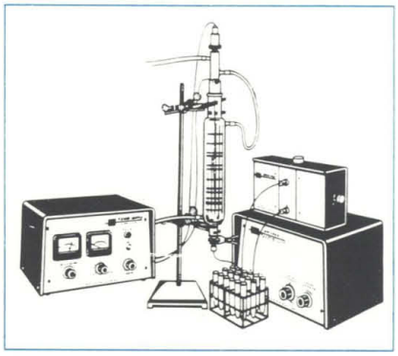
SCIENCE

6 March 1970

Vol. 167, No. 3923

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Ampholine Electrofocusing equipment, including Power Supply, Uvicord ultraviolet Monitor and Recorder, ready for protein separation.



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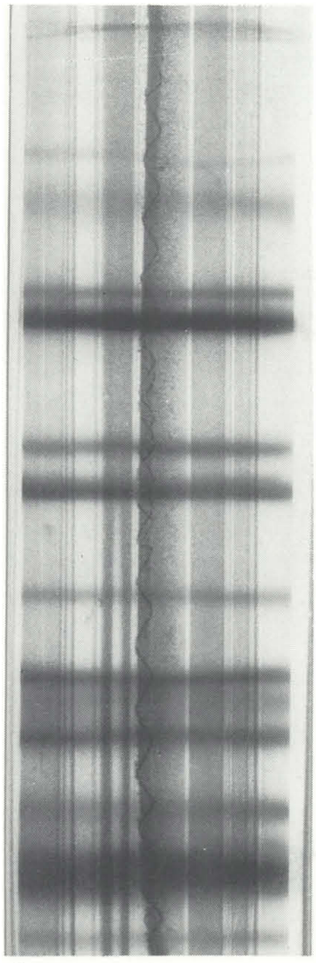

A separation of chicken haemoglobin.

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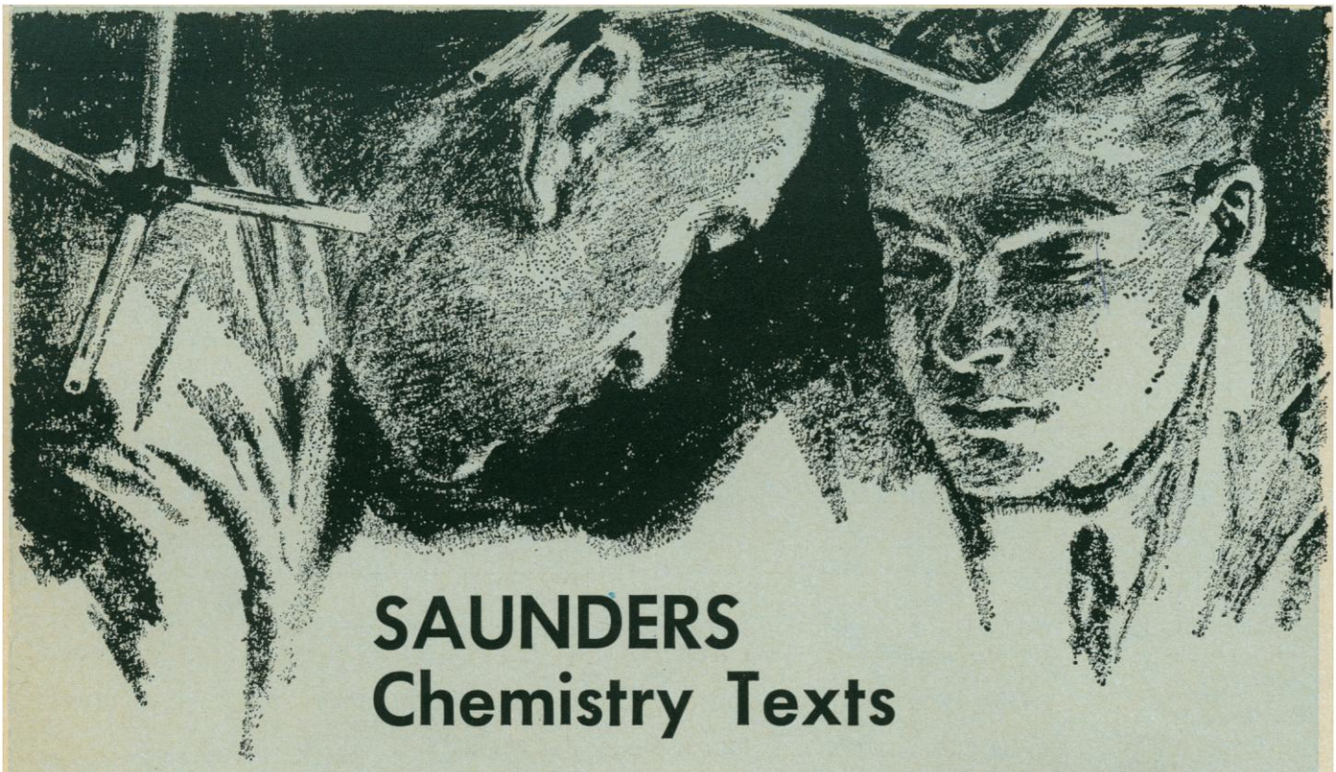

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Vol. 167, No. 3923

SCIENCE

SCIENCE is published weekly on Friday and on the fourth Tuesday in September by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly®**. Second-class postage paid at Washington, D.C. Annual subscription $12; foreign postage: Americas $3; overseas $5; single copies, 50¢ (back issues, $1) except **Guide to Scientific Instruments** and the 30 January issue, which are $3 each. School year subscription: 9 months, $9; 10 months, $10. Provide 4 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature**.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Protonymph of the North American house dust mite (*Dermatophagoides farinae* Hughes, 1961) (about × 200). See page 1382. [W. C. Lane, Battelle Memorial Institute]

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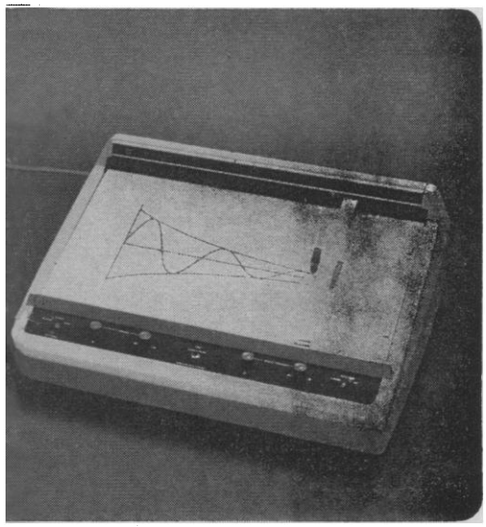

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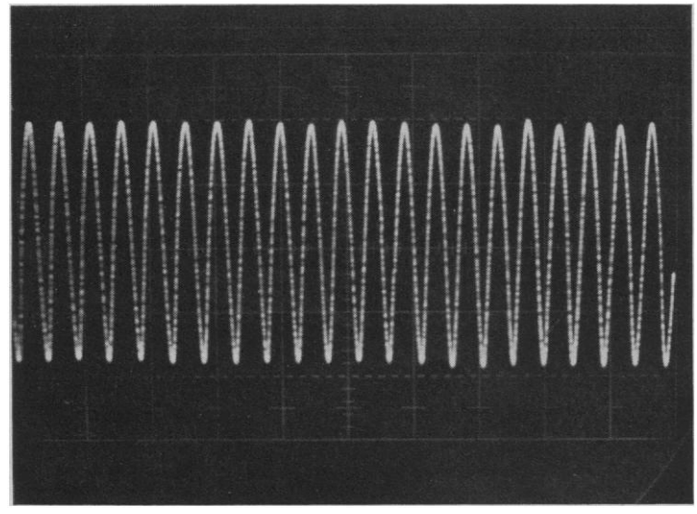

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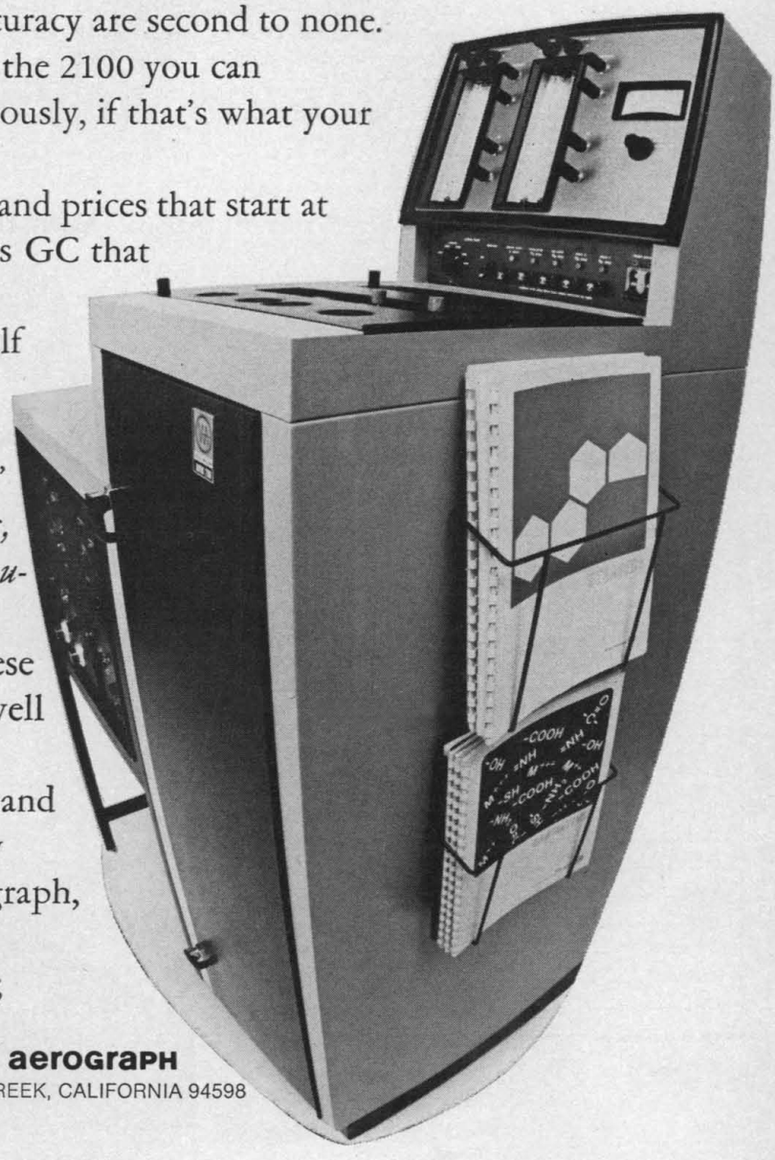

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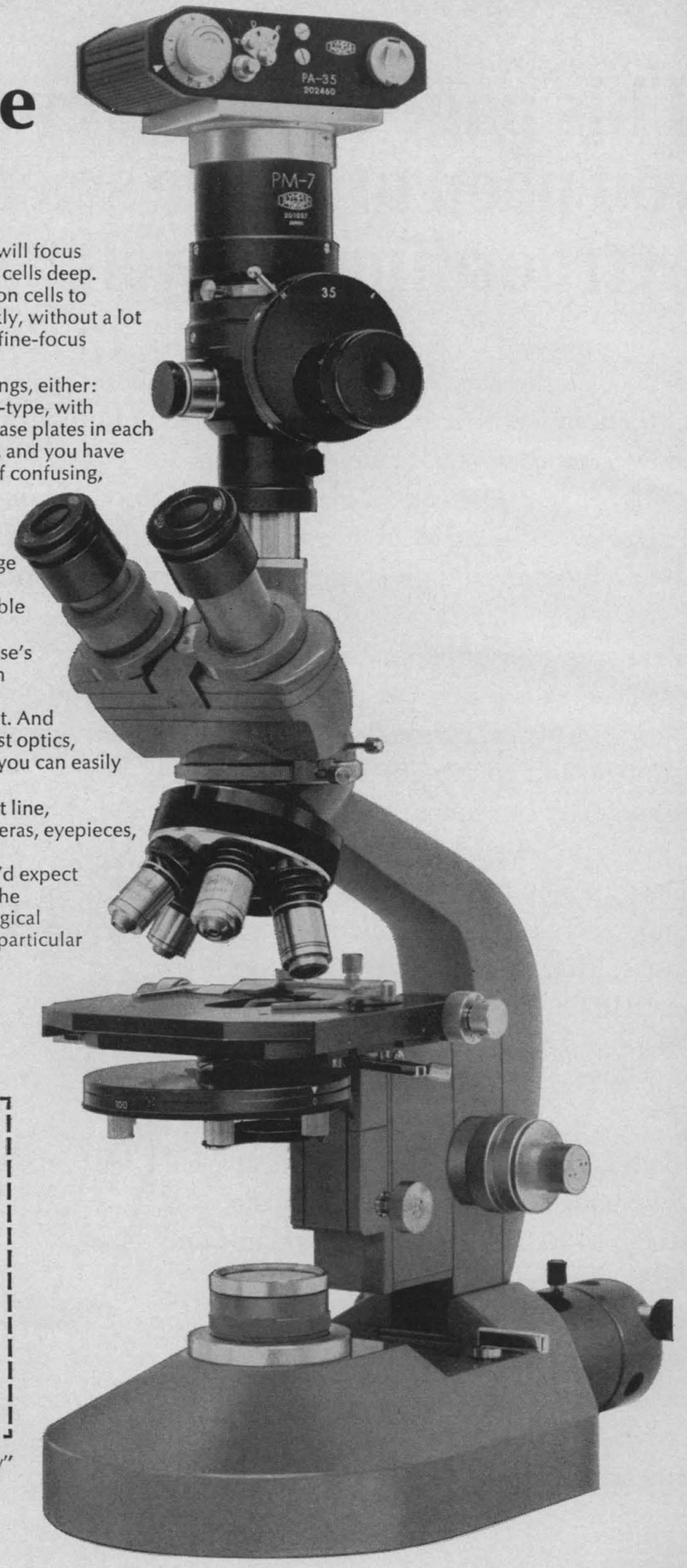

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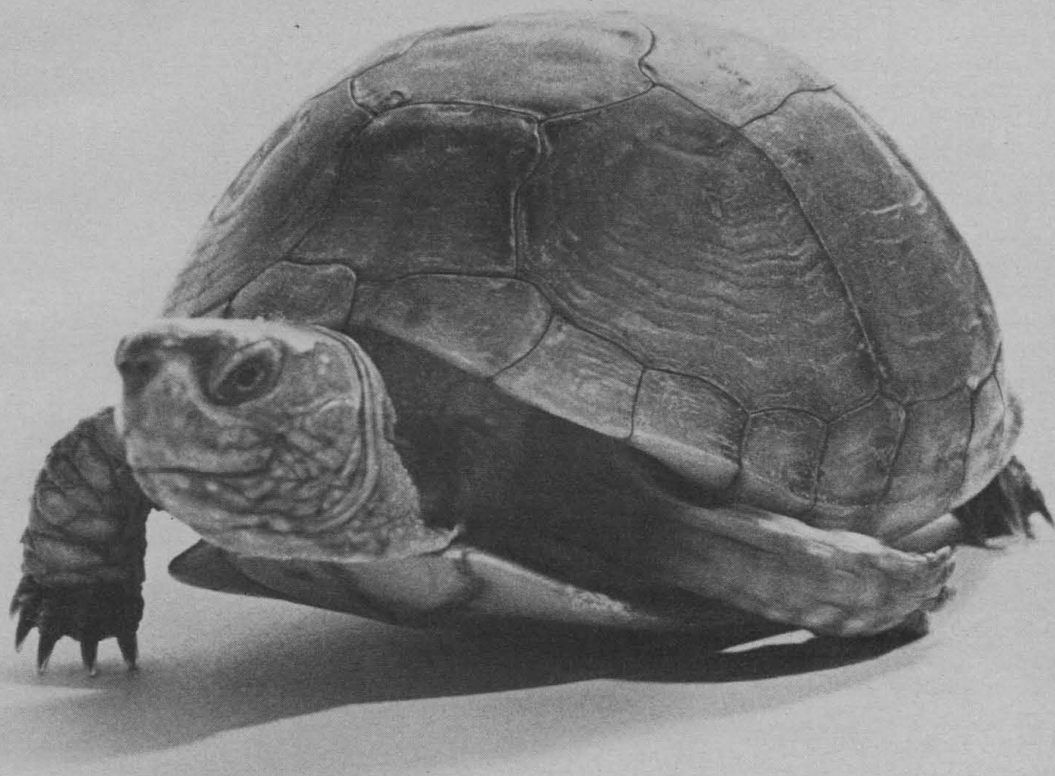

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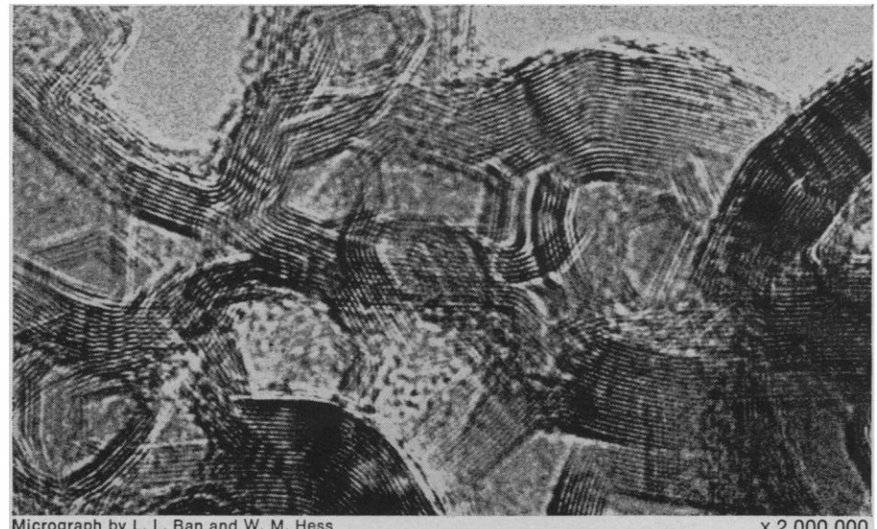

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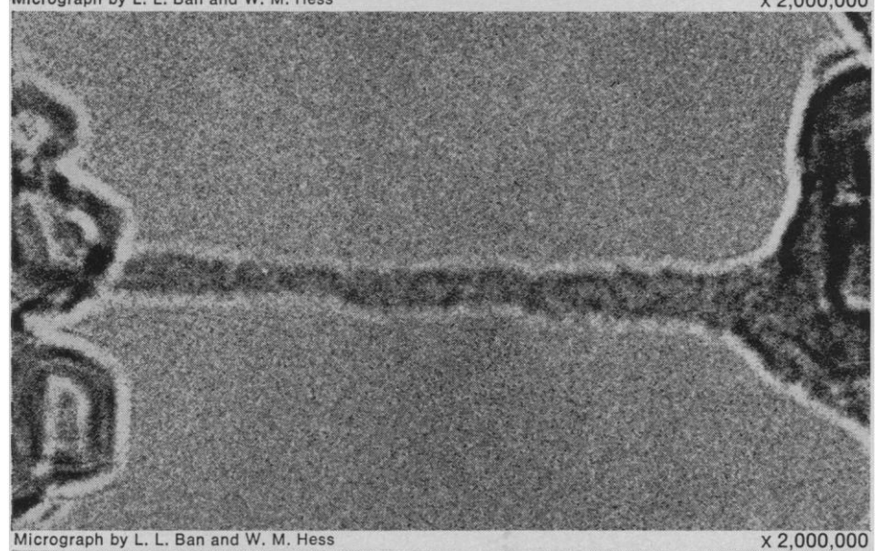

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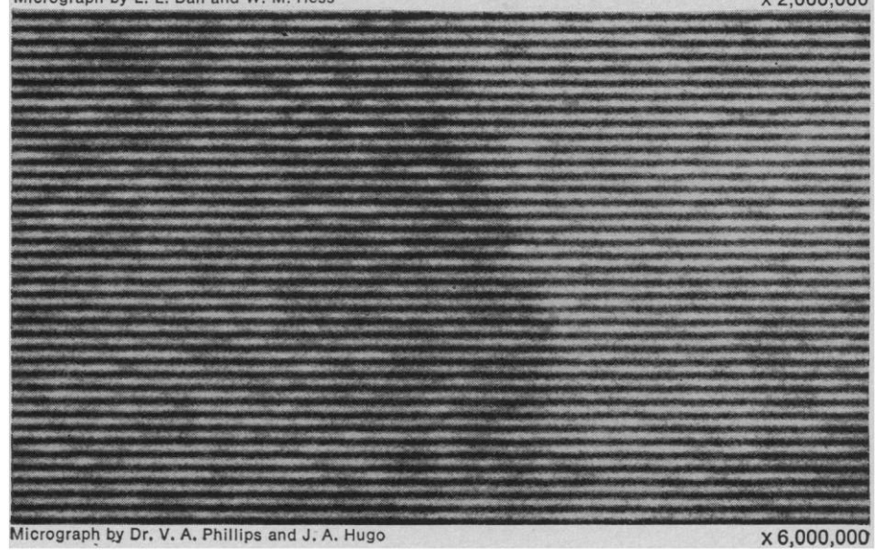

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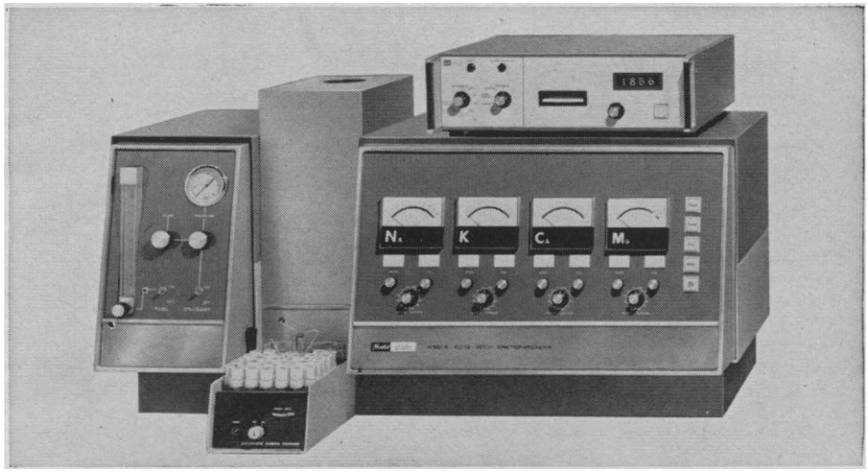

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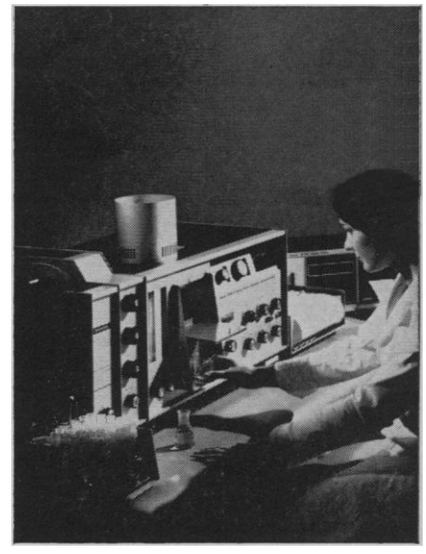

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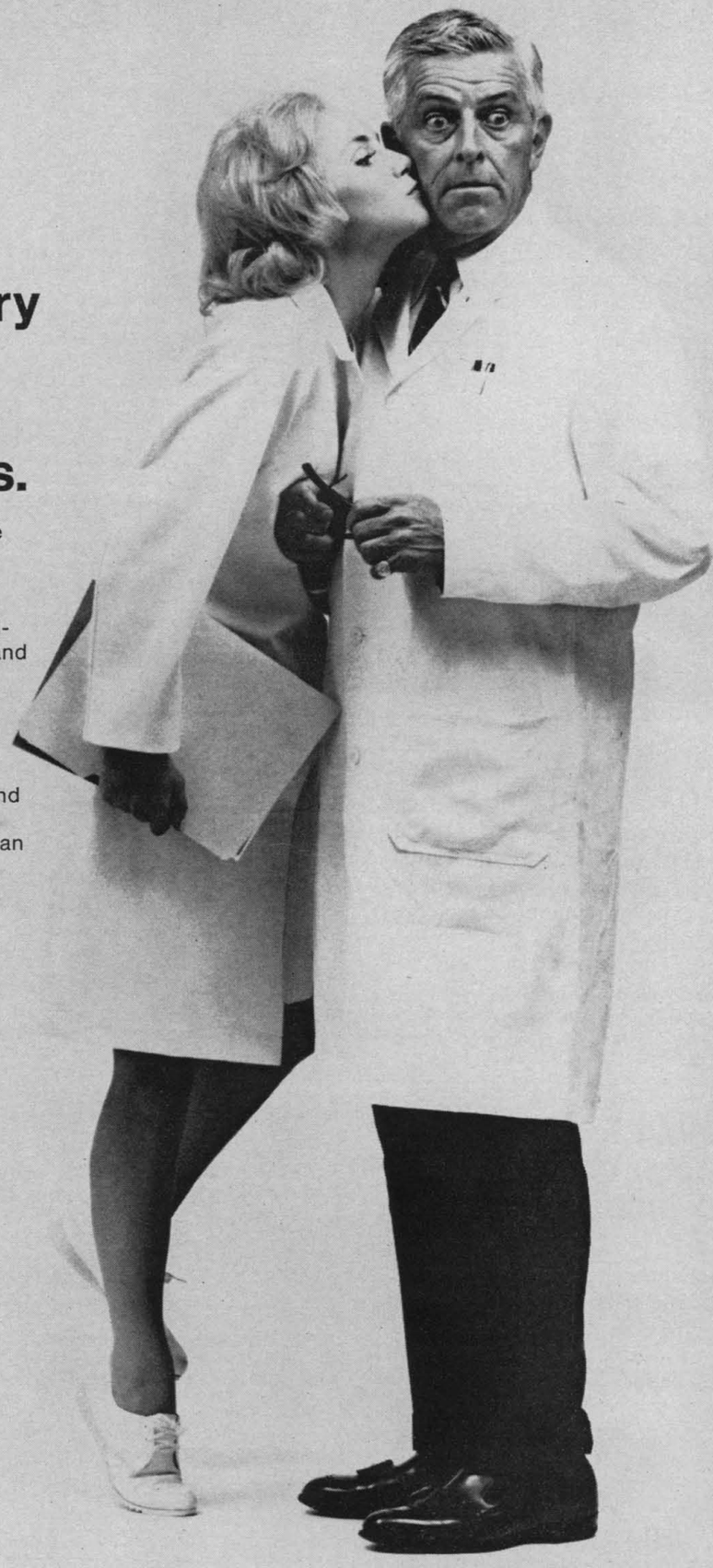

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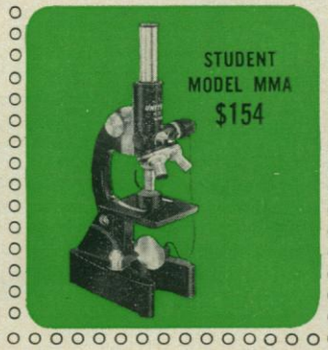

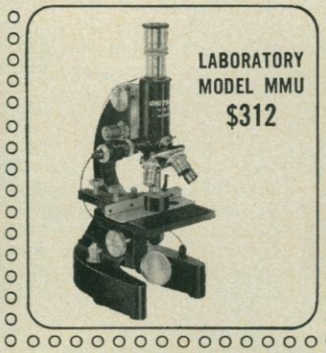

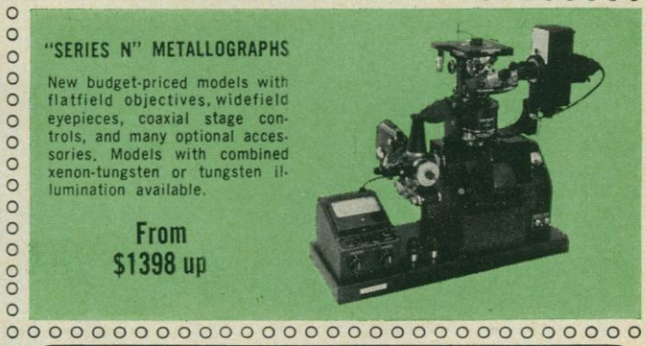

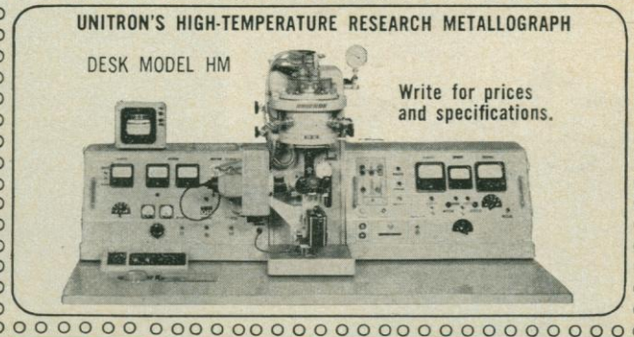


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← Circle No. 36 on Readers' Service Card

Circle No. 42 on Readers' Service Card

The interchangeable back. It's just as important as the interchangeable lens.

In the beginning the camera was a one-piece unit.

Then somebody had an idea. If the lenses could be made to change, then the camera could be made to see more. And the interchangeable lens was born.

Victor Hasselblad had an equally interesting idea when he set out to build his 2¼" single lens reflex. If the back could be made to change, he reasoned, then you could build other backs for other purposes.

Then if you could also change the viewer, and the film advance mechanism, and then could add on all kinds of accessories, you'd have much more than a camera. You'd have a whole system of photography. And the Hasselblad System was born.

Today, many good cameras have interchangeable lenses. Some have interchangeable viewers. But few have interchangeable film magazines.

Which is puzzling. Because a fixed back really ties a camera down, by letting it do only one thing at a time.

For example, with other cameras you have to finish or waste your roll of black and white before you can change to color. With Hasselblad you can switch from black and white to color, or from color negative to color reversal film at any time, simply by switching backs. Each back is like having an extra camera.

And while other cameras can take only one size of film (such as 35mm), Hasselblad can take 120, 220 and 70mm film, as well as any of the numerous cut films. It's all done with interchangeable backs.

And where other cameras take film in a limited number of shots per roll, there are Hasselblad backs that give you 12, 16, 24 and even 70 exposures per roll.

Other cameras take pictures in one size only. Hasselblad gives you three choices of picture size, 2¼"x2¼", 1⅝"x2¼", 1⅝"x1⅝" (for making superslides). It's all done with the same camera. Only the backs change.

With other cameras re-loading is time consuming. Which can cost you a lot of good shots. With Hasselblad you can carry a few extra pre-loaded backs and just snap them on as needed, for uninterrupted shooting. That's how the astronauts re-loaded their Hasselblads in space and on the moon.

We make five interchangeable film magazines in all.

And ten interchangeable Carl Zeiss lenses, from 40mm to 500mm (each lens has a built-in Compur shutter synchronized for flash and strobe at all speeds).

And five interchangeable viewfinders.

And three interchangeable film advance handles.

And a wide range of accessories, all the way from a timer for sequence photography to a flashcube holder that attaches right to the sunshade.

We even make three different Hasselblad bodies. A standard SLR, an electrically-driven SLR and a super wide angle camera with 38mm lens attached.

Many of these components are recent developments. But the interchangeable film magazine is as old as the Hasselblad itself. It was developed more than twenty years ago. Which has certainly given other cameras enough time to catch up.

In this day and age, if a camera has interchangeable lenses, but doesn't have interchangeable film magazines, then the back of the camera is behind the front of the camera.

For more information, see your Hasselblad dealer. For his name, and a free 48-page catalog on The Hasselblad System, write to address below.

HASSELBLAD

Paillard Incorporated,
1900 Lower Road, Linden, N.J. 07036.
Other products: Bolex movie equipment, Hermes typewriters and figuring machines.

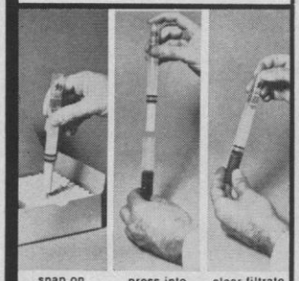
The System

Error Eliminators and $ Savers from L/I

1. L/I LABQUAKE™

1. L/I LABQUAKE™. A **silent, small, submersible** tube rocker and rotator for all sizes of tubes, ¼" to 1½" diameter. Occupies only 2½ x 10 x 4 inches when fully loaded with 14 tubes. LABQUAKE has 28 tube positions altogether that accommodate clips to hold tubes of varying sizes. Adjustable bracket holds LABQUAKE fully or partially submerged in water bath.

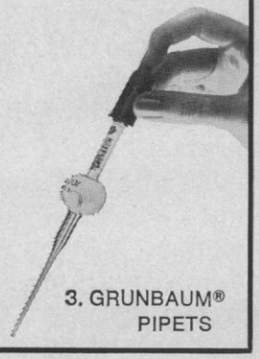
Price: LABQUAKE (patent pending), for 110-120 VAC, furnished with (14) 13 mm and (14) 16 mm clips, $59.50. Maximum capacity, 250 ml. Other clips may be substituted.



2. STAT-FILTER®

2. STAT-FILTER®. For **instant filtration** by high pressure or vacuum—in the palm of your hand. You get crystal clear filtrates within 3 seconds after precipitates form. All precipitates over 10 microns are retained with no possibility of remixing after separation. The versatile **STAT-FILTER** uses disposable polypropylene test tubes and plungers, making it suitable for **any** filtration. Inexpensive demonstration kits are available.

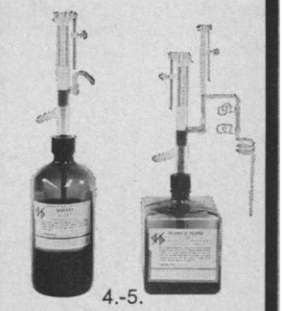
Price: complete **STAT-FILTER SYSTEM**, including 3 plungers, 100 disposable polyethylene filters and test tubes, and 25 test tube closures, $38. Demonstration **STAT-FILTER** kit with 1 plunger, 10 filters, 7 test tubes and 3 closures, $9.00.



3. GRUNBAUM® PIPETS

3. GRUNBAUM® PIPETS (The Perfect Pipet). The versatile **GRUNBAUM** micro-pipet aliquots, dilutes, transfers, and stores reagents. It's self-adjusting, self-filling, non-dripping and self-cleaning (sample B washes out sample A). Guaranteed accuracy: 5 μl, ±3%, 10 and 20 μl, ±2%; 25 μl and larger, ±1%. Guaranteed reproducibility: 0.1% at 100 μl. Sizes stocked for immediate delivery: 1, 2, 3, 4, 5, 10, 15, 20, 25, 50, 75, 100, 150, 200, 250, 300, 400, and 500 μl. Other sizes on request.

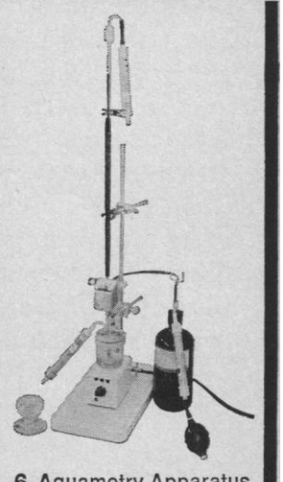
Prices: 1 through 5 and 75 μl, $7. All others $6.



4.-5. Automatic REPIPETS® and Dilutors

4.-5. Automatic REPIPETS® and Dilutors. These unique instruments pipet, dilute and dispense with a *guaranteed* accuracy of 1% and a reproducibility of 0.1%. **PYREX® L/I REPIPETS** and Dilutors are of one-piece fused glass construction with no connections—eliminating any chance for leaks. L/I's instruments fit directly on your reagent bottles, ½ ounce and larger. Any reagent can be handled. All amber instruments are supplied for your labile reagents. Use L/I **LAMBDA-DIALS®** to increase precision to 1% at 10 lambdas! L/I stocks **REPIPETS** and Dilutors in ½, 1, 5, 10, 20, and 50 ml sizes, each adjustable from zero to full capacity. Square amber liter bottles optional at N/C.

Prices: REPIPETS, $52.50; Dilutors, $99.50. Micro and Macro Teflon® tips included.

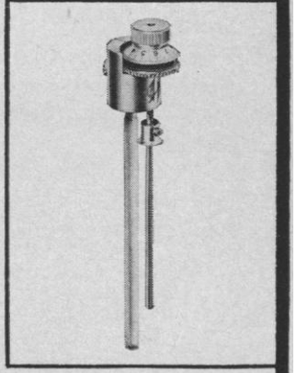


6. Aquametry Apparatus

6. Aquametry Apparatus. L/I's inexpensive Karl Fischer Aquametry Apparatus precisely determines water content of most materials in 4 minutes (1 ppm to 100% water). L/I's versatile apparatus uses the original stock K-F reagent bottle as a reservoir. The "reaction vessel" is an ordinary 4 oz., commonly available, disposable "cream" jar. It is interchangeable with a micro-reaction vessel requiring less than 2 cc total reaction volume for micro-aquametry applications.

No false end points are possible with L/I's color-coded meter indicator. A two-lambda excess of K-F reagent in a 100 ml reaction volume is detectable. The apparatus includes a 1 and 25 ml dual buret with .01 ml divisions in the micro range for high accuracy.

Price: $340 complete. Components available separately.



L/I LAMBDA-DIAL® attachment for all 1 ml REPIPETS and Dilutors. Direct dial any volume from 0.1 to 100 microliters with 0.01% f.s. reproducibility. Accuracy is 1% at 10 lambdas. Price: $49.50.

Order from Labindustries or your distributor.

LABINDUSTRIES

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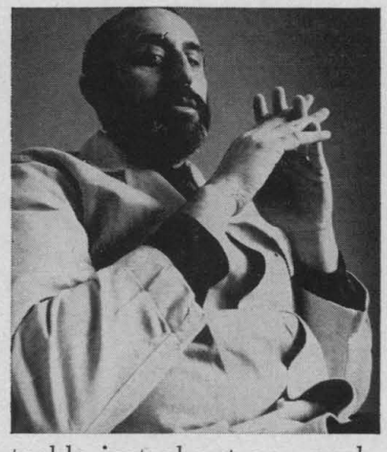
The Cary 401.
Our vibrating reed nit-picker.

The Cary 401 vibrating reed electrometer detects currents on the order of 10^{-17} ampere, charges as small as 5×10^{-16} coulomb and potentials down to 2×10^{-5} volts from high impedance sources. Its list of standard features includes solid state circuitry, multiple resistor input switching, remote input shorting, critical damping, measurement of potentials from grounded sources, and master-slave operation. And it can be rack or bench mounted.

If your application is in mass spectrometry, radioactivity, physical measurement or biomedical research, the Cary 401 can



tackle just about any problem you've got to solve. For example:

MASS SPECTROMETRY

The 401 provides sensitive,

stable ion current measurements in any mass spectrometer system with an optional remote ranging modification available for computer-controlled systems. And, in isotope ratio studies such as uranium 238/235, a pair of our electrometers can determine ion ratios with an accuracy of about 0.02%.

RADIOACTIVITY

While particularly suited to applications which require drift-free operation, the Cary 401 also measures soft beta radiation such as carbon-14, tritium and sulfur-35. Or assays radioactive labeled chromatographic effluents.

PHYSICAL MEASUREMENTS

With the 401, you can investigate resistance, charging, hysteresis, polarization, absorption and dielectric phenomena. Or study the photoelectric, thermoelectric and electrochemical properties of matter. Semiconductor studies include conductivity, resistivity, impurity and Hall effect measurements. And, because input resistance is greater than 10^{16} ohms, the 401 is ideal for measuring transistor leakage currents, diode reverse currents and MOS FET gate resistances.

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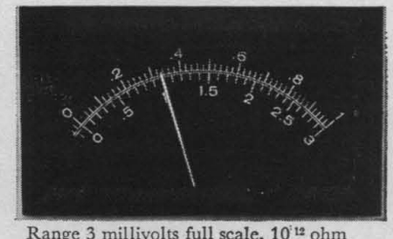
When measuring ion transfer, potentials and resistances across membranes, the 401 gives unmatched performance. Other biomedical applications include in-vivo respiratory analyses of $C^{14}O_2$, intermediary metabolism investigations, polysaccharide synthesis and degradation



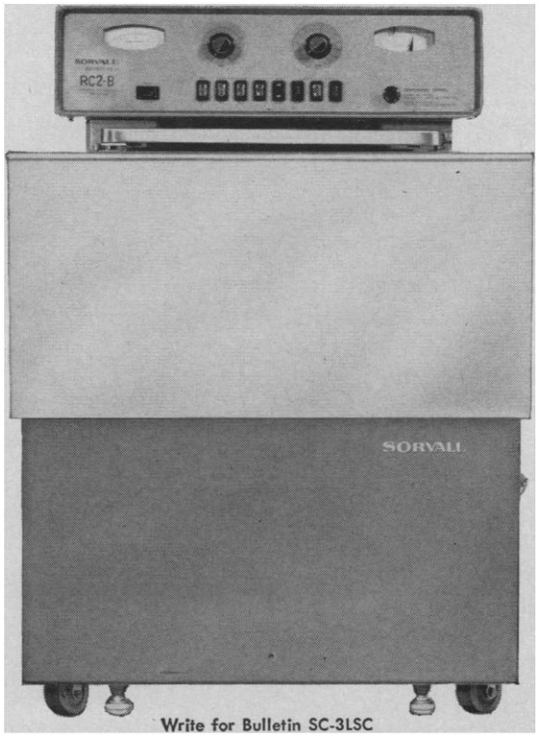
Range 3 millivolts full scale. 10^{12} ohm input resistor. (Equivalent to 10^{-15} amps.)

analyses and gas chromatographic studies of steroid and fatty acid molecular systems.

Twenty-three years of experience stand behind the Cary 401, the world's best commercially available vibrating reed electrometer. By far. For complete details, write Cary Instruments, a Varian subsidiary, 2724 S. Peck Road, Monrovia, California 91016. Ask for data file **E004-30**

cary instruments

Let's separate centrifuges



Write for Bulletin SC-3LSC

It is just as important when looking for reliable sample separation to look for a reliable "separator." That's why we say "Let's separate centrifuges." All centrifuges are not alike, and it *does* make a difference which one you choose. The SORVALL RC2-B Automatic Refrigerated Superspeed Centrifuge has set the standard in its range for automatic programming, Gyro-Action Self-Centering Direct Drive, control accuracy, big, smooth-wall stainless steel chamber and reliability of performance. Eight angle and horizontal rotors are offered currently. If your need is for low-temperature centrifugation, buy the reliable one — buy the RC2-B. You'll also get personal service! From Ivan Sorvall, Inc., Norwalk, Connecticut 06856.

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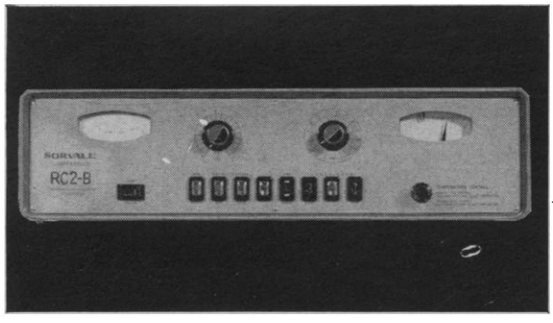
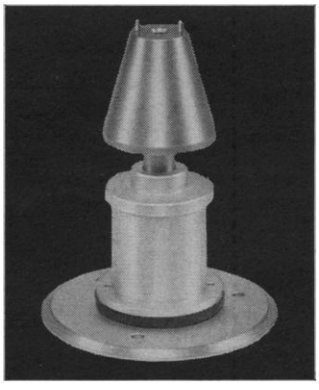
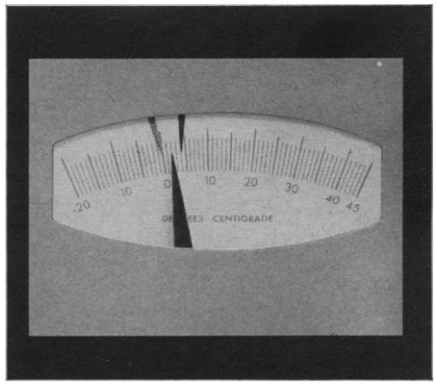
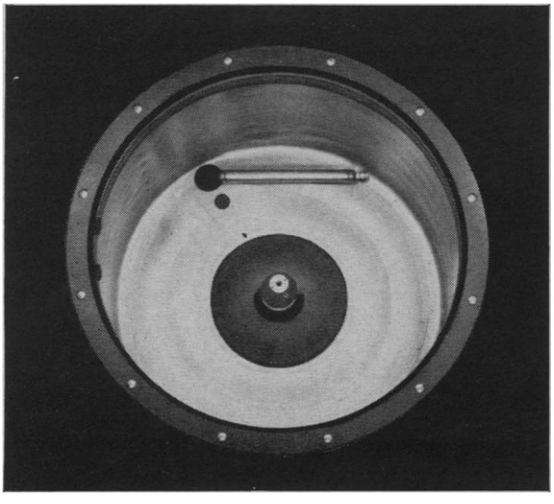
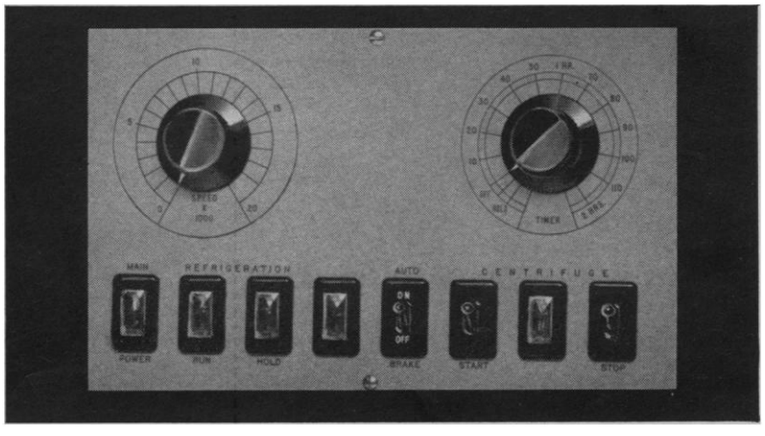
20,000 rpm up to 49,500 x g











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Do the Reichert Zetopan Microscope and Automatic Camera come as a set? Or can I buy and use them independently?

Yes.

Bought separately or together, this one-twosome offers unique capability and outstanding performance.

The Zetopan is an advanced research microscope that can be extended to cover fluorescence, polarization, microphotometry and phase techniques, and can be used with transmitted, incident, epi or Nomarski interference.

The Automatic Camera is adaptable to any microscope in your lab, and is the only camera with direct exposure readout. Built-in factor keys allow you to compensate the measured exposed time for film reciprocity failure. Light measurement may be detailed to one small spot or over the entire frame. Interchangeable 35 mm film magazines.

For a convincing demonstration of the microscope and/or camera write: American Optical Corporation, Reichert Products, Buffalo, New York 14215.

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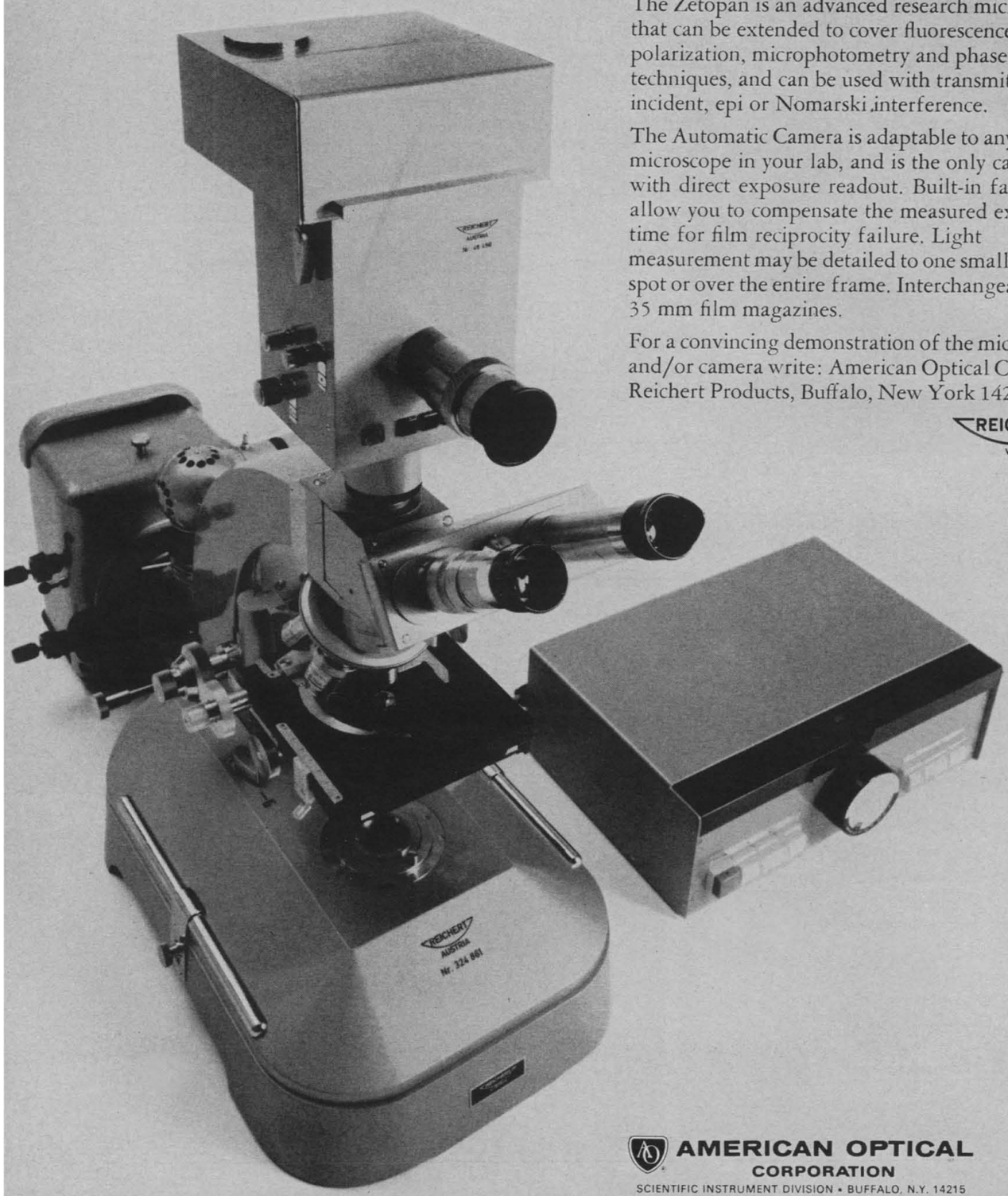

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Thomas Digital Concentration Readout SPECTROANALYTICAL SYSTEM

. . . the low-priced solution to rapid analysis of routine serial samples

■ *easy-to-read digital results in ppm, milliequivalents per liter or other units, combined with fast sample sequencing*
■ *no calibration curves to plot or match*

This new THOMAS SPECTROANALYTICAL SYSTEM is offered for those laboratories now faced with a sharply increased demand for processing a greater number of routine samples per day. Essentially, we are selling time . . . time saved by rapid sample sequencing . . . time saved by eliminating interpolation of meter scale divisions . . . time saved by obviating need for calculation and plotting of calibration curves . . . time saved by removing the necessity of comparing sample readings against those curves.

The investment required for our system (less than $1900) is, we believe, lower than that being asked for any comparable system available to date. Our system also offers advantages in requiring no change in methodology, and in being operable by personnel with the same degree of proficiency as those now performing the analyses.

The Thomas Model 65 Direct Concentration Readout converts spectrophotometer output directly to concentration units; the proper K factor being dialed to agree with concentration of known standards. With K factor potentiometer set at unity it shows absorbance values for checking linear response of any sample range from 0 to 2A.

Detailed information on the Thomas Spectroanalytical System (with prices) will be furnished on request.

Thomas **ARTHUR H. THOMAS COMPANY**

Scientific Apparatus and Reagents

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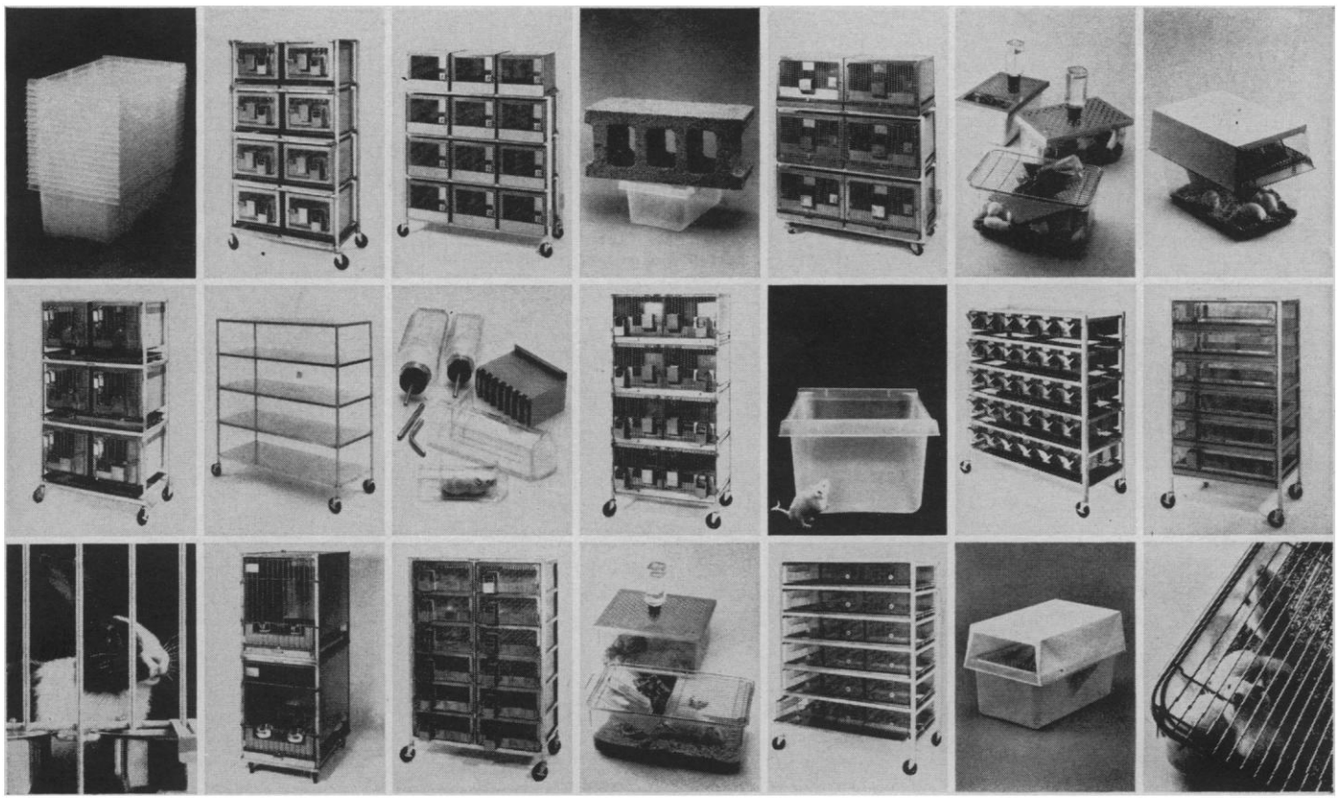

Carworth supplies the widest selection of animal care equipment on this planet.

(Or, perhaps, anywhere.)

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Nalgene Graduates and Beakers. Transparent, autoclavable TPX, and durable polypropylene. All with easy-to-read graduations. 10-4000 ml.

Nalgene Laboratory Bottles and Carboys. Over 30 styles for every laboratory application. Leakproof, cylindrical, rectangular, square. With and without handles, spigots, tubulation. Many autoclavable. Polypropylene, polyethylene, PVC, Teflon® FEP, polycarbonate. New spigot for leakproof performance. 1 oz.-13 gal.

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150mm Desiccator. New, personal-sized unit. Unbreakable, priced so every bench chemist or student can have his own.

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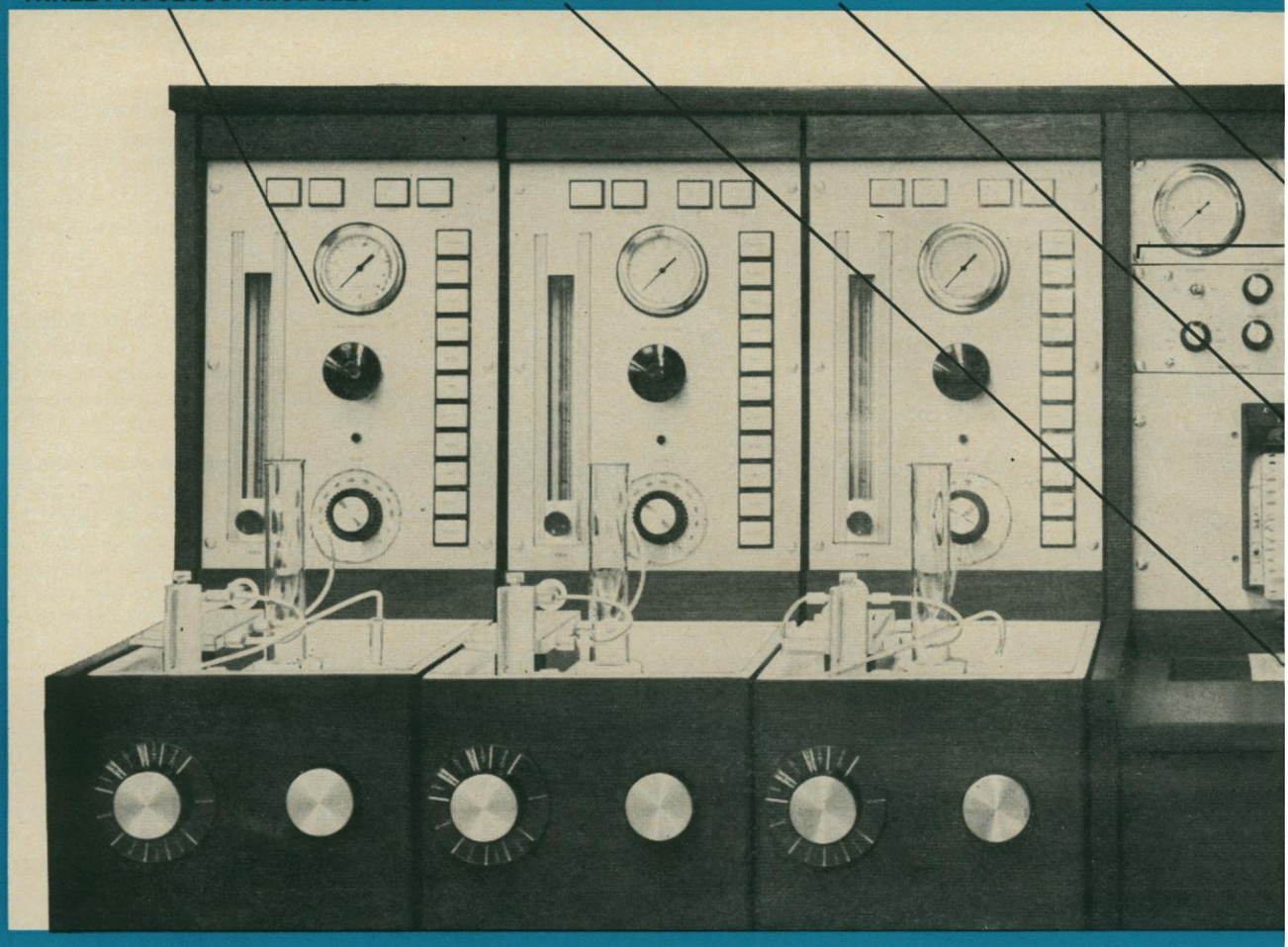

The VIVONEX AMINO ACID ANALYZER, Model 10V provides:

1 **Rapid Analysis** —Three samples per hour.

2 **Precise Quantitation**—Typical error less than ± 5%.

3 **Simple Operation** —Requires no intensive training.

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A REVOLUTIONARY CLINICAL AND RESEARCH TOOL:

Quantitative, Automated Amino-Acid Analysis by Gas-Liquid Chromatography at Unprecedented Speed

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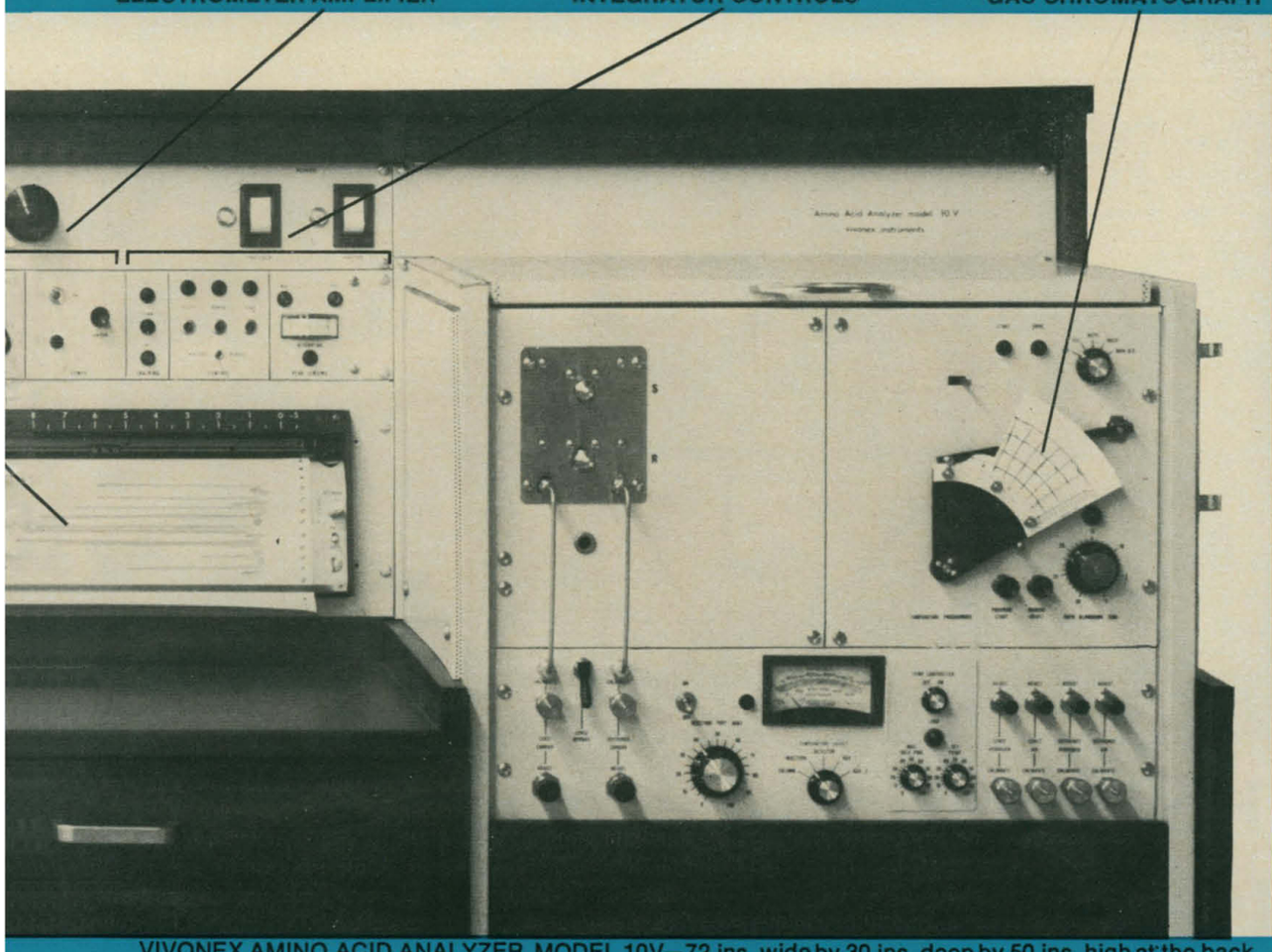

VIVONEX AMINO ACID ANALYZER, MODEL 10V—72 ins. wide by 30 ins. deep by 50 ins. high at the back.

5 **Digital Readout**—Automated integration and printout avoids tedious calculations.

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8 **Reliability**—Simple, unitized construction reduces down-time to the minimum.

The *Vivonex Amino Acid Analyzer, Model 10V,* is the first and only instrument that will *quantitatively* and *automatically* convert amino acids to volatile derivatives and analyze them accurately by gas-liquid chromatography. Precision is substantially higher than that achieved with cumbersome column chromatography techniques employing resins.

Now, amino acid determinations on a limitless number of biological materials can be made by laboratory or clinical personnel with limited training.

The automated, digital printout feature substantially decreases the time required for data reduction. Precise analysis can be achieved with samples containing as little as 0.02 micromole of a given amino acid.

For complete information on this unique instrument write or phone Mike Beigler:

VIVONEX Corporation
867 West Dana, Mountain View, California 94040
(415) 969-1100

Visit the *Vivonex* exhibit at the 54th annual FASEB meeting in Atlantic City, 13-17 April 1970, booth Nos. K-102 and K-103.

How much time do you spend preparing and running GC calibration standards?

Perhaps enough to pay for a Melabs Reaction Coulometer in 6-12 months! Because the Reaction Coulometer **completely eliminates** calibration.

Just consider the steps required to obtain and maintain precise calibration standards. First, obtaining and purifying the standard, pure compounds. Or perhaps even synthesizing the compounds. Then you have to select the proper solvent. And suffer through the demanding weighing process.

Now that you've got your sample made up, is that the end of it? Usually not. Because of evaporation, degradation and absorption, you might have to start all over again a week later.

And remember, you've only considered technician time so far. Think of the instrument time required for actual calibration runs. For some labs, this runs as high as 25 to 50% of available instrument time.

That's why the Melabs Coulometer, even though it's more expensive than conventional GC detectors, will pay for itself before a year goes by.

The versatile Model CRC-1 Coulometer detects most compounds combustible at high temperature over a platinum catalyst. Response is rapid and independent of flow rate and temperature. Sensitivity is 10-20 ng with an absolute accuracy of better than 0.5%. Because the detector is quantitative, it offers a built-in check of column holdup.

Economically and technically, the Melabs detector makes sense. For more details, contact Melabs, Scientific Instruments Operation, 3210 Porter Drive, Stanford Industrial Park, Palo Alto, California 94304. Phone (415) 326-9500. In the U.K. and Europe, address Reaction Coulometers Ltd., Boyn Valley Rd., Maidenhead, Berks, England.

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Circle No. 23 on Readers' Service Card →

Draw your own conclusions with this new time-share terminal.

Now you can have a time-share terminal that lets you see your data graphically—instantly — as it prints out on your Teletypewriter. Now you can plot for comprehension, for meaningful report illustrations, for permanent records. And do it while the time-share data's coming in.

The HP 7200A Graphic Plotter is the first major advance in time-share flexibility since the Teletypewriter itself. The Graphic Terminal feeds from standard EIA ASCII inputs and automatically plots computer data in points, lines, curves, bar graphs, pie charts, or any other useful engineering, mathematical or business graphics you need. Plot directly from the Teletype keyboard, too, or silence the Teletypewriter and use the plotter alone. It's the end of the graphic time lag.

The HP 7200A is easy to use and requires no special operating or programming/language knowledge. It plots smooth lines, not the staircase drawn by the incremental recorder. And it lets you position the graph where you want it on any type or size of graph paper up to 11" x 17".

Talk to your time-share service about Hewlett-Packard's new 7200A Graphic Plotter. If your service doesn't offer it yet, have them give us a call. The Graphic Terminal. For people who can benefit from a dash of art with their cold hard data.

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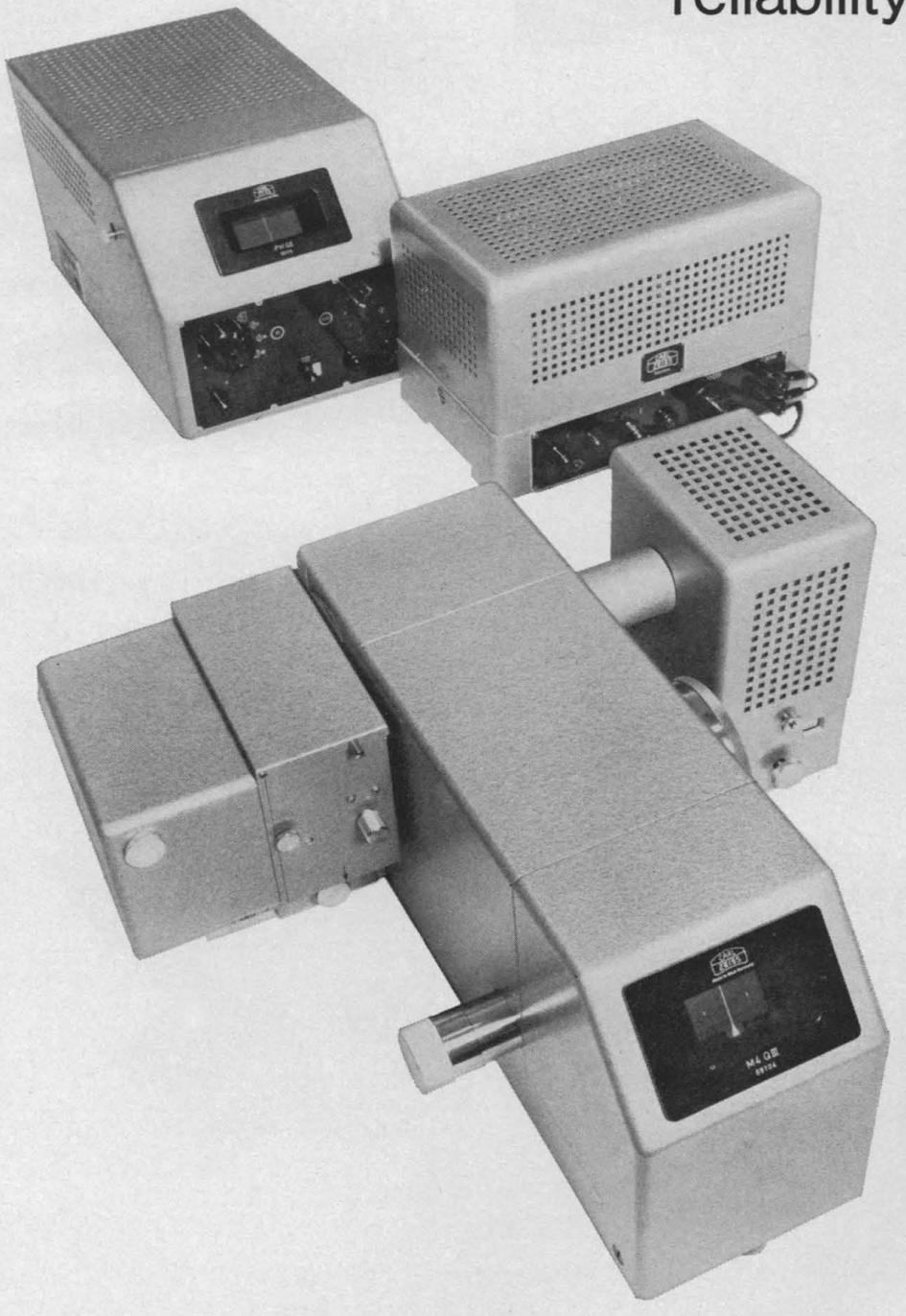

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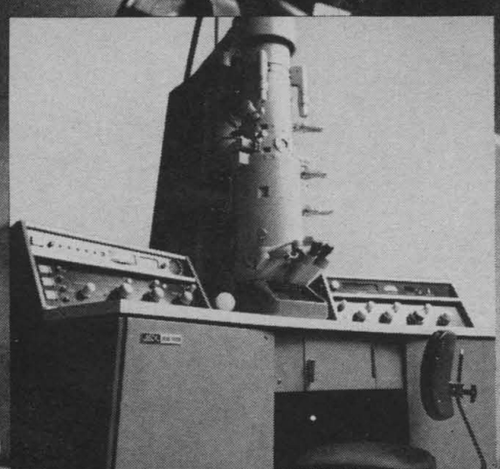

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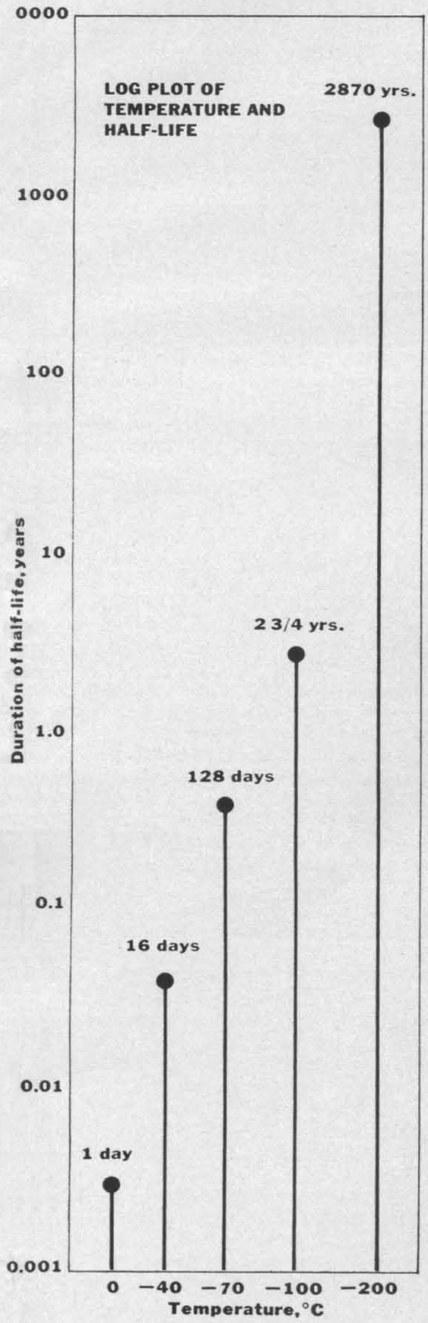
How cryogenic storage can be a lifesaver for the bioscientist

The gradual erosion of a biological property that is being maintained as a preservative measure in the frozen state at a temperature of −70°C or higher is an occurrence with which workers in the biosciences inevitably become familiar. Often marvels of ingenuity are exercised in preparing a system for the potentially dangerous phase transition. The bioscientist is able to show that, as the temperature of the basically aqueous medium is lowered, enzyme activity, membrane integrity, or cellular morphology has survived the excursion from +15°C to −70°C and back. The system, perhaps with the addition of a protective additive, has presumably been well prepared not only for a passage to and from the solid state but also for a storage period in that state. Yet, if the return to +15°C is delayed for weeks, or months or years, these or other desirable and essential properties may be irretrievably lost. What has happened? Why?



The precise mechanisms by which entities of biological origin undergo degradation with time in a frozen environment have not been delineated in terms of their chemistry. The nonfunctioning enzyme system, the infertile sperm cell, the hemolyzed erythrocyte, and other biological disasters nevertheless attest to their reality. Clearly, as the cryobiologists probe the basics of their field, one can expect definition of reactions of great interest, conceivably of wholly new concepts in chemistry. There are portents, perhaps, in Wang's dimerization of 1,3 dimethyl thymine in frozen environments, a photoreaction that proceeds at a negligible rate in the liquid state.

At present known only by their workings, a loss of activity or other form of biological integrity, these degradative reactions are temperature dependent, and it is on this relationship that the success or failure of a frozen storage operation may depend For over a century we have known that a decline in temperature of 10°C decreases the reaction velocity by approximately 1/2 or 2/3, but those of you who remember your problems in chemical kinetics will recall the awe-inspiring influence of temperature on the specific reaction rate as expressed by Arrhenius:

$$K = A\,e^{-\Delta E/RT}$$

The effect of temperature on K, the specific reaction rate, is exerted exponentially through the Boltzmann factor. If the storage temperature used permits significant biological decay, that is to say, an undesirably high degradative reaction velocity, one can slow the process effectively. How effectively can be seen in almost any text of physical chemistry. Daniels, for example, cites a first-order reaction in which the half-life is increased by a factor approaching 10,000 as the temperature is lowered from −75°C to −100°C. Such considerations are necessarily important when materials of biological origin, many of which are intrinsically unstable, are to be stabilized for indefinitely prolonged periods at reduced temperatures. Remember, too, that the frequency factor, A, diminishes with decreasing temperature.

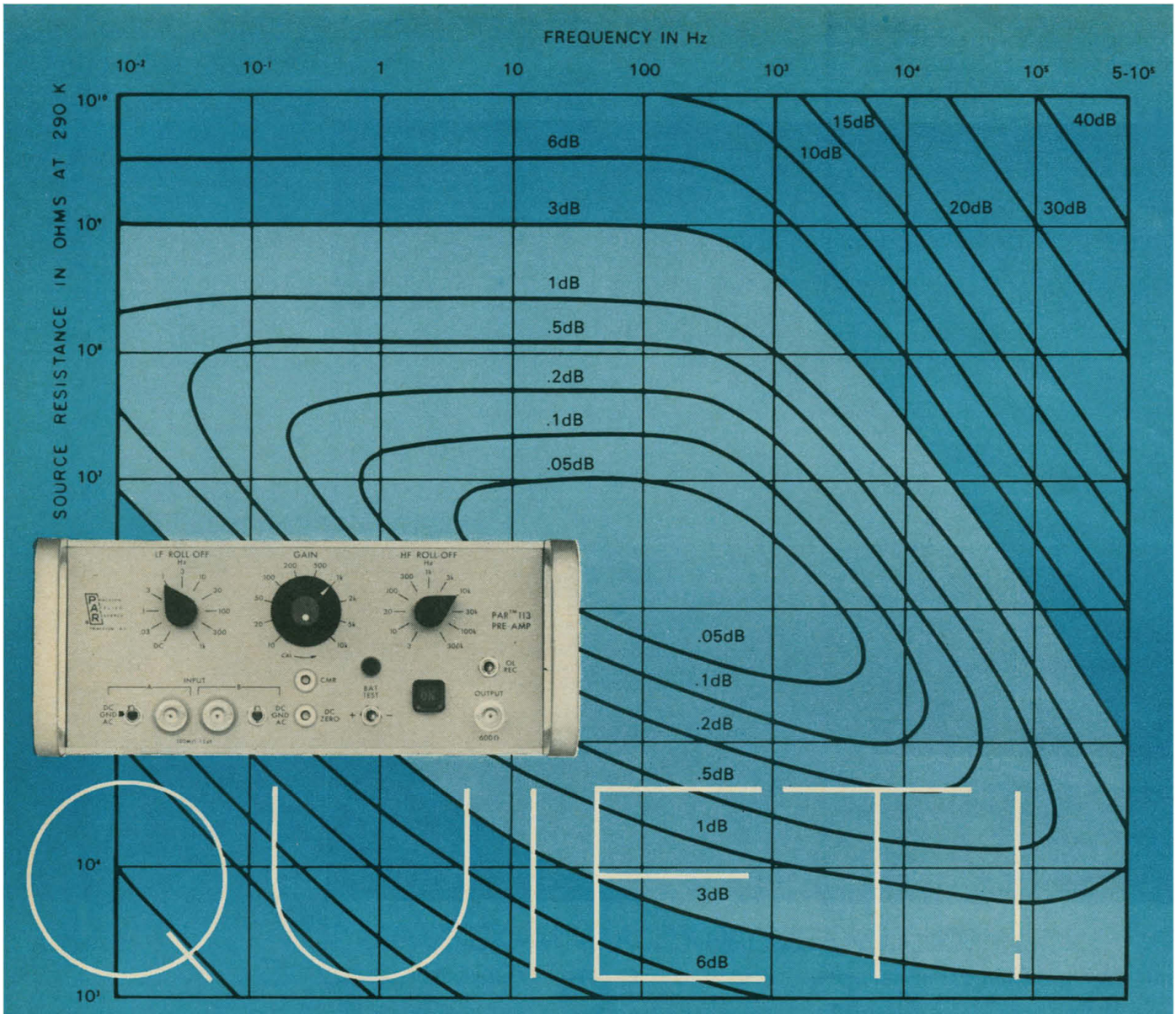
Among the procedures by which the scientist may capitalize on the relationships inherent in the Arrhenius equation to provide maximum stability to systems of biological interest, the use of cryogenic fluids in appropriate storage equipment offers a relatively simple solution. Liquid nitrogen, abundantly available, is a boiling liquid, −196°C, at atmospheric pressure. An idea of its potential effectiveness as a refrigerating agent can be seen from the diagram below. Here we postulate a reaction with a half-life of one day at 0°C and a reduction of reaction rate by one half for each 10°C decline in temperature.

REFERENCES:

Daniels, F.: Outlines of Physical Chemistry, New York, John Wiley & Sons, Inc., 1948, p. 367.

Wang, S. Y.: Photochemical Reactions in Frozen Solutions. Nature *190*:690-4, 1961.

See also: Wang, S.Y.: Photochemical Reactions of Nucleic Acid Components in Frozen Solutions. Fed. Proc. *24*(2) Part III:S-71-9, Mar.-Apr., 1965.



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wish to make is that factors completely outside the power of the Center for Population Research make conditions for the *application* of basic research findings in the fertility control field increasingly more difficult, and nothing in Corfman's letter contradicts this opinion.

I disagree with Corfman that only steroid contraceptives "require special scrutiny simply because of their known effects on blood clotting, a multitude of metabolic functions, and animal carcinogenesis, among others." I stated that irrespective of their chemical structure, all chemical birth control agents will be subjected to the type of detailed scrutiny outlined in my article; and it is preposterous to believe that the FDA or even any responsible investigator will pay less attention to carcinogenesis, blood clotting, or many other effects which may be caused by the continuous administration of any chemical agent for many years to a normal human population. Probably over 99 percent of all the chemical carcinogenic agents are not steroids, and I am convinced that our present attitude with respect to drug evaluation and eventual public use of any substance used in preventive medicine for long periods of time in normal populations will suffer from the difficulties which I have outlined.

Corfman states that "government and nonprofit agencies are more interested in contraceptive methods than in products since it is not the ultimate purpose of these agencies to manufacture drugs to be sold for profit." Within the context of my article, which specifically was limited to *chemical* birth control agents, no contraceptive method will have any effect in reducing population growth unless it is converted into a product which can be distributed and which can be used by people. In all technologically developed countries, with the exception of Eastern Europe, drugs for public use are developed by pharmaceutical companies and not by government or nonprofit agencies. Unless fundamental changes in drug development, manufacture, and distribution are effected, what is needed is intimate collaboration between industrial, government, and nonprofit agencies; and, if the urgency of the world population problem will stimulate such collaboration, then perhaps the prognosis is slightly less dismal than currently viewed by me.

Nestor (Letters, 26 Dec.) takes issue with my recommendation that an independent scientific body should be available to which rulings by the Food and Drug Administration on scientific matters dealing with clinical testing (which is a completely different matter from rulings on permission to market a compound) can be appealed. Nestor favors the present process which involves appeal through the courts. To me this seems completely unrealistic since very few research scientists or research organizations are prepared to go through court procedures in order to settle questions of scientific protocol and research procedure. My views are supported by the observation that virtually no court appeals have been made to such FDA decisions on clinical experimentation and that for all practical purposes such decisions are unappealable. I do, of course, agree that the courts are the right place to deal with matters of drugs that have passed the clinical evaluation phase and are introduced into open commerce.

CARL DJERASSI
Department of Chemistry,
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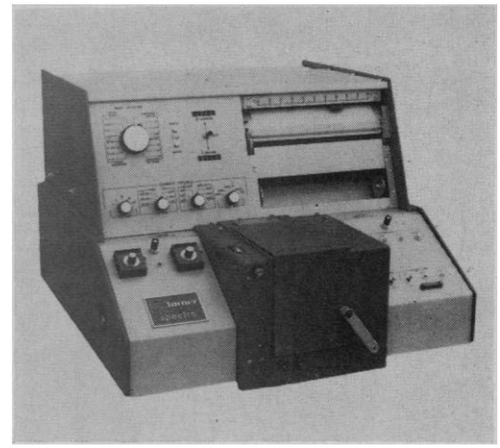
Alaska: A Climate for Cabbages

Frederick Lotspeich's article "Water pollution in Alaska: Present and future" (5 Dec., p. 1239) is in general an excellent overview of Alaska's situation, but he is guilty of repeating an old fallacy which people accept without thinking. He says, "Agriculture is unlikely ever to become important because of unfavorable climates and of Alaska's inability to compete with other areas of agricultural production." No evidence is presented for this statement, and it is nothing more than the perpetuation of the old belief that Alaska is a land of everlasting ice and snow.

The University of Alaska Agricultural Experiment Station has just completed a study of the potential for agricultural production within the state. We estimate the production potential of our class II and III land (classified according to the Soil Conservation Service) to be worth $386 million per year based on 1967 prices. We do not have the population to absorb that production, but we estimate the local market in 1985 will demand in excess of $50 million worth of agricultural products that we can and do produce here. Our population estimates are quite within the range reported by Lotspeich



you buy a research spectrofluorometer to get spectra, correct?

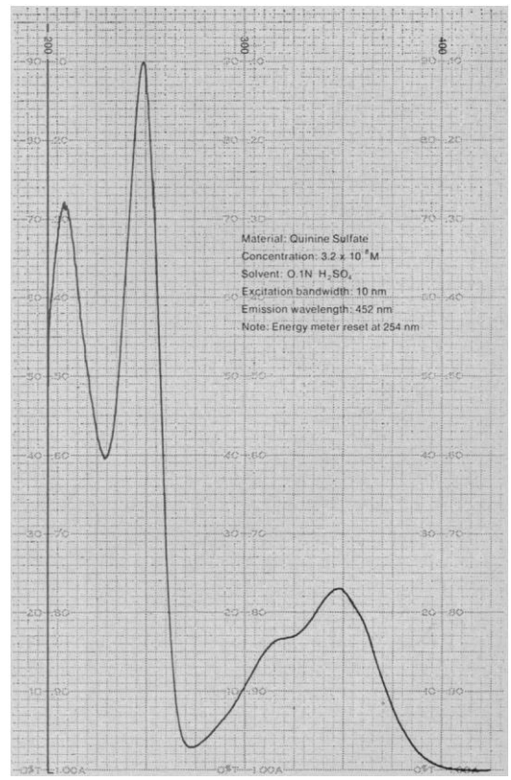
WHY NOT GET CORRECT SPECTRA?

The fluorescence excitation spectrum of a compound **should** correspond point-by-point with the absorbance spectrum. Consider the relative heights of the absorbance peaks of quinine sulfate at 250 and 350 nm. Calculation (Science, Vol 146, No. 3641, pp 183-189, Oct 9, 1964) from absorbance data obtained with a Cary Model 14* indicates that, with an energy-corrected spectrofluorometer, the peak-height ratio should be very close to 4. The fluorescence excitation curve at right, made with the TURNER Model 210, shows this to be true.

With a conventional spectrofluorometer, the ratio will be about 1 — more or less — depending on the individual instrument. The peak at 208 nm will appear as a tiny shoulder (**if** it appears at all), and indeed it may appear elsewhere than 208. The tendency of an uncorrected spectrofluorometer to shift the location of a peak is particularly common in compounds with broad peaks. An indication of this may be found in any paper on the fluorometric determination of serotonin using 3N HCl. It will call for peak activation at 295 nm, whereas the Model 210 shows the peak to be at 280 nm, corresponding to the known absorbance peak.

Correction of activation spectra is only half of the story, as similar errors appear in emission spectra. A conventional spectrofluorometer will show **one** emission peak for coproporphyrin I or at the most, one peak and a shoulder. The Model 210 shows all three peaks (596, 622, and 653 nm) in correct ratio. In addition, the emission spectrum is presented in the form required for the determination of quantum yields.

Write for further details, including a bibliography of the published theoretical studies performed with this precision instrument.



***Comparable absorbance data were obtained also with the TURNER Model 210, which, in addition to being a Spectrofluorometer, is a precision, double-beam, ratio-recording Spectrophotometer.**

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and are probably conservative, since they were made prior to the North Slope oil discovery. Naturally, these figures may seem small by comparison with other states, but "important" is a relative term and a $50-million-per-year harvest of a renewable resource would be important to Alaska.

To say that our climates are unfavorable to agriculture is to forget man's history. As soon as man moved away from the food-gathering economy of the tropics into the temperate zone, he moved into an area unfavorable for agriculture because of winter seasons. He had to learn what crops would grow and how to perpetuate them from one growing season to the next. For most of our field crops in Alaska, we find that Scandinavian varieties do quite well. Rather than having unfavorable climate for our vegetables, the reverse is true. Fifty-pound cabbages are quite common in Alaska, and although useless from a commercial standpoint, they indicate the efficiency of production in this climate of long photoperiod and cool temperatures. The quality of vegetables grown under these climatic conditions far exceeds that of vegetables grown farther south.

Contrary to Lotspeich's statement, we can and do compete. The cost of potato production is fairly comparable to that in California. We do not have to spray for insects or diseases. Late blight, for instance, is unknown except near Ketchikan in the very southeastern portion of the state. Growers compete in the local market on the basis of Seattle price plus freight and net more per acre than almost any other potato growing area. In season, local lettuce completely replaces lettuce which has been shipped in. We can store and sell local lettuce over a 12-week period following the last harvest whereas stateside lettuce can be stored about 4 weeks. We have exported foundation potato seed to the other states and are presently exporting Foundation Nugget Kentucky bluegrass seed. There is no question but that we can compete.

Our problems of agricultural development are not primarily due to climate, or to lack of ability to compete, but to a host of other things, one of which is the readiness of people to accept the belief that agriculture in Alaska is impossible because it is not identical to some other area.

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Crafty, Ambitious Authors

For many years *Science* has served as a forum for debate about problems in scientific communication. There is little question that we are approaching the point of being overwhelmed by scientific information. Part of our "information explosion," however, is only apparent. More and more frequently I am finding the *same* data appearing in more than one journal article. For example, I have before me three articles by the same author submitted to three different journals within an 11-month period. Each contains data from the same experiment. Article 1 contains all of the data; article 2 contains 50 percent of the data from article 1, and no more; article 3 contains 25 percent of the data included in article 1 and again, no additional data. Interestingly, the article which contained all of the data was published in *Science* and not in a speciality journal. The speciality journal article contained only 25 percent of the data. Curiously, these three articles were not even cross-referenced, which added to the appearance that each represented a unique scientific contribution.

Such multiple publication of data in primary source journals represents a "publication explosion" rather than an "information explosion." It contributes nothing to scientific progress and should cease. Many journals specifically state that the material submitted has not been and will not be submitted for publication elsewhere. If this policy were accepted and enforced by all journals, multiple publication would disappear—to our mutual benefit.

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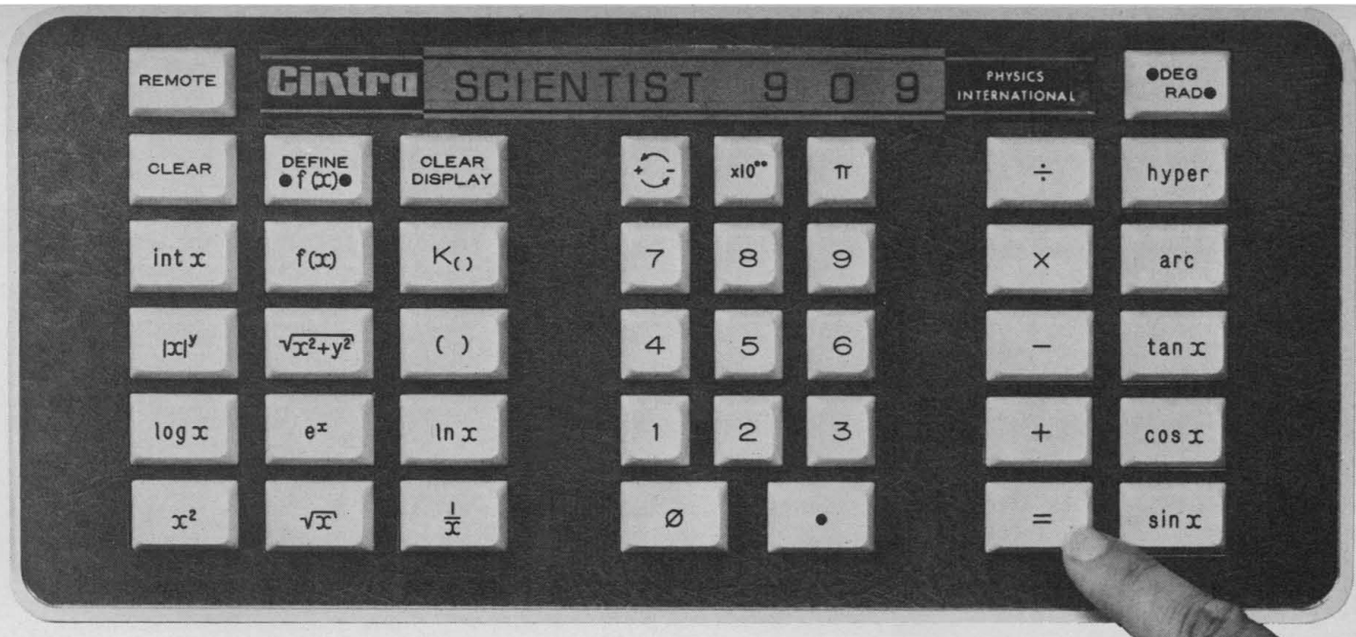
Under the "Liberal" Umbrella

The incredible but fascinating account of the recent AAAS meeting in Boston (2 Jan., p. 36) reaffirms the fact that much of the disaffection of the "New Left" is directed against science and technology. Scientists, having accepted their guilt, are now asking themselves where they have erred, and are trying to atone for their sins. But are scientists really guilty of monstrous crimes? What is the motive of those who proclaim that science, and logical thought in general, are evil and should



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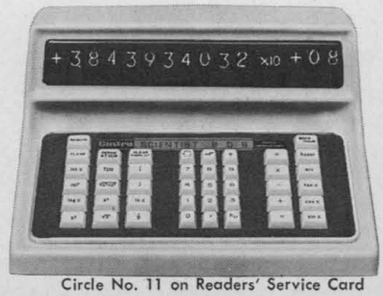

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be abandoned in favor of emotion? Such a question might violate the tacitly accepted rules in intellectual discussions which assume that anyone espousing a point of view labeled "liberal" does so only from a pure and noble concern for the welfare of mankind.

I suggest that in fact many of the fears currently being voiced about the evils of science represent an ignoble reaction stemming from feelings of personal inadequacy. If a person decides that he is an intellectual and should therefore be running the world by virtue of his obvious superiority, he is faced with the fact that many of the forces shaping our civilization require some understanding of the sciences. This knowledge is acquired only after some years of effort. It is easier to seek refuge in activism. Maoism is popular with a segment of the college population not because of a burning concern for social justice but because it is a doctrine which implicitly denies the need for unpleasant mental exertion. Most scientists see themselves as liberals, but unfortunately not all liberals are scientists.

The most strident critics of science will not be mollified by pledges not to participate in "war-related" research or promises to change the emphasis of certain laboratories. They object to such undertakings as the Apollo program not because they are expensive but because they directly threaten their self-esteem. . . . How is freedom of speech bolstered by permitting someone to seize a microphone and shout obscenities for 5 minutes? The opinions of the young are formed by the old, or at any rate by the older, largely through the mass media. To counteract the bad impression many people are forming of science and scientists the first step is to stop agreeing blindly with the critics. The scientific community is at fault for allowing the situation to deteriorate as far as it has. . . .

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Ethical Standards: In Search of a Protector

Recently, I have become aware of a dilemma for researchers in hospitals and private research institutes: there is apparently no channel through which such individuals may carry appeals or complaints resulting from violations of ethical standards by their employer institutions. This has particularly serious consequences for those who are summarily dismissed without valid grounds for dismissal. In addition, the threat of such action can be strongly repressive and preclude maximal individual thought and creative effort. By contrast, the members of the academic community receive powerful and effective support in this regard from the American Association of University Professors.

I believe that the same high standards of ethical conduct which are virtually taken for granted in the academic world should also be established and practiced by institutions outside of that community. I urge readers of *Science* who support this view to write to the Executive Officer of the American Association for the Advancement of Science to request that the AAAS determine the possibility of its acting (as a counterpart to the AAUP) in behalf of individuals whose problem may be beyond AAUP jurisdiction.

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New Sites for Cities and Airports

On a recent flight from Newark, New Jersey, to Washington, D.C., we took off in the fog drifting in from Newark Bay, flew inland a bit and enjoyed clear air until we approached Washington, where again the mingling of cold land air and warm moist sea air produced undesirable airport conditions. Good seaports make poor airports. Most of our overpopulated cities developed because they had good seaports. But today's transportation is by air and we need airport-located cities.

Joachim Wohlwill's letter (23 Jan.) suggested population redistribution and referred to President Nixon's suggestion that new cities be built in places removed from present centers of population. Let the President appoint a city site-planning commission to encourage the growth of towns ideally situated, not only for a good supply of clean air and water, but also for good airports.

ELIZABETH A. WOOD
37 Pine Court, New Providence, New Jersey 07974

Letter to Argentina

The seizure of Argentine universities and the subsequent displacement of scientists was reported earlier in *Science* (16 Sept. 1966, p. 1362), and noted again in a letter by Philip Siekevitz (2 Dec. 1966).

In view of the difficulties encountered by certain individual scientists in Argentina, which have recently come to our attention, a number of faculty members at Harvard and M.I.T. have sent the following letter to the President of Argentina:

The undersigned, who are academic physicians and scientists in the Boston area, have heard with great concern of the internment, without trial, of many Argentinian scientists, physicians, and educators.

As is no doubt very familiar to you, the last few years have seen a very significant migration from Latin America of many of its most able scientists and medical men. In most instances, these men have left their home with the natural reluctance that anyone would show at leaving his native country. Their departure has enriched the United States as well as many other countries. The gain, however, to the countries which have received these scientists is far outweighed by the serious loss to South American science at a critical period in its development. It is precisely such acts as the internment without trial of many academic figures, which have stimulated the departure of scientists from Latin America, and has made many who are abroad prefer not to return.

We would urge you to consider the possible serious long range effects and the immediate obvious outcome of such actions. We would urge that the charges against any individuals in this position be made public, and that they be given their full rights to a free and fair trial, or that the scholars should be released to continue their work freely. We also urge that you permit the free right of contact with them of their family and friends.

We urge this to you not only out of sympathy for these individuals as people, and out of respect for their accomplishments as scholars, but also out of concern that the great scientific and medical heritage of Argentina, which has contributed so much to the world should not be destroyed but should continue to flower and to play its rightful role in the advancement of Argentina and of mankind at large.

S. E. Luria and Boris Magasanik of Massachusetts Institute of Technology, and Stephen W. Kuffler, Edward A. Kravitz, David D. Potter, Edwin J. Furshpan, Deepak N. Pandya, and I, all of Harvard, signed the letter.

NORMAN GESCHWIND
Department of Neurology,
Harvard Medical School,
Boston City Hospital,
Boston, Massachusetts 02118

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6 March 1970, Volume 167, Number 3923

SCIENCE

Russian Roulette?

Planet Earth, seen from space, appears as a fragile and limited life-supporting system in a vast emptiness. That such a view is, in fact, an accurate one is now more widely accepted than it was not long ago, before Earth's problems of overpopulation, overconsumption, limited resources, and environmental degradation attained the limelight. The danger is that a government and public now deluged by doomsday prophecies and bemused by equally confident reiterations that technology will cure all may hesitate in coming to grips with the problem, in the hope that, given time, it will go away.

A recent report by the Committee on Resources and Man of the National Academy of Sciences—National Research Council* may help to dispel such reservations. It provides perspective on the complex of problems centering on the earth's carrying capacity for people, with particular attention to the adequacy of resources. It discusses the interaction of production and consumption with population density, quality of life, and pollution. It stresses the indivisibiliy of the environment and the need to look at all contemplated actions (including no action) in the context of time, space, and ecologic consequences.

The report points to the hazards of relying on the sea as an infinite source of food and mineral resources, and on nuclear energy as the key to obtaining endless mineral resources from common rock. The sea, it concludes, is not likely to yield much more than about 150 million tons of food annually on a sustained basis—a good protein supplement, but wholly inadequate as a source of calories. The sea beyond the continental slopes and inland seas is unlikely to become a source of great mineral wealth—among other reasons because the young and sparsely metalliferous rocks of the deep ocean floor steadily disappear beneath the overriding continents with little opportunity for enrichment. Past relationships between energy input and metal production offer little hope that availability of large quantities of cheap energy can, of itself, much increase the production of metals from lean ores—bright though the expectations are for nuclear energy in terms of replacing and conserving the fossil fuels. Food and mineral production from the lands must continue to be the main source of supply, *supplemented* by production from the sea. Limits are hard to define but there can be no doubt that they exist. Only a certain quantity of food can be produced annually. Only so much in the way of mineral resources can be put into circulation and kept there. And the undesirable side effects, on the quality of environment and human life, of overproduction, improper distribution, and mismanaged waste disposal are now all too evident.

The central theme of the report is that both population control and better resource management are needed, and needed soon. In 26 recommendations the report stresses steps to assess and monitor the resources of the earth. It urges innovation, recycling of materials, evolution of resource policies, research related to understanding and management, and conservation programs for critical mineral resources in short supply.

In this context, population control becomes a key factor. One of the report's conclusions sums it up: "To delay progress toward full self-regulation of population size is to play 'Russian roulette' with the future of man."—PRESTON CLOUD, *Department of Geology, University of California, Los Angeles*

**Resources and Man* (Freeman, San Francisco, 1969); paperback, $2.95. Members of the Committee are Marston Bates, John D. Chapman, Preston Cloud (chairman), Sterling B. Hendricks, M. King Hubbert, Nathan Keyfitz, Thomas S. Lovering, and William E. Ricker.

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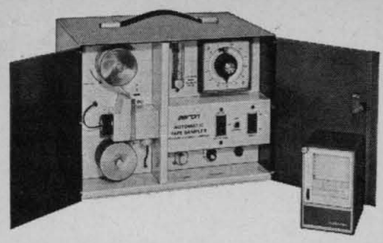

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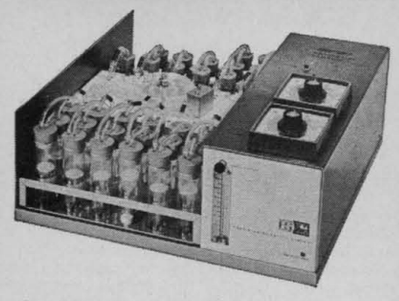

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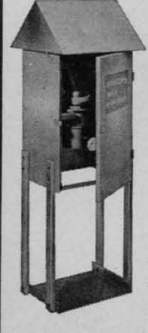

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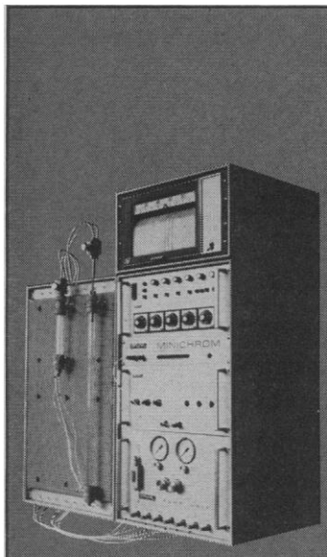

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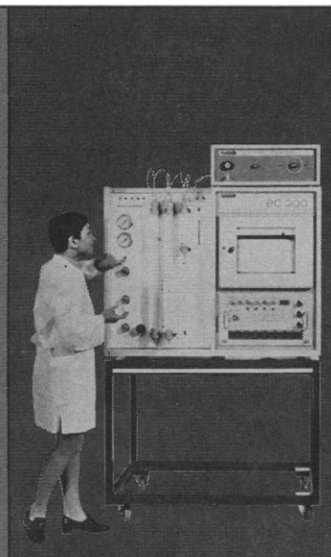

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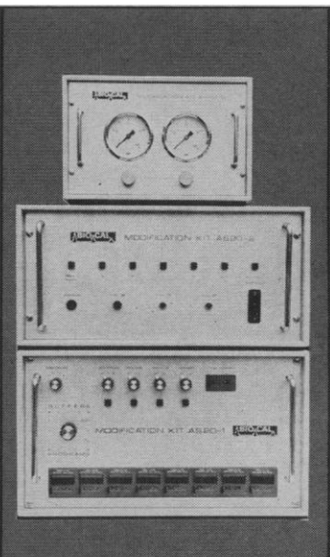

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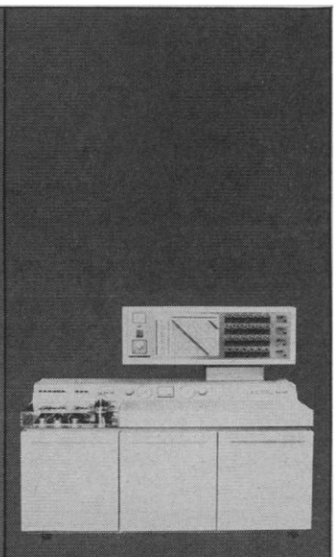

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terfacial bonding between ceramics and bone"; S. Hulbert, "Physical and mechanical testing of composite porous materials"; E. Eyring, "Attempts at knee replacement with ceramic composites"; C. Homsy, "Dynamic interfaces in prosthetic stabilization"; J. Galante, "Fiber metal composites as a basis for skeletal attachment"; J. Hirschhorn, "Studies on porous metal implant materials." R. M. Kenedi (subject to be announced).

26 June. (C. Bean, discussion leader): (speakers to be announced), Progress reports.

Lysosomes

James G. Hirsch, co-chairman; Michael Locke, co-chairman.

29 June. B. Trump, "Autophagy in liver and kidney cells"; M. Locke, "Autophagy in insect fat bodies"; E. Holtzmann, "Remodeling in nerve cells"; M. Farquhar, "Secretion and autophagy in pituitary cells"; R. Rifkind, "Erythrocyte maturation."

30 June. R. Kessel, "Oogenesis"; D. Phillips, "Spermiogenesis"; E. F. Hartree, "Lysosomes in sperm"; A. C. Allison, "Fertilization"; E. Parr, "Hatching and early mammalian egg development"; F. Beck, "Teratogenesis"; J. Ericsson, "Involution of the mammary gland."

1 July. H. Holtzer, "Quantal mitoses during development"; J. Saunders, "Cell death in remodeling during chick development"; R. Ross, "Wound healing"; G. Vaes, "Remodeling in bone"; J. Dingle, "Remodeling in cartilage."

2 July. R. Weber, "Remodeling during amphibian development"; J. Woessner, "Collagen remodeling in the developing chick"; J. Gross, "Biochemical mechanisms for collagen remodeling"; C. Williams, "Remodeling in insect development."

3 July. E. Haye, "Origin of blastemas"; S. Simpson, "Blastemas in lizards."

Developmental Biology

Donald D. Brown, chairman.

6 July. (E. H. Davidson, session chairman): "Differential gene action and informational RNA in embryos"; (I. B. Dawid, session chairman): "Role of cytoplasmic DNAs in development."

7 July. (H. Berendes, session chairman); "Chromosome puffing"; (J. G. Gall, session chairman): "Amplification of genes."

8 July. (A. Garen, session chairman): "Transdetermination"; (R. Briggs, session chairman): "Nucleocytoplasmic interactions in embryos."

9 July. (M. Nemer, session chairman): "Translational control in eggs and embryos"; (W. J. Rutter, session chairman): "Differentiation of specialized cell types."

10 July. (P. A. Marks, session chairman): "Developmental studies of hemoglobin."

Polymer Physics

Robert S. Marvin, chairman; Anton Peterlin, vice chairman.

Five related sessions will be devoted to a comparison of molecular theories, models, and concepts used to describe the viscoelastic behavior of amorphous polymers, and evaluation of their adequacy in predicting the behavior of such systems.

13 July. Dilute solutions (J. D. Ferry and W. H. Stockmayer, discussion leaders).

14 July. Concentrated solutions and undiluted polymers (W. W. Graessley and A. S. Lodge, discussion leaders).

15 July. Summary. Consideration of need for and possibilities of new theories and concepts (R. B. Bird, discussion leader). W. L. Peticolas, "Inelastic laser light scattering from polymers."

16 July. Growth and characterization of solution grown polymer crystals (F. A. Khoury, discussion leader). Open session.

17 July. Liquid crystals (J. L. Ericksen, discussion leader).

Physical Acoustics

John de Klerk, chairman.

20 July. (A. R. Hutson, session chairman): E. Conwell, "Acousto-electric effect for bulk and surface waves"; Y. V. Gulayev, "Acousto-electric phenomena due to interaction of surface waves with electrons in semiconductors and layered media." (E. Stern, session chairman): K. A. Ingebrigtsen, "Experiments with acoustic surface waves in composite structures of semiconducting films on $LiNbO_3$ surfaces"; G. S. Kino, "Parametric effects in acoustic media."

21 July. (W. P. Mason, session chairman): E. G. Spencer, "Crystalline materials for physical acoustics"; J. de Klerk, "Piezoelectric films." (R. T. Smith, session chairman): M. J. P. Musgrave, "Elasticity of piezoelectric

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materials"; E. Sittig, "Creeping waves around isotropic cylinders."

22 July. (E. Sittig, session chairman): G. W. Farnell, "Surface waves in layered media"; P. G. Klemens, "Surface wave scattering mechanisms"; H. F. Tiersten, "Guidance of surface waves." (W. Spencer, session chairman): P. Lloyd, "Analysis of piezoelectric resonator structures in the neighborhood of their thickness cut-off frequencies."

23 July. (B. Auld, session chairman): H. Whitehouse, "Surface wave filters—a time domain approach"; R. H. Tancrell, "Surface wave filters—a frequency domain approach."

24 July. (M. Gottlieb, session chairman): D. A. Pinnow, "Acousto-optic materials, methods and applications"; R. W. Weinert, "Probing of bulk and surface waves by Bragg scattering."

Dielectric Phenomena

Charles P. Smyth, honorary chairman; Graham Williams, chairman; David W. McCall, vice chairman.

27 July. R. Zwanzig, "Theory of dielectric relaxation in polar liquids"; J. E. Anderson, "Model calculations of cooperative motions in chain molecules"; W. P. Slichter, "N. M. R. relaxations in polymers"; G. W. Chantry, "Dielectric behavior of polymers at submillimeter wavelengths."

28 July. C. Brot, "Total dipolar absorption of simple molecules in the microwave–far infrared region"; M. M. Davies, "Absorptions in non-polar liquids"; A. A. Maryott, "Dielectric and N. M. R. correlation times of symmetric top gases and mixtures"; G. Birnbaum, "A new line shape for resonant and non-resonant absorption, and its application to dielectric phenomena."

29 July. H. P. Schwan, "Dielectric relaxation and mechanism in Biology—A Survey"; E. H. Grant, "Dielectric dispersion in aqueous solutions of globular proteins, with particular reference to myoglobin, haemoglobin and serum albumen"; C. T. O'Konski, "Electrical properties of macromolecules"; S. Takashima, "Dielectric properties of ordered solutions of biopolymers."

30 July. W. Dannhauser, "Liquid structure and dielectric polarization of alcohols"; E. Whalley, "The dielectric properties of ice"; L. Onsager, "Protonic semiconductors."

31 July. W. Reddish, "The significance of developments in instrumentation in dielectrics research"; H. K. Welsh, "Dielectric absorption and defects in long chain solids."

Biomathematics

H. David Block, chairman; Simon A. Levin, co-chairman; David Cardus, vice chairman.

3–7 August. (Julia T. Apter, discussion leader): W. H. Bossert, "Models of evolution of polygenic characters"; Hans Bremermann, "Optimization algorithms for many variables. Applications to problems in dynamical systems and pattern recognition"; Jacob Bronowski, "The evolution of complexity"; Dan Cohen (subject to be announced); Jack Cowan, "Some aspects of the modeling of single-unit and large-scale neural activity by differential equations"; Lloyd Demetrius, "Multiplicative processes"; Steve Farris, "A biological interpretation of the Steiner problem with rectilinear distance"; Heinz von Foerster, "Epistemological problems of 'intelligence,' natural or artificial"; Stephen Grossberg, "Operant conditioning: hierarchies of cellular filters and feedback"; Bela Julesz, "Effects of Fourier domain operations on stereopsis"; H. D. Landahl, "On coupling between oscillators which model biological systems"; Jerome Lettvin (subject to be announced); Christopher Longuet-Higgins, "Associative memory models"; Robert MacArthur, "What competition minimizes"; John Maynard-Smith, "Problems in evolution theory"; Theodosios Pavlidis, "Interacting biochemical oscillators"; Robert Rosen, "On the interpretation of dynamical models of biological processes"; Frank Rosenblatt, "Mathematical models of memory mechanisms"; Sol Rubinow, "Problems in cell population kinetics"; Lee Segel, "Collective motions of chemotactic cells"; Norman Shapiro, "Simplicity in biological models"; Lawrence Slobodkin, discussion leader; Arthur Winfree, "The behavior of fungi and fruit flies: geometrical approaches to temporal organization"; Lewis Wolpert (subject to be announced).

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Research at High Pressure

George E. Duvall, chairman; Robert W. Keyes, vice chairman.

15 June. Electronics and optics (R. W. Keyes, chairman): J. Schirber, "Effects of compression on the Fermi surface"; George Bloom, "Brillouin scattering in shock compressed materials"; R. Graham and C. Julian, "Effects of elastic shock compression on conductivity of Ge." Equations of state

(E. Teller, chairman): M. Ross, "Theories of melting"; E. B. Royce and R. Grover, "Equation of state data from shock compression"; C. W. F. T. Pistorius, "Regularities in solid-solid phase transitions"; M. Nicol, "Raman spectroscopy of high pressure phases of solids."

16 June. Superconductivity (P. Seiden, chairman): J. Olsen, "General review"; J. W. Garland, "Microscopic theory"; J. P. Franck, "Phonon spectra and energy gap from tunneling"; R. J. Higgins, "Fermi surface topology from superconducting pressure measurements." Calculations of mechanical properties from first principles (Neil Ashcroft, chairman): D. Liberman, "Self-consistent field calculations of equations of state for solids"; W. Rudge, "First principles calculations of the mechanical properties of solids under pressure"; E. Kmetko, "Calculations of effects of pressure on band structure and Fermi surfaces. Correlation with compressibility."

17 June. Magnetic properties (C. Tomizuka, chairman): Daniel Bloch, "Pressure effects on magnetism of rare earth elements"; T. M. Rice, "Pressure effects on antiferromagnetism of chromium"; Akira Sawaoka, "Magnetic anisotropy"; L. C. Bartels, "Effects of pressure on properties of itinerant ferromagnets." Dielectric properties (G. Samara, chairman): W. Daniels, "Dielectric properties of rare gas solids"; Don Schuele, "Pressure dependence of dielectric properties of alkaline earth fluorides"; E. Whalley, "Dielectric properties of various forms of ice"; G. Samara, "Pressure dependence of dielectric properties of ferroelectric crystals."

18 June. Mechanical properties (George C. Kennedy, chairman): H. Ll. D. Pugh, "Mechanical properties under hydrostatic pressure"; R. W. Rhode, "Mechanical response of solids to shock wave compression"; S. Mitra, "Pressure dependence of optically active phonons in crystals." Metal-semiconductor transitions (T. M. Rice, chairman): D. B. McWhan, "Mott transition in doped V_2O_3"; D. Jerome, "Metal-semiconductor transitions in Yb metals"; W. Paul, "Pressure-induced transitions in VO_2."

19 June. Experimental techniques and recent results (W. Paul, chairman).

Crystal Growth

W. G. Pfann, co-chairman; Robert L. Parker, co-chairman.

22 June. R. F. Sekerka, "Phenomeno-

logical theory of growth from the melt"; S. Coriell, "Morphological stability of ice crystals in aqueous solutions"; D. Uhlmann, "Crystallization and melting in glass-forming systems"; H. Gatos, "Crystal growth from the melt with emphasis on aspects of the growth interface."

23 June. (K. A. Jackson, discussion leader): A. A. Chernov, "Theory of crystal growth from solutions and in the presence of impurities"; J. Verhoeven, "Controlled solidification and melting experiments in concentrated alloys"; W. A. Tiller, "Crystallization interfaces—their energetics, kinetics and topography."

24 June. L. G. Van Uitert, "Growth of crystals for magnetic and optical applications"; H. Reiss, "Mobilities of nulcei and islands of outgrowth during formation of hetero-epitaxial films from the vapor"; R. S. Wagner and R. J. H. Voorhoeve, "Nucleation and growth of cadmium from the vapor."

25 June. J. J. Tietjen, "Vapor phase growth of 3–5 compounds"; B. W. Batterman, "Assessment of crystal perfection"; R. E. Hanneman, "Diamonds, meteorites and the moon."

26 June. D. T. J. Hurle, "Convection in the liquid, and its effects on solute segregation"; W. R. Wilcox, "Macroscopic segregation phenomena."

Biochemistry in Agriculture

Edward F. Rogers, chairman; Arthur W. Galston, vice chairman.

29 June. G. M. Woodwell, "Toxic substances and ecological cycles"; P. C. Kearney, "Biodegradation of pesticides"; D. G. Crosby, "Photodecomposition of pesticides"; L. D. Owens, "Rhizobitoxin, a naturally occurring model for the design of herbicides."

30 June. C. A. West, "Regulation of kaurene biosynthesis"; R. H. Hageman, "Nitrate reductase assays as a means of selecting higher-yielding, high-protein cultivars"; A. R. Cooke, "Uses of Ethrel for inducing ethylene responses in plants"; N. J. Leonard, "Cytokinins."

1 July. F. Matsumura, "Studies on the membrane ATPases in relation to the action mechanism of DDT"; C. F. Wilkinson, "The mode of action of insecticide synergists"; G. Kaugars, "Newer types of insecticidal structures"; C. P. DiSanzo, "Principles governing the control of plant-parasitic nematodes with contact nematocides."

2 July. N. E. Tolbert, "Plant microbodies (peroxisomes and glyoxysomes)"; I. Zelitch, "The relation of photorespira-

tion to net photosynthesis"; O. E. Nelson, "Opaque-2 maize."

3 July. D. C. Torgeson, "New developments in fungicides"; K. Maramorosch, "Mycoplasma as causative agents in plant diseases."

Heart Muscle

John R. Blinks, chairman.

3 August. (A. F. Huxley, chairman): Models of muscular contraction. (B. R. Jewell, chairman): Mechanics of cardiac and skeletal muscle.

4 August. (H. Reuter, chairman): Activating currents in cardiac and skeletal muscle. (G. A. Langer, chairman): Ion fluxes across membranes.

5 August. (D. Noble, chairman): Passive electrical properties of heart muscle. (G. Moe, chairman): Mechanism of arrhythmias.

6 August. (D. R. Wilkie, chairman): Energetics of contraction in cardiac and skeletal muscle. (H. Morgan, chairman): Metabolic control in cardiac and skeletal muscle.

7 August. (A. Katz, chairman): Contractile proteins.

Particle-Solid Interactions

Sheldon Datz, chairman; Walter L. Brown, vice chairman.

10 August. (Hans Schiøtt, discussion leader): J. M. Poate, "Energy loss phenomena"; R. H. Ritchie, "Plasmons." (Peter Sigmund, discussion leader): Felix T. Smith, "Interatomic potentials and scattering."

11 August. (W. M. Gibson, discussion leader): Mark T. Robinson, "Channeling mechanisms and ion trajectories." (Q. Kessell, discussion leader): Arnold Russek, "Inelastic atomic collisions."

12 August. (E. Merzbacher, discussion leader): J. Kahn and J. Cairns, "Ion-induced x-ray emission." (R. S. Nelson, discussion leader): Hans O. Lutz, "Impact parameter dependence of x-ray emission"; Nicole Colombie, "Kinetic secondary electron ejection."

13 August. M. Kaminsky, "States of ions in solids"; C. D. Moak, "Charge-state spectroscopy." (M. W. Thompson, discussion leader): P. K. Rol and W. van der Weg, "Atom surface collisions"; E. Bøgh, "Rutherford scattering in the surface region."

14 August. (James W. Mayer, discussion leader): L. Feldman, "Ion crystallography."

Metals and Metal Binding in Biology

Paul Saltman, chairman; Richard H. Holm, vice chairman.

17 August. Alkali ions in biological systems (M. Eigen, discussion leader): J. H. Prestgaard, "Cation specificity of nonactin"; B. Pressman, "The valenomycin effect"; G. Eisenman, "Alkali ion transport in lipid bilayers"; H. A. Lardy, "Active ion transport."

18 August. Non-heme iron: I. Gunsalus, "Biochemistry of non-heme iron proteins"; W. Orme-Johnson and M. Poe, "Structure of non-heme iron proteins"; R. Holm, "Iron sulfur chemistry"; P. Saltman, "Biochemistry of iron storage and transport"; H. Gray, "Iron oxide chemistry."

19 August. Oxygen binding and oxidation: J. Ibers, "Structure of metal-oxygen models"; L. Hoard, "Oxygen stero chemical constraints provided by porphrin skeletons"; R. Shulman, "NMR of heme proteins"; T. Vanngard, "EPR studies of metalo-oxidases"; I. Fridovich, "Oxygen radicals, oxygen toxicity and superoxide desmutase."

20 August. Nitrogen binding and fixation: J. Chatt and E. van Tamelen, "Abiological nitrogen fixation"; L. E. Mortensen, R. Hardy and R. C. Burns, "Biochemistry of nitrogenase: characterization, reactions and mechanisms." All speakers, "Abiological-biological relationships."

21 August. Open for discussion—presentation of related papers.

Cyclic AMP

G. Alan Robison, co-chairman; Earl W. Sutherland, co-chairman; Charles G. Smith, vice chairman.

24 August. (E. W. Sutherland, discussion leader): N. D. Goldberg and A. L. Steiner, "Newer methods of assay." (G. I. Drummond, discussion leader): D. A. Walsh and P. Greengard, "Mechanism of action of cyclic AMP."

25 August. (S. P. Colowick, discussion leader): R. L. Perlman and G. Zubay, "Catabolite repression." (H. C. Pitot, discussion leader): W. D. Wicks and T. A. Langan, "Protein synthesis and histone phosphorylation."

26 August. (G. A. Robison, discussion leader): O. M. Rosen and S. L. Pohl, "Receptors and adenyl cyclase." (G. W. Liddle, discussion leader): A. E. Broadus and L. R. Chase, "Clinical endocrinology." (C. R. Park, discussion leader): F. Murad and H. M. Good-

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man, "Factors influencing the formation and action of cyclic AMP."

27 August. (R. W. Butcher, discussion leader): M. Schramm and H. Wells, "The release of large and small molecules." (T. W. Rall, discussion leader): T. M. Konijn and J. W. Dobbs, "Some other effects of cyclic AMP."

28 August. (C. G. Smith, discussion leader): J. G. Hardman and R. Paoletti, "Derivatives and other cyclic nucleotides."

Geochemistry

Wilson L. Orr, co-chairman; Gordon W. Hodgson, co-chairman.

31 August. Geochemistry of porphyrins and biochemical fossils (J. Sugihara, session chairman): A. Treibs, "Work of Hans Fischer, fundament of our knowledge on porphyrins in nature"; E. W. Baker, "Fossil porphyrins and chlorins in deep ocean sediments"; M. Blumer, "Structure and geochemical significance of high molecular weight porphyrins"; A. Corwin, E. Baker, E. Klesper and E. Danielly, "A crystalline petroporphyrin from Wilmington crude oil"; T. C. Hoering, "Optically active steranes in a Miocene petroleum and in an Eocene shale"; W. K. Seifert, E. J. Gallegos and R. M. Teeter, "Identification of steranoid and diterpenoid crude oil carboxylic acids by deuterim labeling"; F. M. Swain, "Carbohydrates in Mesozoic and Cenozoic plant fossils."

1 September. Chemical fossilization and mineralization (R. M. Mitterer, session chairman): R. M. Mitterer, "Amino acid composition of organic matter in biogenic and non-biogenic carbonates"; P. E. Hare, "Amino acid reactions in deep-sea sediments"; R. A. Berner, "Mineralization as a result of organic matter decomposition"; E. W. Biederman, Jr., "Growth of pyrite in organic rich sedimentary environments." Natural gases (session chairman to be announced): R. Kranz, "Organic matter in the gas and liquid inclusions of uranium bearing minerals and their radioactive disequilibrium"; M. Duel and A. G. Kim, "Gases produced by microbial action during early coalification"; R. D. McIver, "Natural gas."

2 September. Sedimentary organic matter (R. F. Scalan, session chairman): J. M. Hunt, "Organic geochemistry of Black Sea sediment"; J. A. Calder, "Organic geochemistry of marsh environments"; M. A. Rashid, "Humic acids of different sources and clay-organic interactions"; H. W. Scharpen-

seel, "The role of various cations and nitrogeneous substances as bridge links in clay-organic interactions." I. Havenaar, "Geochemical data on organic matter in Recent sediments off the southwest African coast." Isotope geochemistry (J. M. Hunt, session chairman): W. D. Redfield, "Distribution of stable carbon isotopes in microbial lipids"; A. Nissenbaum, "Carbon isotopes as tracers of source of organic matter in Recent sediments"; S. R. Silverman, "Carbon isotope geochemistry of petroleum."

3 September. Organic processes in the sub-surface (A. Hood, session chairman): B. P. Tissot, "Effects of temperature and pressure in organic processes in lower Toarcien shales of the Paris basin"; F. T. C. Ting, "Alteration of organic matter and its bearing on the thermal history of sediments"; J. C. Winters and J. A. Williams, "Microbial alteration of crude oil in the reservoir." Geochemistry of petroleum (E. E. Bray, session chairman): J. A. Williams and J. A. Momper, "Effects of crude oil alteration on correlation properties"; E. G. Baker, "Liquid crystal micelles for the migration of hydrocarbons in water."

4 September. Lunar samples in general papers (K. A. Kvenvolden, session chairman): B. Nagy, "Analysis of lunar rock samples"; G. W. Hodgson, "Porphyrins in lunar rock samples"; S. Chang, K. A. Kvenvolden, I. R. Kaplan and C. Ponnamperuma, "Molecular composition and abundances of carbon compounds in lunar samples"; J. D. Brooks and co-workers (subject to be announced); G. Eglington and co-workers (subject to be announced); P. H. Given and D. J. Cassagrande, "Amino acids in the plants and peats of the Florida Everglades."

Providence Heights College

Plasma Physics

John Dawson, chairman; A. Trivelpiece, vice chairman.

15 June. Methods and technology for generating high-current relativistic electron beams (B. D. Fried, chairman): J. C. Martin, "Technology of high voltage systems used in the generation of high-current relativistic beams"; S. V. Nablo, "Technology of diodes used in the generation of high-current relativistic beams." High-current relativistic beam diodes (W. B. Lewis, chairman): H. R. Jory, "Numerical studies of equilibrium conditions for high-current rela-

tivistic diodes"; R. Z. Sagdeev (subject to be announced); L. C. Hebel (subject to be announced).

16 June. High-current relativistic beam transport (W. H. Bennett, chairman): G. Yonas, "High-current relativistic beam transport and ion acceleration results"; D. Hammer, "Propagation of high-current relativistic beams theory"; Ya. B. Fainberg (subject to be announced). Collective effect acceleration schemes (M. Reiser, chairman): J. D. Lawson, "Review and theory of collective effect acceleration mechanisms"; B. Eastlund, "Cerenkov drag acceleration of ions by high-current relativistic beams"; M. Rabinovich (subject to be announced).

17 June. Electron ring accelerators (W. Perkins, chairman): D. Keefe, "Electron ring accelerators"; A. Schluter (subject to be announced); L. I. Rudakov (subject to be announced). ASTRON (G. Budker, chairman): N. C. Christofilos, "Recent progress on ASTRON"; R. J. Briggs, "Negative mass instabilities"; M. Rensink, "Equilibrium and stability."

18 June. Un-neutralized plasmas (R. M. Kulsrud, chairman): R. C. Davidson, "Equilibrium and stability of un-neutralized magnetically confined plasma"; R. Levy, "HIPAC-theory and experiment"; R. Sudan (subject to be announced). Electron cyclotron resonance plasmas (A. Bers, chairman): R. Dandl, "Electron cyclotron resonance plasma experiments"; T. Consoli (subject to be announced); A. Kuckes, "Cyclotron heating theory."

19 June. Review of promising theoretical and experimental problems (S. J. Buchsbaum, chairman): N. Rostoker, "Theory"; A. C. Kolb, "Experiment."

Immunochemistry and Immunobiology

Ray D. Owen, chairman; Herman N. Eisen, vice chairman.

22 June. (R. Owen, chairman): B. A. D. Stocker, "Chemistry and genetics of bacterial polysaccharides"; V. Ginsburg, "Cell surface sugars as determiners of specificity." (J. Preer, chairman): I. Finger, "Biochemical immunogenetics of ciliates."

23 June. (S. Hakomori, chairman): S. J. Singer, "The cell membrane"; V. Defendi, "Modification of cell surface specificities by viruses." (R. Prehn, chairman): K. Hellstrom, "Tumor immunity."

24 June. (J. Stimpfling, chairman):

D. Shreffler, "Immunogenetics of the H-2 region of the mouse"; L. Herzenberg, "The H-2 region and the immune response." (R. Weiser, chairman): A. Nisonoff, "Cytochrome immunochemistry."

25 June. (H. Winn, chairman): D. B. Amos, "Genetics of human histocompatibility antigens"; S. Nathenson, "Chemistry of histocompatibility antigens." (A. Bearn, chairman): B. Blumberg, "The Australia antigen and serum protein polymorphism."

26 June. (H. Eisen, chairman): L. Hood, "Immunoglobulins and the immune response."

Chemistry and Physics of Isotopes

V. J. Shiner, Jr., chairman; F. S. Rowland, vice chairman.

29 June. Isotope abundances in lunar samples, Apollo 11 and 12 (R. N. Clayton, chairman): (speakers to be announced), "Stable isotopes of H, C, N, O, S and Si." Chemical activation studies (D. W. Setser, chairman): H. Heydtmann, "Isotope effects in chemical activation studies"; P. S. T. Lee, "Tritium and C^{14} tracer studies of methylene reactions with deuteromethyl halides."

30 June. Organic chemistry (R. L. Schowen, chairman): B. L. Murr, "Deuterium effects on the reactions of carbonium ion pairs." Session for short contributed papers on research in progress (J. G. Jewett, chairman).

1 July. Lunar samples (continued) (R. N. Clayton, chairman): (speakers to be announced), "Radioactive isotopes, noble gases, cosmic radiation and solar wind effects." Hot atom processes (B. S. Rabinovitch, chairman): R. N. Porter, "Recent developments in the theory of hot atom processes"; C. C. Chou, "Isotope effects in hot atom reactions of tritium."

2 July. Organic chemistry (T. W. Koenig, chairman): J. E. Baldwin, "Isotope effects in cycloaddition reactions"; W. H. Saunders, Jr., "Isotope effects in SYN elimination reactions." Models in the calculation of isotope effects (M. Wolfsberg, chairman): J. Bigeleisen, "Introduction"; A. Kuppermann, "The hydrogen atom plus hydrogen molecule exchange reactions—exact calculations, approximate models and isotope effects."

3 July. (M. Wolfsberg, chairman): P. Yankwich, "Modeling the transition state"; M. J. Stern, "Isotope effects as indicators of quantum mechanical tunnelling—predictions from model calculations."

High-Temperature Chemistry

Robert J. Thorn, chairman; K. Douglas Carlson, vice chairman.

Order-Disorder and Meanings of High-Temperature Chemistry

6 July. Order-disorder in nonstoichiometric compounds (L. Eyring, session chairman): J. W. Cahn, discussion leader.

7 July. Ordered clusters in liquids (alloys) (G. R. B. Elliott, session chairman): G. Borelius, L. S. Darken, discussion leaders. Correlation of entropic and enthalpic effects. Scaling laws (J. Norman, session chairman): P. Winchell, H. T. Davis, discussion leaders.

8 July. Transport and reactions in solids (J. B. Wagner, Jr., session chairman): R. E. Hanneman, H. Schmalzried, D. A. Stevenson, discussion leaders.

9 July. Gas-solid interactions, vaporization and sublimation (P. G. Wahlbeck, session chairman): F. O. Goodman, J. T. Yates, Jr., discussion leaders. Directions in science and technology in high-temperature chemistry (P. W. Gilles, session chairman): H. Burte, A. V. Grosse, discussion leaders.

10 July. Syntheses (J. L. Margrave, session chairman): P. L. Tims, L. Andrews, discussion leaders.

Molecular Pathology

Henry C. Pitot, chairman; Russell Ross, vice chairman.

The Biochemical Bases of Genetic Disease

13 July. X-linked disease (Henry C. Pitot, chairman): Robert DeMars; J. Edwin Seegmiller, "X-linked uric-acidurias." Disorders of nucleic acid metabolism (Robert DeMars, chairman): James Regan.

14 July. Ganglioside and phospholipid storage diseases (J. Edwin Seegmiller, chairman): Roscoe Brady, John S. O'Brien. The mucopolysaccharidoses and cystic fibrosis (Roscoe Brady, chairman): Albert Dorfman, B. S. Danes.

15 July. The glycogenoses (James Regan, chairman): D. H. Brown, H. G. Hers. Galactosemia, diabetes and other genetic disorders of carbohydrate metabolism (H. G. Hers, chairman): David Hsia, George Cahill.

16 July. Disorders of amino acid and heme metabolism (David Hsia, chairman): Donald Tschudy, S. Harvey Mudd. (Donald Tschudy, chairman): Harry Waisman, Joseph Dancis.

17 July. The hemoglobinopathies (Harry Waisman, chairman): H. Lehman, Paul Marks.

Chemistry and Biology of Pyrrole Compounds

Lawrence Bogorad, chairman; Lyonel G. Israels, vice chairman.

20 July. Porphyrin and metalloporphyrin chemistry and photochemistry: D. H. Dolphin, J. J. Katz, D. Mauzerall, A. A. Krasnovskii. Biosynthetic and control mechanisms in pyrrole and porphyrin metabolism. δ-Aminolevulinic acid and porphobilinogen: B. Burnham, A. Gajdos, S. Granick, P. Jordan, A. Kappas.

21 July. δ-Aminolevulinic acid and porphobilinogen (continued): G. Kikuchi, J. Lascelles, G. S. Marks, A. Neuberger, S. van Heyningen, H. von Kowsky, D. Tschudy. Uroporphyrinogens: L. Bogorad, B. Frydman, M. Grinstein, E. Y. Levin.

22 July. Protoporphyrin and hemes: Y. Yoneyama, O. T. G. Jones, R. Labbe, A. G. Redeker. Chlorophylls: S. Aronoff, M. Gassman, S. Holt, A. H. Jackson, A. A. Shlyk.

23, 24 July. Bile pigments: I. Arias, N. Berlin, D. Drabkin, L. Israels, R. Lester, H. S. Marver, W. Rudiger, S. Schwartz, H. W. Siegelman, R. Troxler, P. White.

Dynamics of Quantum Solids and Fluids

W. Kohn, co-chairman; P. A. Wolff, co-chairman.

Major Problems in Solid State Physics

27 July. Phenomenology of materials: B. T. Matthias, "Superconductivity and the periodic system"; J. Phillips, "Ionicity of the chemical bond in crystals"; D. Adler, "Electrical and optical properties of transition metal compounds"; (speaker to be announced), "Quantum electronic materials."

28 July. Disordered systems: Nevill Mott, "Impurity conduction in crystals and glasses"; J. Stuke, "Electronic properties of amorphous semiconductors—experiments"; David Turnbull, "Structure and thermal properties of amorphous solids"; Morrell Cohen, "Electronic structure in amorphous semiconductors—theory"; Hans Stocker, "Mechanism of threshold switching in semiconducting glasses—theory and experiment."

29 July. Surfaces: R. Gomer, "Ad-

sorption and the properties of clean metal surfaces"; R. Schrieffer, "Theory of chemisorption"; P. J. Estrup, "Surface studies by low energy electron diffraction"; C. G. B. Garrett, "Semiconductor surfaces: science and related technology."

30 July. Matter under extreme conditions: Y. R. Shen, "Highly nonlinear optical phenomena"; M. Ruderman, "Superdense matter in astrophysics"; H. Brooks, "Prospects for solid state physics."

31 July. Matter under extreme conditions (continued): G. E. Duvall, "Concepts and applications of shock waves"; B. J. Alder, "Pressure induced transitions."

Nonlinear Optic Effects

C. K. N. Patel, chairman; Y. R. Chen, co-vice chairman; R. W. Hellwarth, co-vice chairman.

3–7 August. Far infrared nonlinear optical effects; stimulated nonlinear effects including stimulated Rayleigh, Brillouin, Raman and Polariton scattering; linear and nonlinear optical effects with picosecond light pulses; propagation of coherent optical radiation through absorbing media. Discussion leaders and speakers: N. Bloembergen, M. Duguay, H. Gibbs, J. A. Giordmaine, T. Greytak, R. W. Hellwarth, B. F. Levine, C. K. N. Patel, P. W. Richards, Y. R. Shen, George Benedek, R. G. Brewer, B. Stoicheff, E. B. Treacy, S. Yatsiv, K. Dransfeld, C. H. R. Flytzanis.

Courses

Paleogeography, Mainz and Karlsruhe, Germany, 3–21 August. The purpose of this NATO Advanced Study Institute is to bring together scientists interested in the problems of paleogeography. Emphasis will be on the integration of the various aspects of geology and geophysics and upon the field excursion program in the Saar-Nahe basin and the Rhine graben. Applications are invited from participants who should have some knowledge of German. Limited funds are available to assist with travel expenses. *Deadline for applications:* 15 April. (Prof. A. E. M. Nairn, Geology Department, Case Western Reserve University, Cleveland, Ohio 44106)

Powder Metallurgy for Engineers, Madison, Wis., 27–31 July. The entire field will be covered with emphasis on the application of metallurgical and scientific principles to the understanding and commercial utilization of the process. (David L. Atwood, University of Wisconsin Engineering Extension, 432 North Lake St., Madison 53706)

BOOKS RECEIVED

(*Continued from page 1366*)

Documentation, Wageningen, 1969. ii + 416 pp., illus. Paper, Dfl. 42.50.

Approximations with Special Emphasis on Spline Functions. Proceedings of a symposium, Madison, Wis., May 1969. I. J. Schoenenberg, Ed. Academic Press, New York, 1969. xii + 492 pp., illus. $10. Publication No. 23 of the Mathematics Research Center, U.S. Army, University of Wisconsin.

Artifact in Behavioral Research. Robert Rosenthal and Ralph L. Rosnow, Eds. Academic Press, New York, 1969. xvi + 400 pp., illus. $7.50. Social Psychology Series.

Atomic Medicine. Charles F. Behrens, E. Richard King, and James W. J. Carpender. Williams and Wilkins, Baltimore, ed. 5, 1969. xviii + 876 pp., illus. $28.50.

Autoradiography. Techniques and Application. Renato Baserga and Daniel Malamud. Harper and Row, New York, 1969. xii + 284 pp., illus. $12.50. Modern Methods in Experimental Pathology, vol. 1.

Building Acoustics. B. F. Day, R. D. Ford, and P. Lord, Eds. Elsevier, New York, 1969. viii + 120 pp., illus. $4.50.

Causes of Delinquency. Travis Hirschi. University of California Press, Berkeley, 1969. xii + 310 pp. $8.95.

The Computer and Business Unity. Robert Hitchcock and Edgar Wille. Elsevier, New York, 1969. viii + 232 pp., illus. $8.75.

Corneo-Plastic Surgery. Proceedings of the second international conference, London, July 1967. Incorporating the Pocklington Memorial Lecture (1967). P. V. Rycroft, Ed. Pergamon, New York, 1969. xl + 628 pp., illus. $27.

Current Topics in Plant Science. James E. Gunckel, Ed. Academic Press, New York, 1969. xvi + 464 pp., illus. $19.50.

Current Topics in Surgical Research. Vol. 1, Second Annual Meeting of the Association for Academic Surgery, St. Louis, November 1968. George D. Zuidema and David B. Skinner, Eds. Academic Press, New York, 1969. xviii + 518 pp., illus. $21.

Cyclitols and Phosphoinositides: Chemistry, Metabolism, and Function. A conference, New York, September 1968. Frank Eisenberg, Jr., Ed. New York Academy of Sciences, New York, 1969. Illus. Paper, $18.50. *Annals of the New York Academy of Sciences*, Vol. 165, Art. 2, pp. 509–819.

Demography in Early America. Beginnings of the Statistical Mind, 1600–1800. James H. Cassedy. Harvard University Press, Cambridge, Mass., 1969. xvi + 358 pp. $8.50.

Distributions in Statistics: Discrete Distributions. Norman L. Johnson and Samuel Kotz. Houghton Mifflin, Boston, 1969. xvi + 336 pp. $12.50. Houghton Mifflin Series in Statistics.

The Elements and Structure of the Physical Sciences. J. A. Ripley, Jr., and R. C. Whitten. Wiley, New York, ed. 2, 1969. xxii + 698 pp., illus. $11.50.

Elements of Number Theory. Anthony J. Pettofrezzo and Donald R. Byrkit. Prentice-Hall, Englewood Cliffs, N.J., 1969. xii + 244 pp. $7.95.

Fish Physiology. W. S. Hoar and D. J. Randall, Eds. Vol. 1, Excretion, Ionic Regulation, and Metabolism. Academic Press, New York, 1969. xiv + 466 pp., illus. $23.

Flow through Porous Media. Roger J. M. De Wiest, Ed. Academic Press, New York, 1969. xiv + 530 pp., illus. $22.50.

Hamlet's Mill. An Essay on Myth and the Frame of Time. Giorgio de Santillana and Hertha von Dechend. Gambit, Boston, 1969. xxviii + 510 pp., illus. $10.

Handbook of Transducers for Electronic Measuring Systems. Harry N. Norton. Prentice-Hall, Englewood Cliffs, N.J., 1969. xvi + 704 pp., illus. $26. Prentice-Hall Series in Electronic Technology.

Health and the Developing World. John Bryant. Cornell University Press, Ithaca, N.Y., 1969. xxx + 346 pp., illus. $10.

Historical Geology. Carl O. Dunbar and Karl M. Waage. Wiley, New York, ed. 3, 1969. xiv + 562 pp., illus. $10.95.

Human Ecology and Public Health. Edwin D. Kilbourne and Wilson G. Smillie, Eds. Macmillan, New York; Collier-Macmillan, London, ed. 4, 1969. xiv + 466 pp., illus. $11.95.

The Insects. Structure and Function. R. F. Chapman. Elsevier, New York, 1969. xii + 820 pp., illus. $13.75.

An Introduction to Abstract Algebra. Vol. 2. F. M. Hall. Cambridge University Press, New York, 1969. xii + 388 pp., illus. $9.50.

Introduction to the Theory of Random Processes. I. I. Gikhman and A. V. Skorokhod. Translated from the Russian edition (Moscow, 1965) by Scripta Technica. Saunders, Philadelphia, 1969. xvi + 516 pp. $17.50. Saunders Mathematics Books.

Kidney Disease Services, Facilities, and Programs in the United States. Kidney Disease Control Program, Regional Medical Programs Service, Arlington, Va., 1969 (available from the Superintendent of Documents, Washington, D.C.). vi + 230 pp. Paper, $1.

The League of Grey-Eyed Women. Julius Fast. Lippincott, Philadelphia, 1969. 224 pp. $5.95.

Magnetic Domains. R. S. Tebble. Methuen, London, 1969 (U.S. distributor, Barnes and Noble, New York). xii + 100 pp. + plates. $4. Metheuen's Monographs on Physical Subjects.

Man, Climate and Architecture. B. Givoni. Elsevier, New York, 1969. xiv + 368 pp., illus. $14. Elsevier Architectural Science Series.

Man-Machine Simulation Models. Psychological and Performance Interaction. Arthur I. Siegel and J. Jay Wolf. Wiley-Interscience, New York, 1969. xiv + 178 pp., illus. $9.95. Wiley Series in Human Factors.

Man's Discovery of His Past. A Sourcebook of Original Articles. Robert F. Heizer. Peek, Palo Alto, Calif., 1969. x + 294 pp., illus. Paper, $4.

Marine Animals. Partnerships and Other Associations. R. V. Gotto. Illustrated by Gloria Sidwell. Elsevier, New York, 1969. 96 pp. $4.25.

Nuclear Isospin. Proceedings of a conference, Asilomar-Pacific Grove, Calif., March 1969. John D. Anderson, Stewart D. Bloom, Joseph Cerny, and William W. True, Eds. Academic Press, New York, 1969. xviii + 854 pp., illus. $22.

Olena Farm, U.S.A. An Agricultural Success Story, V. A. Tiedjens. Exposition Press, New York, 1969. 164 pp. + plates. $7.50. An Exposition-Banner Book.

Optical Rotary Dispersion of Proteins and Other Macromolecules. B. Jirgensons. Springer-Verlag, New York, 1969. xii + 168 pp., illus. $12.70. Molecular Biology, Biochemistry, and Biophysics, vol. 5.

Organic Charge-Transfer Complexes. R. Foster. Academic Press, New York, 1969. xii + 472 pp., illus. $22.50. Organic Chemistry, vol. 15.

The Original Australians. A. A. Abbie. Elsevier, New York, 1969. 288 pp. + plates. $9.

Our Blue Planet. The Story of the Earth's Evolution. Heinz Haber. Translated from the German edition (Stuttgart, 1965) by Ernst Stuhlinger. Scribner, New York, 1969. viii + 88 pp. $5.95.

The Phosphohydrolases: Their Biology, Biochemistry and Clinical Enzymology. A conference, New York, November 1968. William H. Fishman, Ed. New York Academy of Sciences, New York, 1969. Illus. Paper, $24.50. *Annals of the New York Academy of Sciences,* **Vol. 166, Art. 2,** pp. 365–819.

Photo-Electronic Image Devices. Proceedings of a symposium, London, September 1968. J. D. McGee, D. McMullan, E. Kahan, and B. L. Morgan, Eds. Academic Press, New York, 1969. xxiv + 552 pp., illus. $21.50. Advances in Electronics and Electron Physics, vol. 28A.

The Photographic Action of Ionizing Radiations. In Dosimetry and Medical, Industrial, Neutron, Auto- and Microradiography. R. H. Herz. Wiley-Interscience, New York, 1969. xxii + 634 pp., illus. $22.50. Wiley Series on Photographic Science and Technology and the Graphic Arts.

Physical Chemistry. Problems and Solutions. Leonard C. Labowitz and John S. Arents. Academic Press, New York, 1969. xii + 524 pp., illus. Paper, $7.50.

Physical Chemistry of Proteins and Nucleic Acids in Mammals. George Kaldor. Saunders, Philadelphia, 1969. xii + 226 pp., illus. $9. Physiological Chemistry, vol. 2.

Physics of the Solid State. Commemoration Volume to Professor S. Bhagavantam. S. Balakrishna, M. Krishnamurthi, and B. Ramachandra Rao, Eds. Academic Press, New York, 1969. xxiv + 542 pp., illus. $24.

Pigments in Pathology. Moshe Wolman, Ed. Academic Press, New York, 1969. xviii + 554 pp., illus. $29.50.

Statistical Computation. Proceedings of a conference, Madison, Wis., April 1969. Roy C. Milton and John A. Nelder, Eds. Academic Press, New York, 1969. xiv + 466 pp., illus. $11.

Theories of Abstract Automata. Michael A. Arbib. Prentice-Hall, Englewood Cliffs, N.J., 1969. xviii + 414 pp., illus. $14.95. Prentice-Hall Series in Automatic Computation.

Theory of Fish Population Dynamics as the Biological Background for Rational Exploitation and Management of Fishery Resources. George V. Nikolskii. Translated from the Russian edition (Moscow, 1965) by J. E. S. Bradley. R. Jones, Ed. Oliver and Boyd, Edinburgh, 1969. xvi + 324 pp., illus. £8, 10s.