake. Immunogenic surely implies that the substance referred to will make animals immune. But not all antigens produce immunity; in fact, some produce hypersensitivity, more or less the reverse of immunity. Would it not be better to retain the older and more general term, or if the word immunogenic is to be used at all, to restrict it to organisms or substances that actually produce immunity?

WILLIAM C. BOYD
Department of Biochemistry, Boston University School of Medicine, 80 East Concord Street, Boston, Massachusetts 02118

Early Vision of Public Education

Recent development of the State University Center in Albany ("News and Comment," 24 Mar., p. 1521) reminded me that Theodoric Romeyn Beck proposed such a center over 100 years ago. His remarks before the Literary Convention and the New York State Legislature on 30 March 1854 urged the state to establish the university center as an alternative to the proposed National University in Washington, which he believed would not be built. He was right. The following excerpts from his statement proved him to be over 100 years ahead of his time:

> I beg to say the plan presented by our respected president is one which meets my hearty approbation. It includes many of the subjects required to be taught in the proposed University—all of them called for by the wants of the times and of the country. . . . What shall be the system of instruction? Are the Latin and Greek languages to be taught? Certainly not. . . . We have already in this state alone, some 160 academies, some 7 or 8 colleges, in which the study of these is pursued. And if the teachers are competent, we do not need a University for that purpose. But it is desirable to have professors who are perfect masters of these languages. . . . You cannot expect that they will be attended by large classes, and this renders it more imperative to endow professorships for them.

Beck went on to say that the future of transportation, building, and such depended upon knowledge of physical and chemical composition of materials. He suggested an independent professorship on *Iron*, its chemical characteristics, its manufacture and its application. He mentioned microscopy, which was "already successfully applied to the development of the intimate structure of man and of the inferior animals." He suggested a professor of physical geography and meteorology, justifying it by the needs of navigation. "It has been asserted of late years, that a ship can outride a storm. Certainly we know, that if the barometer was generally studied, many dangers might be avoided."

He also proposed professorships of public hygiene, medical jurisprudence, statistics, comparative law and legislation, and physical astronomy and pleaded for "a number of free seats" to be made available for students in order to meet the "wants of the masses" to study in such an institution, it being understood that "the necessity of increase in knowledge is recognized in every right minded man until the day of death."

Beck was a physician-educator in Albany during the first half of the 19th century. He was principal of the Albany Boys Academy for almost 50 years, professor of medical jurisprudence at the College of Physicians and Surgeons at Fairfield, New York, 1816–39 and professor of physics at the Albany Medical College 1840–54. The State of New York is now developing, hopefully, an outstanding graduate school. Although different chairs from those proposed by Beck might be more appropriate now, his principles are still sound.

WILLIAM A. BRUMFIELD
Department of Health, County of Westchester, White Plains, New York

CB Weapons: Powder Keg or Deterrent?

It seems to me that the letters (9 June) on moral issues of chemical and biological warfare have missed the main point which is that the vast majority of the earth's population regards science and technology as an increasingly mortal threat to their lives; they feel powerless at the mercy of a few, as if they were on the operating table in the hands, not of healers, but of

irresponsible playboys driven by curiosity, if not by the desire for prestige and promotion.

I learned this, to my surprise, more than 10 years ago when I traveled from Paris to Rouen. Opposite me sat a very intelligent lady who was a staff member of UNESCO. During our conversation on the world situation, she remarked that mankind could escape annihilation only if all scientists were executed. Concealing my vested interest in the matter, I applied the strategy of the new intern whom the chief of the psychiatric hospital had left with a patient convinced that he was Louis XIV; when the chief returned, the exultant intern told him that he first had persuaded the patient that he was only Louis XIII, and then continued until the patient agreed that he was only Louis I. "If you had arrived a few minutes later," the intern said to the chief, "he would have been cured." Similarly, I first persuaded the lady that biologists were a harmless lot (I see from the correspondence on CB warfare that I was wrong), and then I continued until finally she restricted her demand to nuclear physicists. I could have saved the lives of these too, but we arrived in Rouen and I had to leave.

It would be a good thing if scientists realized that they are dancing on a powder keg. The best of them are more aware of the situation and of the responsibility involved than anyone else; unfortunately, dangerous individuals are jailed or hanged not because of moral issues, but in order to eliminate the danger.

EGON OROWAN

44 Payson Terrace,
Belmont, Massachusetts 02178

The clear inference running through Langer's presentations is that it is wrong for the U.S. Defense Department to maintain a chemical and biological capability ("Chemical and biological weapons: once over lightly," 26 May, p. 1073). We have a defense department for the purpose of using force to protect our national interests and our welfare should other rational and peaceful means fail. Once reason fails and the United States is required to rely for continued existence on force, it seems to me that we should have the fullest possible range of force options at our disposal. By the same token, isn't it highly dangerous to expect our defense establishment to deny itself, for purely idealistic reasons, the potential

of weapons which our current and most realistic opposition has openly indicated he will use, and in fact is now using?

I might point out that even Aesop, who was admittedly more of a social than physical scientist, in his fable about the boar sharpening his tusks, recognized that being prepared for a conflict was the best way of avoiding one. . . Langer fails to realize that in this bipolar world the only benefactors of a unilateral renunciation of CB weapons by the United States would be the Soviet Union and its fraternal associates.

D. RICHARD MCKEEN
8416 Porter Lane, Alexandria, Virginia

Tactful Editors and Bad Authors

May one more editor describe how he deals with bad authors? Most of my authors write badly, but I do not find it necessary to tell them so, as Trigg quite rightly fears to do (Letters, 7 July). If, after considerable correspondence, an author appears to have a sense of humor, I may perhaps tell him he is "a noun piler-upper" but nothing sharper than that.

I correct all the English on one copy of the paper. If I am uncertain about the meaning, or if the meaning is completely obscure, I fix up a passage that means *something*. Then personally with my own hand, I transfer all the marks to another copy of the paper, which I send to the author. In a covering letter I explain the reasons for some of my changes, but by no means all. The author usually accepts nearly all my changes, and often thanks me for making them. And he has the pleasure of correcting me very firmly on any technical inaccuracies I may have made.

I unsplit infinitives, when this is desirable—the easy way—the adverb goes at the end. "Our object was to completely prevent . . ." does not become "Our object was completely to prevent . . ." which is almost as awkward; it turns into "our object was to prevent . . . completely." If an author writes "basic" where it could be mistaken for "alkaline," I change it to "fundamental." If he says "anticipate" when he means no more than "expect," I change it to "expect." But if he writes "due to" where orthodox British usage (and American pedantry) require "owing to," I leave it. After all, what does it matter? American usage is one syllable shorter, and nothing is

lost. But the point is, the author sees *all* my changes in the manuscript before it goes to the printer. I hope this will be of help to some editors.

ANTHONY STANDEN
Encyclopedia of Chemical Technology,
605 Third Avenue, New York 10016

Air Force: Reconstructed History

As Theodore von Karman's collaborator in writing his autobiography (which will be published this fall by Little, Brown under the title *The Wind and Beyond*), I was in a position to cover some of the same ground surveyed by Greenberg in his review of *Science and the Air Force* ("News and Comment," 16 June, p. 1463). One finds that history reconstructed entirely from documents may be quite different from history as told by one of the leading participants.

For instance, while I am sure that after World War II university scientists overran the Air Force in search for support, as Greenberg states, the actual marriage between university research and the Air Force was initially inspired by the Air Force itself, through the vision of General "Hap" Arnold. Several years before U.S. entry into World War II, Arnold sought out von Karman and his small group of amateur rocketeers at Caltech and helped them launch what was to become the nation's first important military research program in rocketry. In 1944 Arnold also asked von Karman to peer into the technological future and set down the steps he considered necessary to maintain U.S. air supremacy. Out of this came a report *Toward New Horizons* which guided Air Force thinking in scientific areas for a good many years. This doesn't mean that the report recommendations were adopted without struggle. Von Karman describes some difficulties within the Air Force in obtaining support for research (all research, not just basic research). But his emphasis lies in explaining how the Air Force gained greater respect for science and scientists—fostered by certain events, such as the Korean War which demonstrated the effectiveness of the F-86—a fighter plane that was developed from information based on captured Luftwaffe data of early German aeronautical research in jet aircraft.

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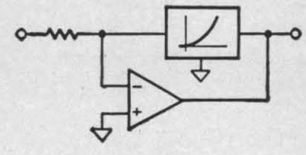

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SCIENCE

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Discretionary Funds

Congress is now approving budgets it received in January. These budgets started to take shape well over a year ago, were intended to go into effect on 1 July, and will run through June of 1968, with some of the funds being expended after June 1968. This time lapse is typical. Each year unanticipated opportunities and new requirements inevitably call for changes in the adopted budgets, and every successful federal administrator learns how to reprogram funds to match new demands. Sometimes it is necessary to secure approval of the Bureau of the Budget or the cognizant congressional committee. Sometimes activities can be reclassified to fit budget categories. Usually what is desirable can be achieved, but delay, extra work, and red tape are inescapable. The problem would be eased if a small fraction of an agency's budget were available to the director to be used as he thought necessary to accomplish the objectives of the agency.

The principle of a discretionary or contingency fund is well established in private foundations. One of the clearest lessons of Project Hindsight (*Science*, 30 July 1965) was evidence of the need of industrial and government laboratories for flexible funds enabling them to take advantage of a new idea or a promising but unexpected research lead. This year the House of Representatives' Committee on Appropriations, while recommending a reduction of $171 million in the Department of Defense funds for research, development, test, and evaluation, approved the Department's use of its emergency fund for these purposes and left intact the full requested amount of $125 million.

The need for fiscal flexibility in universities was the central theme of a declaration of policy entitled *The Efficiency of Freedom* that was prepared by a committee of businessmen, university presidents, and community and labor leaders under the chairmanship of Milton S. Eisenhower. The gist of the argument is contained in a quotation from Arthur Naftalin, then commissioner of administration for the State of Minnesota and now mayor of Minneapolis. The decision as to how much of a state's resources should be allocated to higher education, Naftalin wrote, lies "wholly, appropriately and inescapably within the jurisdiction of the governor and the state legislature." But after the amount is determined, the institution itself must have the "responsibility to determine how the limited resources available shall be distributed among the infinite number of competing academic needs."

Congress cannot abandon close surveillance over agency budgets. Yet federal agencies responsible for major research and educational activities need some of the same fiscal flexibility that is necessary for universities, the Department of Defense, and research laboratories. Congressional and Bureau of the Budget review and control would not be lost if government agencies were given some discretionary funds that remained available until spent, that the director could use for worthwhile but unanticipated activities that lie within the agency's area of responsibility, and for which he would later render account.

If a man is deemed qualified to carry the heavy responsibilities of a budget the size of those of NASA, HEW, AEC, NIH, or NSF, surely he is qualified to have disposition of a small portion of the budget entrusted entirely to his judgment. It is a good bet that a discretionary fund of this kind would be at least as prudently handled as any other portion of an agency's entire budget.—DAEL WOLFLE

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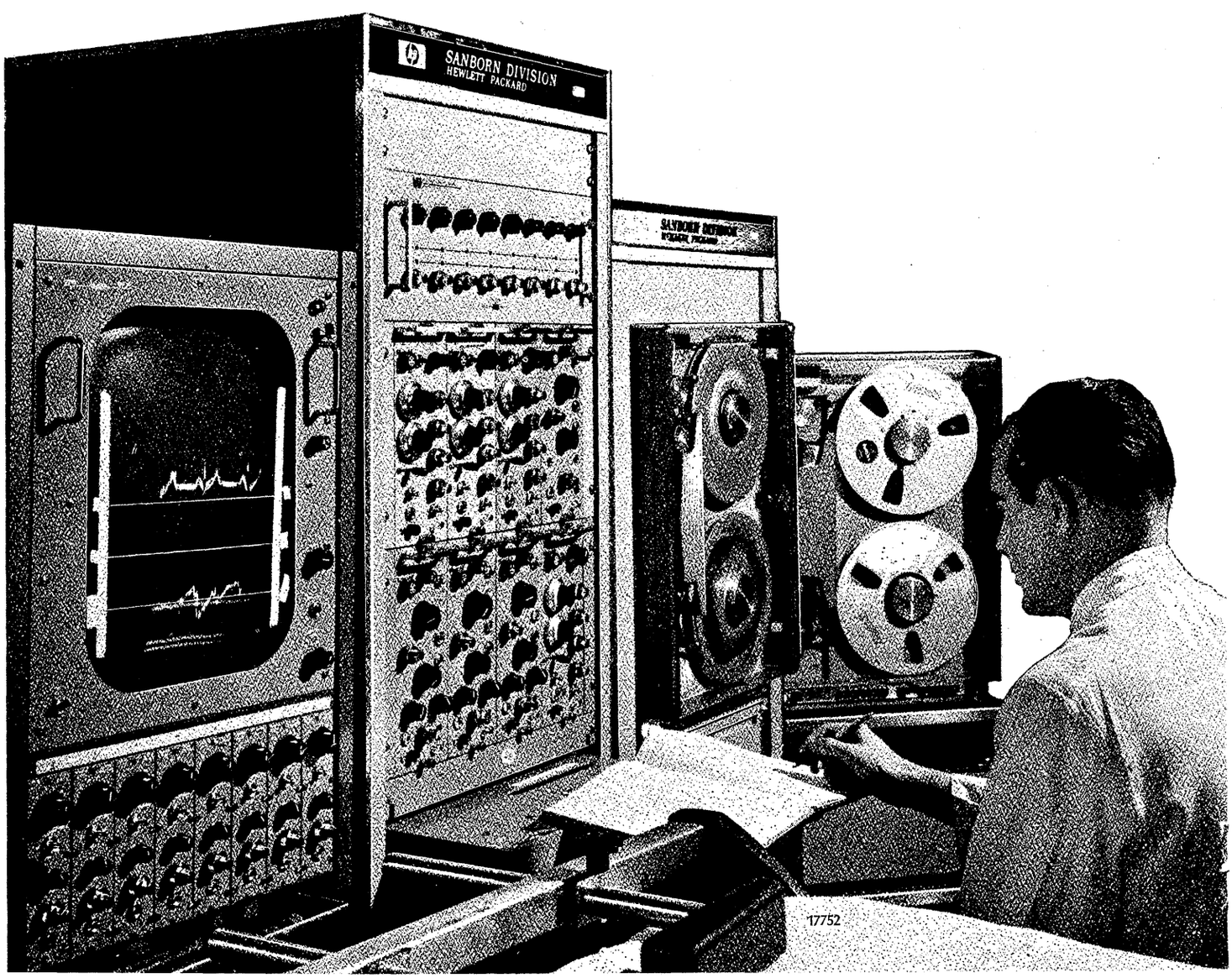

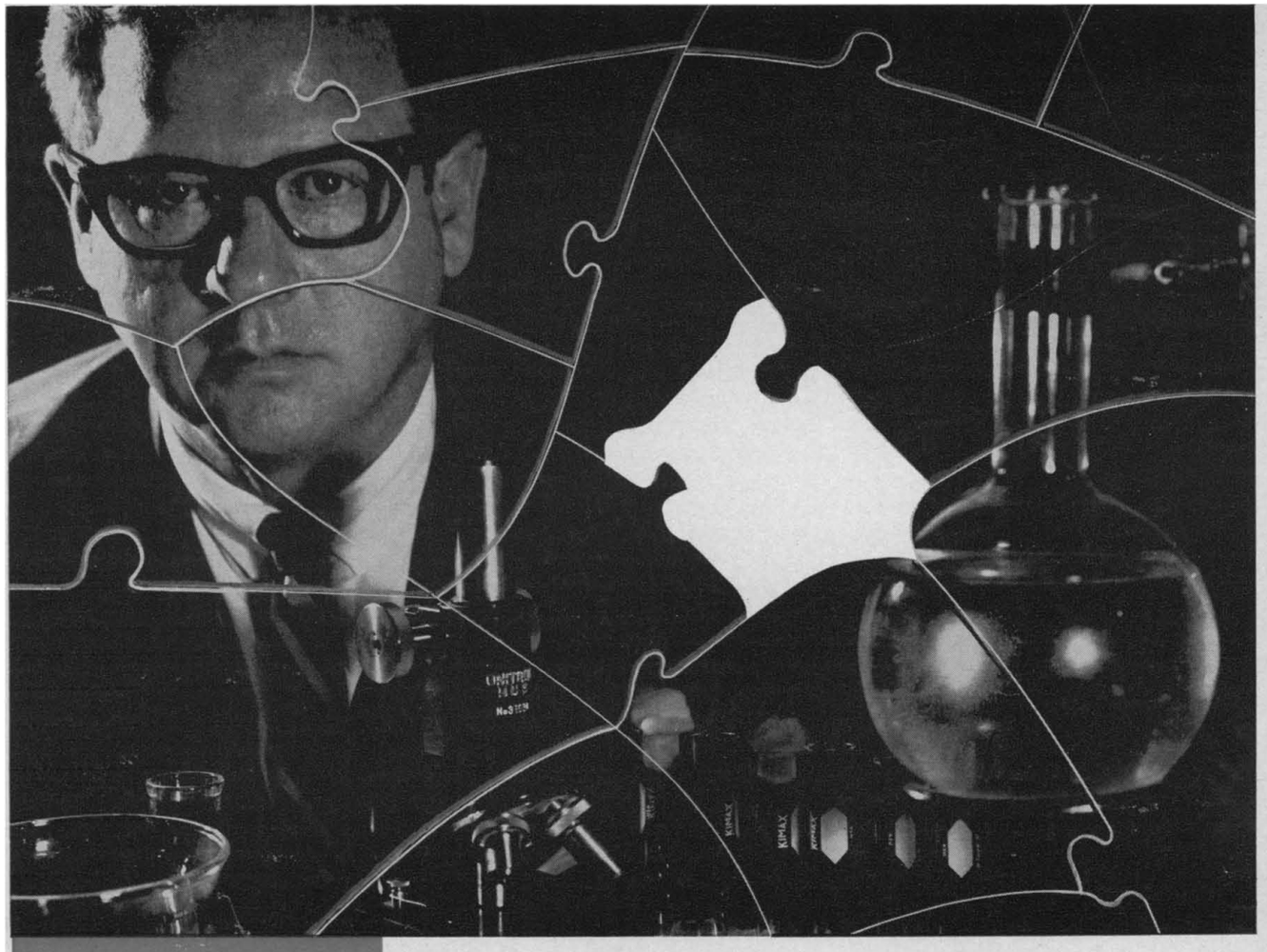

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Calendar of Events

National Meetings

August

28–2. **Alaska Science** Conf., 18th, College. (P. Morrison, Inst. of Arctic Biology, Univ. of Alaska, College 99735)

29–31. Association for **Computing Machinery**, 22nd natl. conf., Washington, D.C. (T. Willette, Box 6, Annandale, Va.)

29–1. **Electron Microscopy** Soc. of America, annual mtg., Chicago, Ill. (A. V. Loud, Pathology Dept., College of Physicians and Surgeons, Columbia Univ., 630 W. 168 St., New York 10032)

31–2. American **Physical Soc.**, Seattle, Wash. (Executive Secretary, 538 W. 120 St., New York 10027)

31–6. American **Psychological** Assoc., annual mtg., Washington, D.C. (APA, 1200 17th St., NW, Washington 20036)

September

1–5. American **Psychological** Assoc., 75th annual mtg., Washington, D.C. (A. Edwards, APA, 1200 17th St., Washington, D.C. 20036)

5–9. American **Political Science** Assoc., annual mtg., Chicago, Ill. (E. M. Kirkpatrick, APSA, 1527 New Hampshire Ave., NW, Washington, D.C. 20036)

5–9. **Molecular Structure and Spectroscopy**, Columbus, Ohio. (K. Narahari Rao, Dept. of Physics, Ohio State Univ., Columbus)

6–8. **Civil Engineering in the Oceans**, conf., San Francisco, Calif. (C. E. Lent, Jr., ASCE, 345 E. 47 St., New York 10017)

6–8. IEEE **Computer**, 1st annual conf., Chicago, Ill. (S. S. Yau, Dept. of Electrical Engineering, Technical Inst., Northwestern Univ., Evanston, Ill. 60201)

6–8. Mechanical **Behavior of Materials under Dynamic Loads**, San Antonio, Tex. (D. Black, Southwest Research Inst., 8500 Culebra Rd., San Antonio, Tex.)

6–8. Society of **Mining Engineers**, fall mtg., Las Vegas, Nev. (C. Hopkins, AIME, 345 E. 47 St., New York 10017)

7–8. **Fiber** Soc., annual mtg., Princeton, N.J. (L. Rebenfeld, TFS, Box 625, Princeton)

7–9. American Assoc. of **Obstetricians and Gynecologists**, annual mtg., Hot Springs, Va. (R. B. Wilson, AAOG, 200 First St., SW, Rochester, Minn.)

10–13. **Mining**, conv., Denver, Colo. (R. W. Van Evera, AMC, Ring Bldg., Washington, D.C. 20036)

10–15. American **Chemical** Soc., 154 annual mtg., Chicago, Ill. (A. T. Win-

stead, ACS, 1155 16th St., NW, Washington, D.C. 20036)

11–13. Electric **Propulsion and Plasmadynamics**, conf., Colorado Springs, Colo. (Meetings Manager, American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

11–13. **Space Simulation**, 2nd annual conf., Philadelphia, Pa. (J. Wheeler, ASTM, 1916 Race St., Philadelphia 19103)

11–14. **Instrument** Soc. of America, 22nd annual conf., Chicago, Ill. (M. Reed, ISA, 530 Wm. Penn Pl., Pittsburgh, Pa. 15219)

11–16. **Magnetism**, intern. congr., Boston, Mass. (J. S. Smart, IBM Thos. J. Watson Research Center, Yorktown Hgts., N.Y. 10598)

12–14. Chemical **Vapor Deposition** of Refractory Metals, Alloys and Compounds, conf., Gatlinburg, Tenn. (J. E. Cunningham, Metals and Ceramics Div., ORNL, Box X, Oak Ridge, Tenn. 37830)

12–14. **Materials Sciences in Oceanography**, symp., New York, N.Y. (D. H. Kallas, U.S. Naval Applied Science Lab., Brooklyn, N.Y.)

14–16. American **Thyroid** Assoc., annual mtg., Ann Arbor, Mich. (W. McConahey, ATA, 200 First St., SW, Rochester, Minn. 55901)

15–23. American Acad. of **General Practice**, mtg., Dallas, Tex. (M. F. Cahal, AAGP, Volker Blvd. at Brookside, Kansas City, Mo.)

17–20. **Petroleum Mechanical Engineering**, conf., Philadelphia, Pa. (A. B. Conlin, Jr., ASME, 345 E. 47 St., New York 10017)

18–20. **Electrical Insulation** and **Dielectric Phenomena**, conf., Pocono Manor, Pa. (Col. R. A. Cliffe, Conf. on EIDP, National Acad. of Sciences, 2101 Constitution Ave., NW, Washington, D.C.)

18–20. Society of **Logistics Engineers**, 2nd annual conv., Washington, D.C. (J. L. Carpenter, Jr., Martin-Marietta, Friendship Intern. Airport, Baltimore, Md. 21240)

18–20. **Standards Engineers Soc.**, 16th annual mtg., Detroit, Mich. (B. J. Powell, Bendix Corp., Res. Lab. Div., Southfield, Mich. 48076)

18–21. **Marine Corrosion**, seminar, Wrightsville Beach, N.C. (T. P. May, Box 656, Wrightsville Beach)

18–21. **Pulp and Paper**, 22nd engineering conf., Atlanta, Ga. (H. B. Harris, Jr., Union Camp Corp., Savannah, Ga.)

18–22. Localized **Excitations in Solids**, Los Angeles, Calif. (A. A. Maradudin, Dept. of Physics, Univ. of California, Irvine 92664)

19–22. Pulsed **High-Density Plasmas**, conf., Los Alamos, N.M. (F. L. Ribe, Los Alamos Scientific Lab., Box 1663, Los Alamos 87544)

21–24. American **Medical Writers'** Assoc., annual mtg., Chicago, Ill. (E. G. Dailey, AMWA, Box 267, Arlington, Va. 22210)

22–30. American Soc. of **Clinical Pathologists** and College of American Pathologists, joint annual mtg., Chicago, Ill. (M. Damron, ASCP, 445 N. Lake Shore Dr., Chicago 60611)

25–27. **Environmental Effects on Aircraft and Propulsion Systems**, 7th annual

conf., Princeton, N.J. (H. F. Sander, IES, 940 E. Northwest Highway, Mount Prospect, Ill.)

25–28. Association of **Iron and Steel Engineers**, annual conv., Chicago, Ill. (T. J. Ess, AISE, 1010 Empire Bldg., Pittsburgh, Pa. 15222)

25–28. **Human Factors Soc.**, 11th annual mtg., Boston, Mass. (P. G. Ronco, Systems Bldg., Tufts Univ., Medford, Mass.)

26–28. **Survival and Flight Equipment** Assoc., 5th natl. symp., San Diego, Calif. (J. Dolan, 939 Nolan Way, Chula Vista, Calif.)

26–29. American **Roentgen Ray** Soc., annual mtg., Washington, D.C. (T. F. Leigh, ARRS, Emory Univ. Clinic, Atlanta, Ga. 30322)

27–29. American Assoc. of **Petroleum Geologists**, mid-continent section mtg., Wichita, Kan. (R. J. Gutru, Beardmore Drilling Co., 700 One Twenty Bldg., Wichita 67202)

28–30. **Surgery of Trauma**, mtg., Chicago, Ill. (S. B. Gaston, AAST, 180 Fort Washington Ave., New York 10032)

28–30. **Cervix Uteri**, symp., Miami, Fla. (J. W. Scott, 701 du Pont Bldg., Miami 33131)

29–3. American Soc. of **Anesthesiologists**, annual mtg., Las Vegas, Nev. (W. S. Marinko, ASA, 515 Busse Hwy, Park Ridge, Ill. 60608)

International and Foreign Meetings

2–9. **Mechanical and Electrical Engineering**, 2nd Pan-American congr., Caracas, Venezuela. (Executive Secretary, AVIEM, Colegio de Ingenieros de Venezuela, Parque Los Caobos, Caracas)

3–9. **Embryology**, 8th intern. congr., Bern, Switzerland. (A. S. Curtis, University College of London, Gower St., London, W.C.1, England)

4–8. **Automatic Control in Space**, symp., Vienna, Austria. (J. A. Aseltine, TRW Systems, Space Park Dr., Houston, Tex. 77058)

4–9. International Union of **Forest Research** Organizations, 14th congr., Munich, Germany, (J. Speer, Forstliche Forschungsanstalt, Amalienstrasse 52/11, Munich 13)

4–10. International Union of **Pure and Applied Chemistry**, 21st congr., Prague, Czechoslovakia. (O. Wichterle, Inst. of Macromolecular Chemistry, Petriny, Prague 6)

5–8. **Solid State Devices**, conf., Manchester, England. (L. Lawrence, Inst. of Physics, 47 Belgrave Sq., London, S.W.1)

5–9. **Electron and Photon Interactions at High Energies**, intern. symp. (by invitation only), Stanford, Calif. (Symp. Secretary, Stanford Linear Accelerator Center, Stanford Univ., Stanford)

6–8. **Devonian System**, intern. symp., Calgary, Canada. (Secretary, Intern. Symp. on Devonian System, Box 53, Calgary, Alberta)

6–8. **Hydrology**, intern. symp., Fort Collins, Colo. (V. M. Yevdjevich, Colorado State Univ., Fort Collins 80521)

6–8. **II–VI Semiconducting Compounds**, intern. conf., Providence, R.I. (D. W. Langer, Aerospace Research Labs., Wright-Patterson AFB, Ohio 45433)

6–14. **Hydraulic** Research, 12th intern. congr., Fort Collins, Colo. (V. M. Yevdjevich, Colorado State Univ., Fort Collins)

7–9. **Analytical Chemistry**, symp., Sackville, Canada. (T. H. G. Michael, Chemical Inst. of Canada, 151 Slater St., Ottawa 4).

10–14. American Soc. of **Psychosomatic Dentistry and Medicine**, 18th annual mtg., Mont Gabriel, Canada. (L. Wollman, ASPDM, 2177½ Seneca St., Buffalo, N.Y.)

10–15. **Illuminating Engineering** Soc., conf., Montreal, Canada. (A. D. Hinckley, IES, 345 E. 47 St., New York 10017)

11–15. **Cybernetics**, 5th intern. congr., Namur, Belgium. (International Assoc. for Cybernetics, 13 Rue Basse-Marcelle, Namur)

11–15. **High Energy Accelerators**, 6th intern. conf., Cambridge, Mass. (W. A. Shurcliff, Cambridge Electron Accelerator, 42 Oxford St., Cambridge 02138)

11–15. **Information Theory**, Inst. of Electrical and Electronic Engineers, intern. symp., San Remo, Italy. (D. Schilling, Polytechnic Inst. of Brooklyn, 333 Jay St., Brooklyn, N.Y.)

13–15. American **Fisheries** Soc., 97th annual mtg., Toronto, Canada. (R. F. Hutton, AFS, Suite 1040, Washington Bldg., 15th and New York Ave., NW, Washington, D.C.)

17–20. **High Temperature**, 3rd intern. symp., Asilomar, Calif. (Dept. 366, Stanford Research Inst., 333 Ravenwood Ave., Menlo Park, Calif. 94025)

17–23. **Neuro-Genetics and Neuro-ophthalmology**, 2nd intern. congr., Montreal, P.Q., Canada. (A. Barbeau, Section de Neurologie, Univ. of Montreal, Montreal)

18–19. American Assoc. of **Botanical Gardens and Arboretums**, Hamilton, Ontario, Canada. (F. Widmoyer, Dept. of Horticulture, New Mexico State Univ., University Park)

18–20. **Buoy Technology**, 2nd intern. symp., Washington, D.C. (M. H. Simons, MTS, 1030 15th St., NW, Washington, D.C. 20005)

20–23. Use of **Radioactive Isotopes in Pharmacology**, intern. conf., Geneva, Switzerland. (B. Glasson, School of Medicine, Univ. of Geneva, 1211 Geneva 4)

24–27. American Inst. of **Chemical Engineers** and Mexican Inst. of Chemical Engineers, joint mtg., Mexico City. (J. Henry, AICE, 345 E. 47 St., New York 10017)

24–30. International **Astronautical** Federation, 18th annual congr., Belgrade, Yugoslavia. (American Inst. of Aeronautics and Astronautics, 1920 Sixth Ave., New York 10019)

25–29. **Mass Spectrometry**, intern. conf., West Berlin, Germany. (Geschaftsstelle der Gesellschaft Deutscher Chemiker, z Hd von Herrn Dr. W. Fritsche, 6 Frankfurt/Main, Postfach 9075, Germany)

26–28. Problems of **Quantitative Biology of Metabolism**, intern. symp., Helgoland, Germany. (O. Kinne, Biologische Anstalt Helgoland, Helgoland)

29–1. International Soc. for **Comprehensive Medicine**, annual mtg., Chicago, Ill. (R. C. Batterman, ISCM, 2030 Haste St., Berkeley, Calif. 94704)

BOOKS RECEIVED

(Continued from page 916)

Arms Control and Disarmament: The Critical Issues. James E. Dougherty. Center for Strategic Studies, Georgetown Univ., Washington, D.C., 1966 (order from Renaissance Editions, New York). 104 pp. Paper, $2.

Aspects of Marine Zoology. Proceedings of a symposium (London), March 1966. N. B. Marshall, Ed. Academic Press, London, 1967. 280 pp. Illus. $14. Twelve papers.

Attitude, Ego-Involvement, and Change. Based on a symposium (University Park, Pa.), May 1966. Carolyn W. Sherif and Muzafer Sherif, Eds. Wiley, New York, 1967. 328 pp. Illus. $9.75. Fourteen papers.

Aurora and Airglow. Proceedings of the NATO Advanced Study Institute (Staffordshire, England), August 1966. Billy M. McCormac, Ed. Reinhold, New York, 1967. 697 pp. Illus. $28.50. Forty-seven papers.

Basic Principles of Molecular Genetics. Irwin H. Herskowitz. Little, Brown, Boston, 1967. 310 pp. Illus. Paper, $6.

Biochemistry of Some Foodborne Microbial Toxins. Papers presented at the Symposium on Microbial Toxins (New York), September 1966. Richard I. Mateles and Gerald N. Wogan, Eds. M.I.T. Press, Cambridge, Mass., 1967. 183 pp. Illus. $7.50. Ten papers.

The Biological Basis of Radiation Therapy. Emanuel E. Schwartz, Ed. Lippincott, Philadelphia, 1966. 640 pp. Illus. $18.50.

Biosynthesis of Small Molecules. Georges N. Cohen, Harper and Row, New York, 1967. 126 pp. Illus. Paper, $5.95.

Campaigns against Hunger. E. C. Stakman, Richard Bradfield, and Paul C. Mangelsdorf. Harvard Univ. Press, Cambridge, Mass., 1967. 346 pp. Illus. $7.50.

A Catalogue and Reclassification of the Neotropic Ichneumonidae. Henry Townes and Marjorie Townes. American Entomological Institute, Ann Arbor, Mich., 1966. 371 pp. $11. Memoirs of the American Entomological Institute, No. 8.

Chemical Kinetics. G. Pannetier and P. Souchay. Translated from the French edition (Paris, 1964) by H. D. Gesser and H. H. Emond. Elsevier, New York, 1967. 471 pp. Illus. $17.

The Chemistry and Metabolism of Microbial Lipids. William M. O'Leary. World, Cleveland, 1967. 224 pp. Illus. $8.

Chemistry in the Utilization of Wood. R. H. Farmer. Pergamon, New York, 1967. 201 pp. Illus. $6.

College Chemistry. Harry H. Sisler, C. A. VanderWerf, and Arthur W. Davidson. Macmillan, New York, ed. 3, 1967. 925 pp. Illus. $9.95.

College Chemistry: A Laboratory Manual. Clark E. Bricker. Harcourt, Brace, and World, New York, 1967. 203 pp. Illus. Paper, $5.50.

Colloquium and Late-Type Stars. Proceedings of a colloquium (Trieste), June 1966. Margherita Hack, Ed. Osservatorio Astronomico, Trieste, 1967. 465 pp. Illus. Paper. Fifty-one papers in English or French.

Experiments in Modern Genetics. George A. Hudock. Wiley, New York, 1967. 110 pp. Illus. Paper, $3.95.

Experiments in Physical Chemistry. David P. Shoemaker and Carl W. Garland. McGraw-Hill, New York, ed. 2, 1967. 500 pp. Illus. $9.95.

Ferroelectricity. Ennio Fatuzzo and Walter J. Merz. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. 299 pp. Illus. $11.25. Series of Monographs on Selected Topics in Solid State Physics.

Fields Teaching Tests in General Psychology. Paul E. Fields. Scott, Foresman, Glenview, Ill., 1967. 256 pp. Paper, $2.25.

FORTRAN with Engineering Applications. Daniel D. McCracken. Wiley, New York, 1967. 249 pp. Illus. Paper, $6.95.

Foundations of Education. George F. Kneller, Ed. Wiley, New York, ed. 2, 1967. 694 pp. Illus. $8.50.

Foundations of Physics. Mario Bunge. Springer-Verlag, New York, 1967. 323 pp. Illus. $14. Springer Tracts in Natural Philosophy, vol. 10.

Foundations of Social Psychology. Edward E. Jones and Harold B. Gerard. Wiley, New York, 1967. 755 pp. Illus. $8.95.

Glacier Bay: The Land and the Silence. Dave Bohn. David Brower, Ed. Sierra Club, San Francisco, 1967. 165 pp. Illus. $25.

Grey Seal, Common Seal. An account of the life histories of British seals. R. M. Lockley. October House, New York, 1967. 175 pp. Illus. $7.95. A Survival Book on Seals.

The Growth of Knowledge: Readings on Organization and Retrieval of Information. Manfred Kochen, Ed. Wiley, New York, 1967. 412 pp. Illus. $14.95. Twenty-four papers.

Heterocyclic Compounds. vol. 8, *Tetrazoles, Tetrazines, and Related Ring Systems*. Robert C. Elderfield, Ed. Wiley, New York, 1967. 470 pp. Illus. $28.

Human Behavior: Shorter Edition. Bernard Berelson and Gary A. Steiner. Harcourt, Brace, and World, New York, 1967. 233 pp. Illus. Paper, $2.40.

An Illustrated Catalogue of the Rothschild Collection of Nycteribiidae (Diptera) in the British Museum (Natural History). Oskar Theodor. British Museum (Natural History), London, 1967. 526 pp. Illus. £18.

Infrared Spectroscopy in Surface Chemistry. Michael L. Hair. Dekker, New York, 1967. 331 pp. Illus. $15.75.

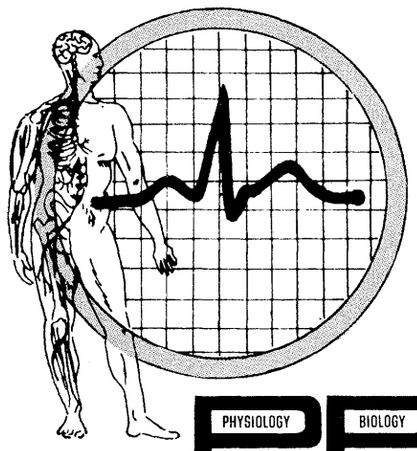
Index and Bibliography of Mass Spectrometry, 1963–1965. F. W. McLafferty and John Pinzelik. Interscience (Wiley), New York, 1967. Unpaged. Paper, $12.

Inorganic Chemistry. R. T. Sanderson. Reinhold, New York, 1967. 442 pp. Illus. $14. Reinhold Chemistry Textbook Series.

Interferometry. W. H. Steel. Cambridge Univ. Press, New York, 1967. 281 pp. Illus. $11.50.

Interpersonal Styles and Group Development: An Analysis of the Member-Leader Relationship. Richard D. Mann, Graham S. Gibbard, and John J. Hartman. Wiley, New York, 1967. 320 pp. Illus. $8.25.

Introduction to Electron Spin Resonance. H. M. Assenheim. Plenum Press, New



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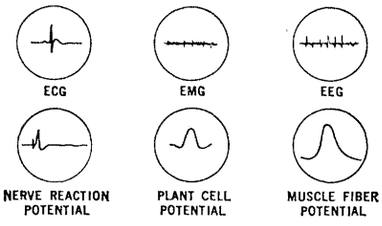

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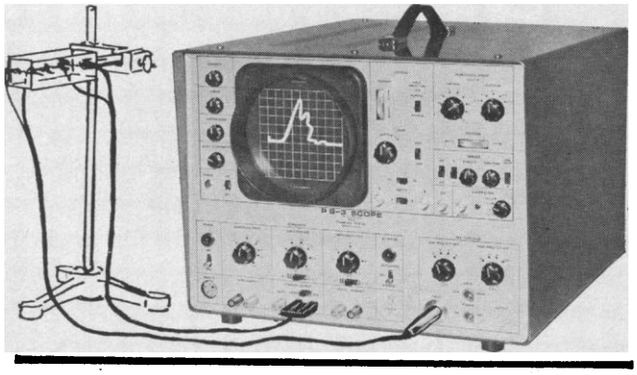

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York, 1967. 208 pp. Illus. $9.50. Monographs on Electron Spin Resonance.

Introduction to Electronics. Lane K. Branson. Prentice-Hall, Englewood Cliffs, N.J., 1967. 614 pp. Illus. $12. Prentice-Hall Series in Electronic Technology.

Introduction to the Operational Calculus. Lothar Berg. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. 304 pp. Illus. $12.

Is Anyone There? Isaac Isimov. Doubleday, Garden City, N.Y., 1967. 334 pp. $5.95. Thirty-seven speculative essays on the known and unknown.

I. V. Kurchatov. I. N. Golovin. Atomizdat, Moscow, 1967. 110 pp. Illus. Paper, $1.25.

Laboratory Experiments in Physiology. Blaine H. Levedahl and Albert A. Barber. Mosby, St. Louis, ed. 7, 1967. 185 pp. Illus. $3.95.

A Laboratory Guide in Chemistry. Joseph H. Roe. Mosby, St. Louis, ed. 5, 1967. 270 pp. Illus. Paper, $3.95.

Landmarks of the Western Heritage Since 1500. C. Warren Hollister, Ed. Wiley, New York, 1967. 660 pp. Illus. Paper, $5.95; cloth, $8.95.

Large-Signal Transistor Circuits. Donald T. Comer. Prentice-Hall, Englewood Cliffs, N.J., 1967. 284 pp. Illus. $10.50.

The Layman's Dictionary of Psychiatry. James A. Brussel and George La Fond Cantzlaar. Barnes and Noble, New York, 1967. 283 pp. Paper, $1.95.

The Liquid State. J. A. Pryde. Hillary House, New York, 1967. 187 pp. Illus. $6.

Magnetism and the Cosmos. N.A.T.O. Advanced Study Institute (Newcastle upon Tyne, England), April 1965. W. R. Hindmarsh, F. J. Lowes, P. H. Roberts, and S. K. Runcorn, Eds. Elsevier, New York, 1967. 450 pp. Illus. $27.50. Thirty-eight papers.

The Management of Data Processing. Richard G. Canning and Roger L. Sisson. Wiley, New York, 1967. 136 pp. Illus. $6.95. Manager's Guide Series.

A Manager's Guide to Computer Processing. Roger L. Sisson and Richard G. Canning. Wiley, New York, 1967. 140 pp. Illus. $6.95. Manager's Guide Series.

Mathematical Logic. Stephen Cole Kleene. Wiley, New York, 1967. 414 pp. Illus. $10.95.

Medical World Annual. Compiled by the Editors of *Medical World News.* McGraw- Hill, New York, 1967. 259 pp. Illus. $9.95.

Milk Production in Developing Countries. R. O. Whyte. Praeger, New York, 1967. 240 pp. Illus. $10.

Missile Base Beneath the Sea: The Story of Polaris. J. J. DiCerto. St. Martin's Press, New York, 1967. 175 pp. Illus. $5.95.

Modern Prestressed Concrete. H. Kent Preston and Norman J. Sollenberger. McGraw-Hill, New York, 1967. 349 pp. Illus. $13.50.

Molecular Mechanisms of Temperature Adaptation. A symposium. AAAS Publication No. 84. C. Ladd Prosser, Ed. AAAS, Washington, D.C., 1967. 398 pp. Illus. Members, $10.50; others, $12.50. Twenty papers.

Mössbauer Effect Data Index 1958–1965. Arthur H. Muir, Jr., Ken J. Ando,

and Helen M. Coogan. Interscience (Wiley), New York, 1967. 369 pp. Illus. $9.

The Moynihan Report and the Politics of Controversy. Lee Rainwater and William L. Yancy. M.I.T. Press, Cambridge, Mass., 1967. 511 pp. Illus. Paper, $3.95.

Multivariate Statistics for Personnel Classification. Phillip J. Rulon, David V. Tiedeman, Maurice M. Tatsuoka, and Charles R. Langmuir. Wiley, New York, 1967. 420 pp. Illus. $12.95.

Negative Taxes and the Poverty Problem. Christopher Green. Brookings Institution, Washington, D.C., 1967. 224 pp. Illus. Paper, $2.50; cloth, $6.75.

New Methods for Solving Elliptic Equations. I. N. Vekua. Translated from the Russian by D. E. Brown. A. B. Tayler, Translation Ed. North-Holland, Asterdam; Interscience (Wiley), New York, 1967. 370 pp. $16. North-Holland Series in Applied Mathematics and Mechanics, vol. 1.

Nonlinear Programming. J. Abadie, Ed. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. 338 pp. Illus. $13. Fourteen papers.

Oeuvres Mathématiques. Raphaël Salem. Hermann, Paris, 1967. 645 pp. 90 F.

Ontogeny of Immunity. Proceedings of the second Developmental Immunology Workshop (Sanibel Island, Fla.), February 1966. Sponsored by National Institute of Child Health and Human Development. Richard T. Smith, Robert A. Good, and Peter A. Miescher, Eds. Univ. of Florida Press, Gainesville, 1967. 222 pp. Illus. $15. Twenty-three papers.

Operations Research in Sellers' Competition. A stochastic microtheory. S. Sankar Sengupta. Wiley, New York, 1967. 246 pp. Illus. $9.95.

Order and Change: Essays in Comparative Sociology. Wilbert E. Moore. Wiley, New York, 1967. 323 pp. $8.95.

Penguin Technology Survey 1967. Arthur Garratt, Ed. Penguin Books, Baltimore, 1967. 207 pp. Illus. Paper, $1.95.

Personality Measurement: An Introduction. Benjamin Kleinmuntz. Dorsey, Homewood, Ill., 1967. 477 pp. Illus. $10.60. Dorsey Series in Psychology.

Perspectives and Principles for Physical Education. Janet Felshin. Wiley, New York, 167. 243 pp. $5.95.

Physics and Chemistry of II–VI Compounds. M. Aven and J. S. Prener, Eds. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. 862 pp. Illus. $30.

The Physiography of Arctic Canada. With special reference to the area south of Perry Channel. J. Brian Bird. Johns Hopkins Press, Baltimore, 1967. 356 pp. Illus. $15.

Plant–Water Relationships. R. O. Slatyer. Academic Press, New York, 1967. 378 pp. Illus. $16.50. Experimental Botany, an International Series of Monographs.

Potter's Laboratory Outline for General Zoology. James A. MacMahon. Mosby, St. Louis, ed. 6, 1967. 255 pp. Illus. Paper, $4.25.

Joseph Priestley: Revolutions of the Eighteenth Century. F. W. Gibbs. Doubleday, Garden City, N.Y., 1967. 270 pp. Illus. $6.