SCIENCE

21 November 1969

Vol. 166, No. 3908

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Have you seen our bench top Raman in action?

It's so small that it looks like an infrared spectrophotometer—but it's doing many jobs that infrared can't do.

For example, laboratories can use the Spectra-Physics Model 700 Raman Spectrophotometer for quantitative analysis of a wide variety of organic and inorganic substances; for study of symmetric skeletal and lattice vibrations; and for compound identifications and characterizations never possible before.

Until the introduction of Spectra-Physics Model 700, the power of the Raman technique was not available to most labs. It was too costly and too complicated. Now, that's changed.

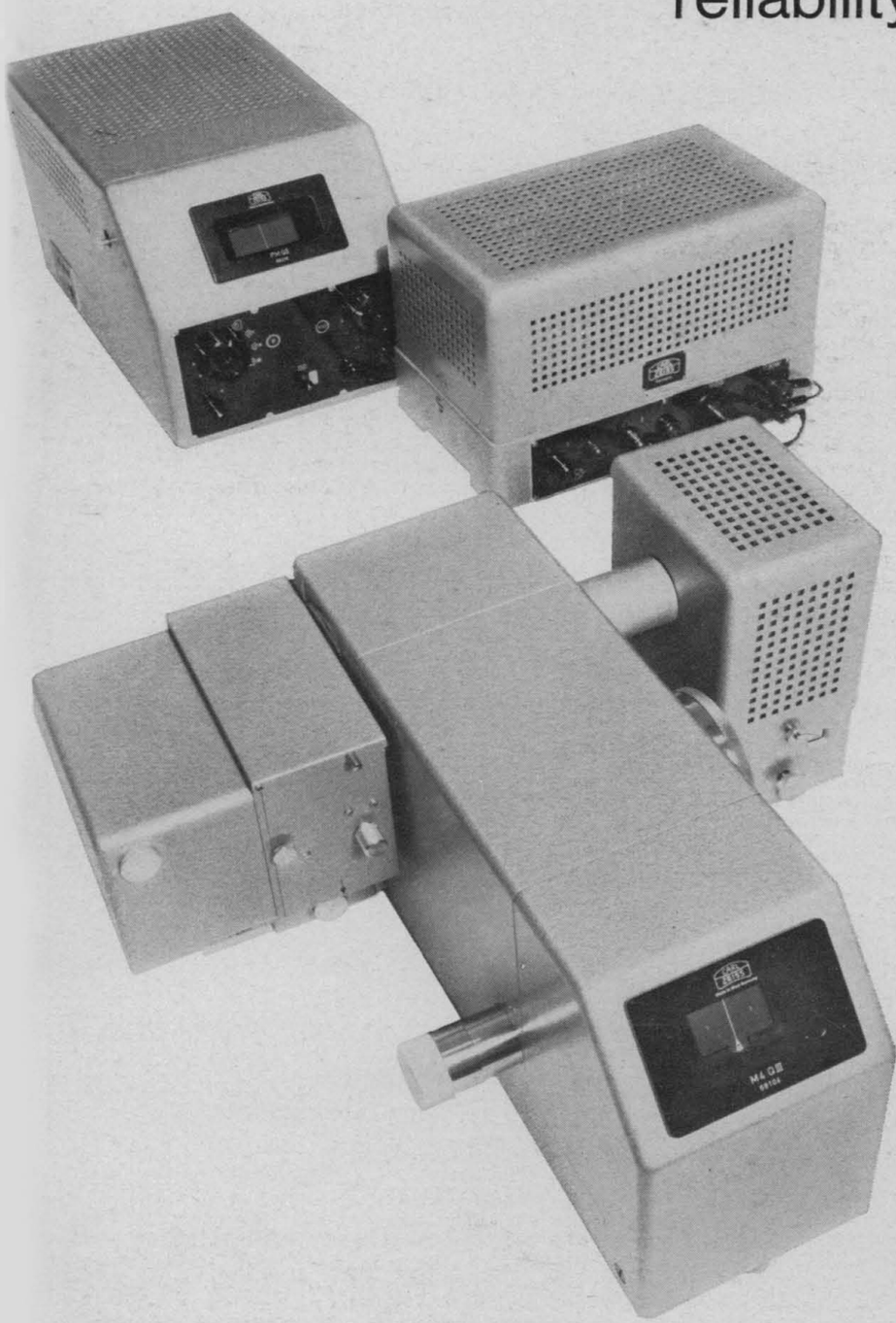
At $24,900*, Spectra-Physics Model 700 quickly pays for itself. It's easy to operate: put it on a bench top, plug it in, push three buttons, and the spectra records . . . accurately and rapidly.

For complete specifications, and possibly the solution to your problem, contact: Spectra-Physics, 1250 West Middlefield Road, Mountain View, California 94040, (415) 961-2550.

Spectra-Physics

* Prices slightly higher outside the United States.

Why is it hard to convince users of the ZEISS PMQ II Spectrophotometer to buy a service contract?



Because they are sold on the PMQ II's reliability.

One major university has had eight Zeiss PMQ IIs for from 5 to 8 years with never a breakdown in any of them. So they questioned the need for a service contract. Our answer, of course, is that the service contract is really worthwhile to keep the instrument at top-performance level. But even so, it's quite a testimony to the PMQ II.

We would like to point to the seven big factors that contribute to its reliability:

(1) The monochromator is absolutely backlash-free. Couple this with the no-parallax readout, and you have accuracy and reliability in wavelength and slit setting far beyond any other instrument.

(2) The craftsmanship of the light source is unmatched. What's more, it's so made that replacing a lamp (either tungsten or deuterium) is easy, aligning it is positive, and, once aligned, it stays put.

(3) For utmost stability, the instrument is constructed of strong castings and heavy gauge sheet metal.

(4) The chemical-resistant enamel finish is baked onto the surface for permanence.

(5) The electronics system, with its built-in check-out, is so reliable our most experienced technical rep has never seen an unstable detector.

(6) The built-in wavelength calibration is the soul of simplicity to use.

(7) The versatility of the instrument is such that, with the proper modules, it can be used for TLC, Kinetics, and Atomic Absorption.

For the full story on the reliable, accurate, and versatile PMQ II (and on a fine nationwide service policy), write Carl Zeiss, Inc., 444 5th Ave., New York, New York 10018.

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21 November 1969
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SCIENCE

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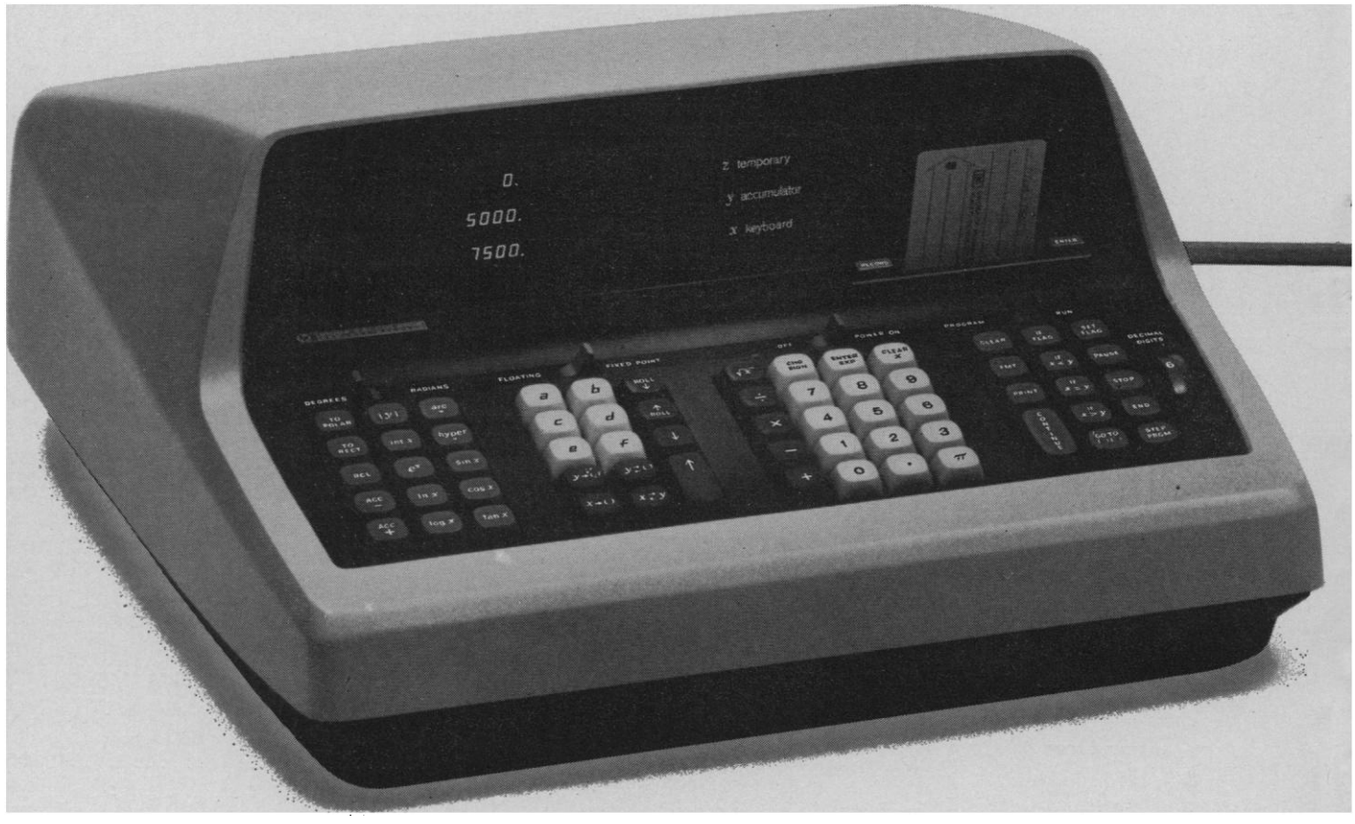
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Cretaceous trace fossil, *Helminthoida labyrinthica* (lower left); simulation by farmer spraying his fields (top, traced from aerial photograph); simulation by computer (right). See page 994. [David M. Raup, University of Rochester]

The Emancipator Becomes a Show-off!



The HP 9100A Calculator gave you

Freedom from waiting to get on the BIG computer;

Freedom from translating your problems into foreign computer languages;

Freedom from starvation-level computing with under-developed calculators;

Freedom from the drudgery of manual computation— All for the one-time price of $4400.

NOW—EVEN GREATER COMPUTING FREEDOM IS YOURS. GRAPHIC DISPLAY

Add the new HP 9125A X-Y Recorder. Make your HP 9100A desk-top computing calculator a show-off. You will be liberated from the tediousness of hand-plotting, from the omnipresent human errors and from inundating reams of data that go with point-to-point hand plotting.

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The 9125A recorder automatically draws the answers as the calculator solves your problems—such as differential equations (photo shows second-order, non-linear spring-mass plot), gear design (including involute curves), roots of polynomials, heat transfer and structural diagrams. It shows you the results of your calculations faster, easier, and more accurately than you can get with hand plots! It ends the gnawing frustration of interpreting the limbo between data points. And... it gives you a calibrated plot so you can read your units directly!

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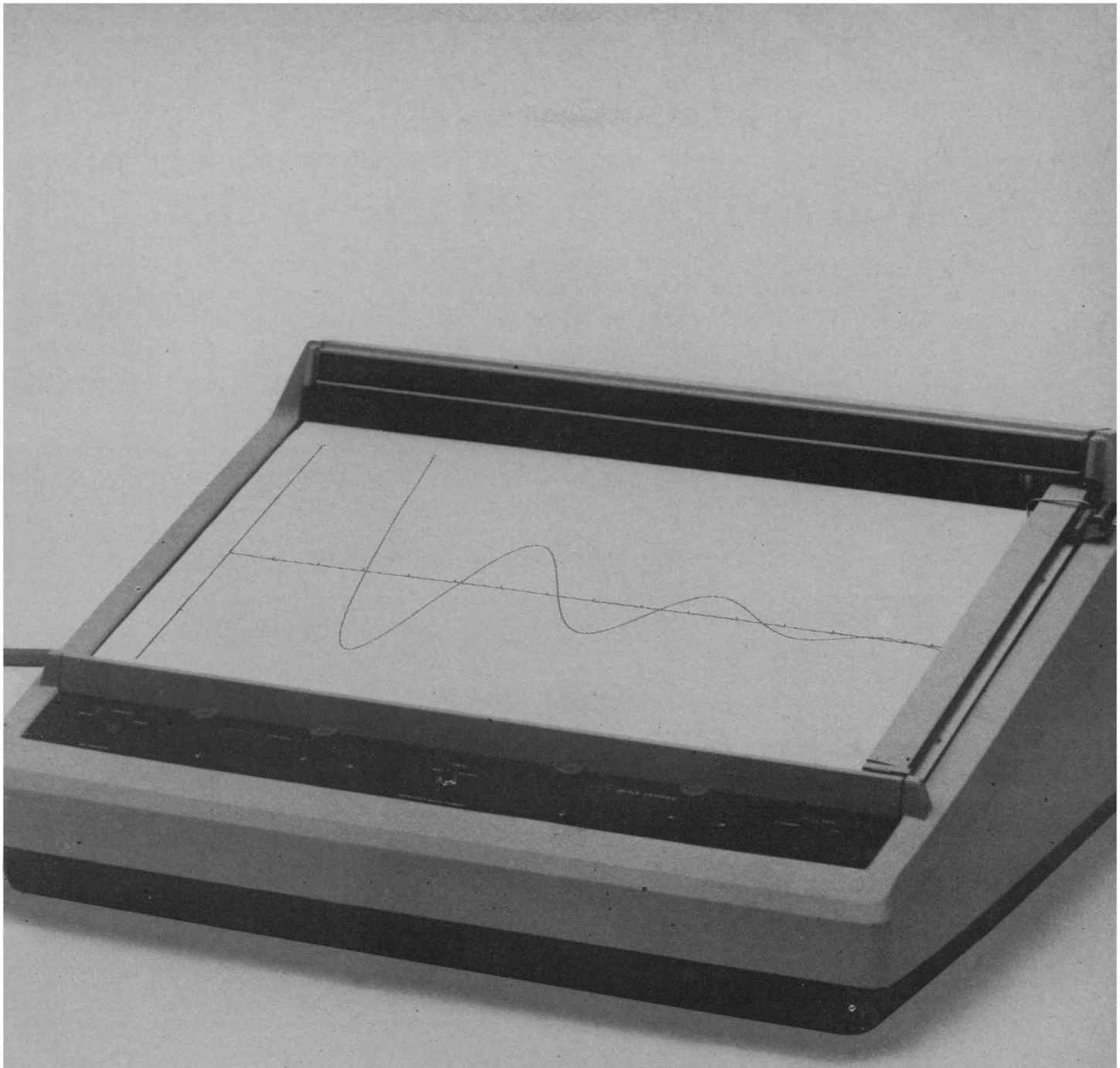

What's more, once the 9125A has given you a permanent graphic presentation, you can modify the input data, plot again, and immediately see the changes you have made. Nuances in areas of critical importance can be readily identified because of the pin-point resolution of the calculator/recorder combination – a resolution made possible by the four-digit calculator output that locates coordinate points with hair-splitting accuracy.

Completely documented programs for use with the HP 9100A Calculator and the HP 9125A X-Y Recorder are supplied with your instrument.

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099/208

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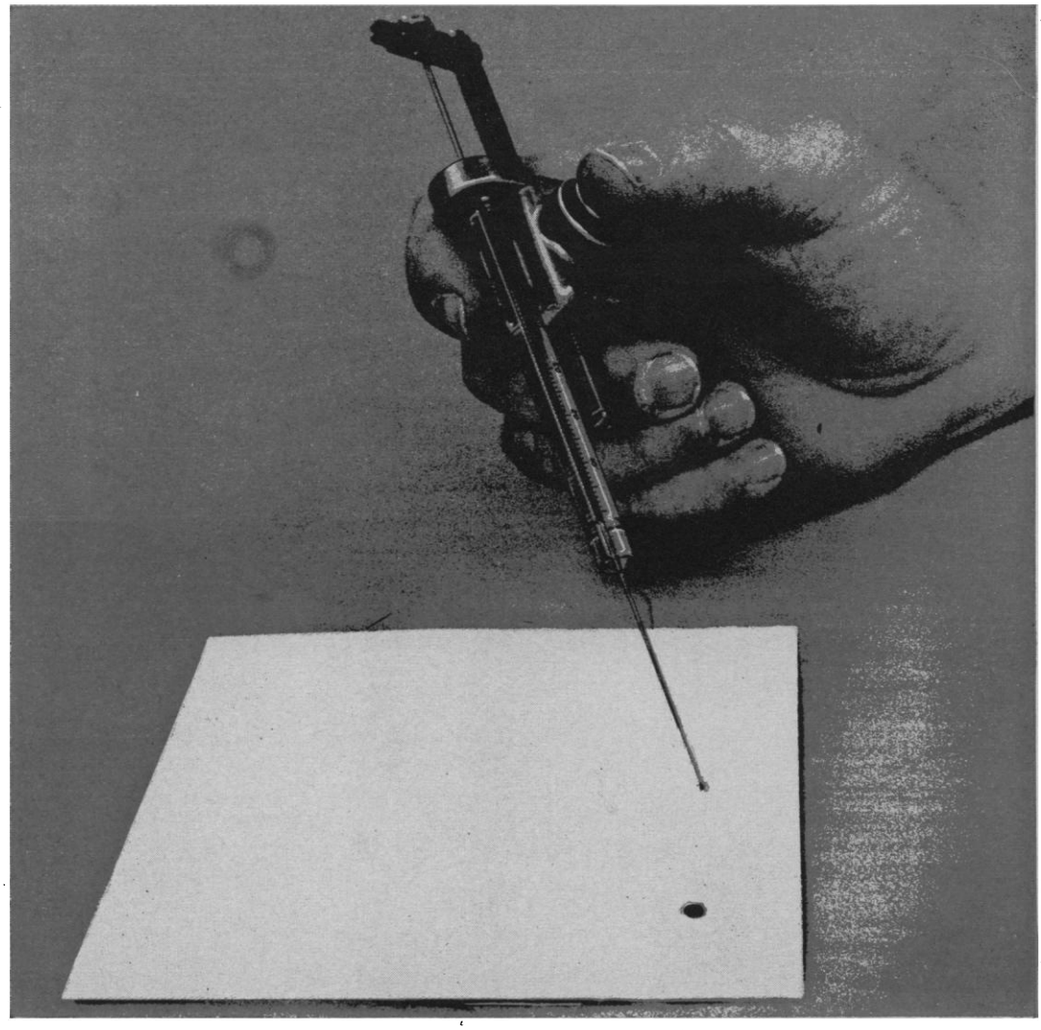

HAMILTON

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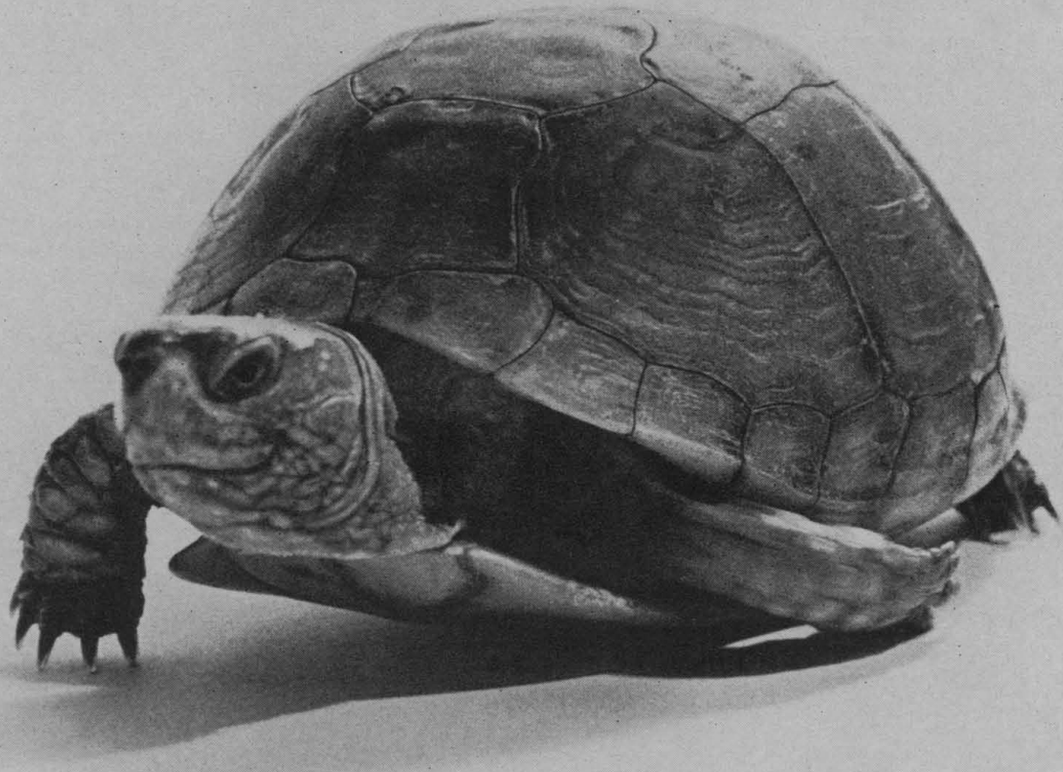

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Son of a gun.

The son: our new 1 ml Biopette automatic pipette. And the gun it's a son of: our original revolver-reminiscent Biopette. So the chore of repetitive pipetting is now further lessened.

THE NEW 1 ML BIOPETTE

The charm of this new automatic pipette is that it retains the advantages of the original Biopette while picking up a few of its own.

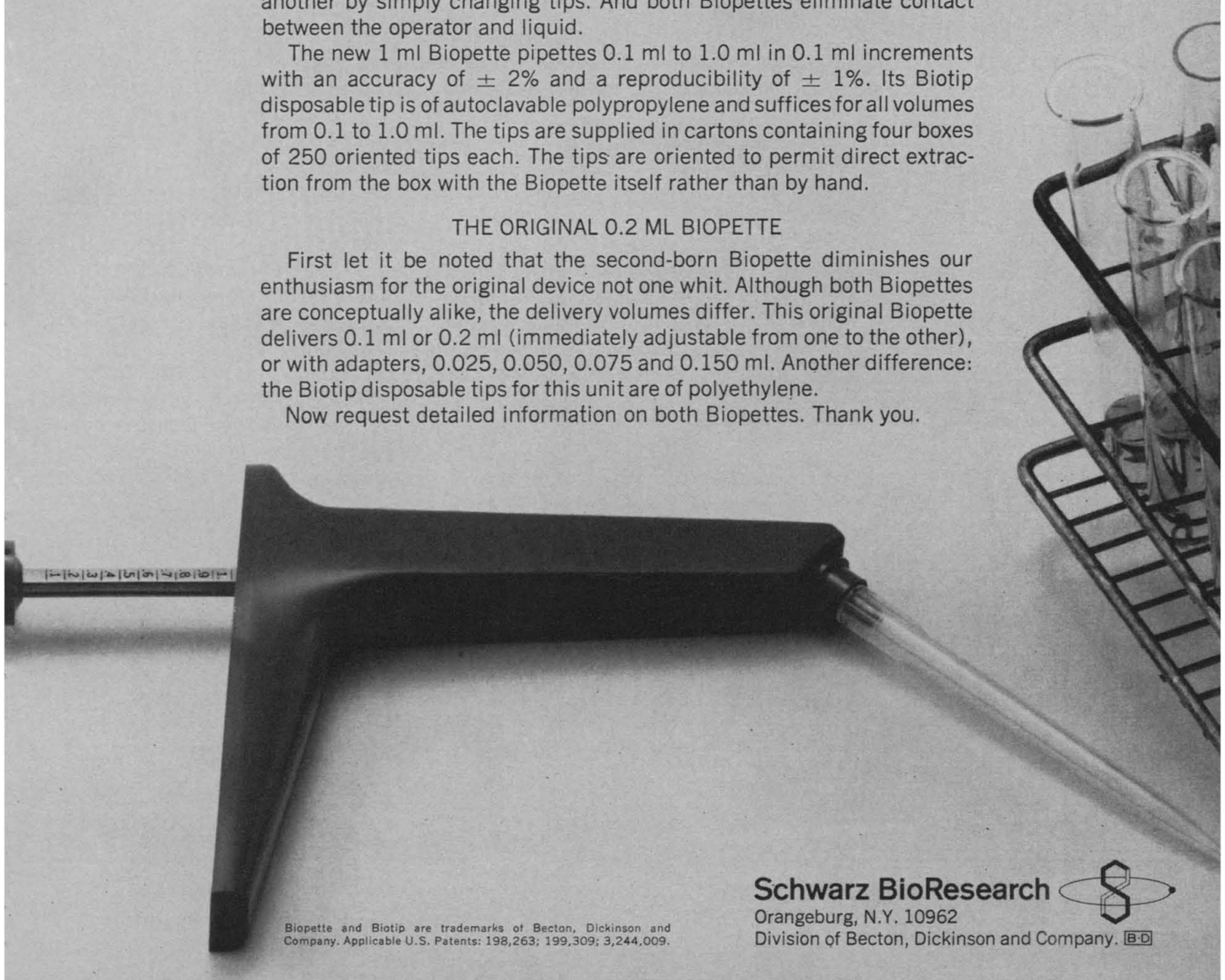
And lest you have forgotten these advantages: Biopettes (both of them) make repetitive pipetting fast, simple, and accurate. Both Biopettes avoid the problems of contamination and washing because the measured aliquot is held in the disposable plastic tip and doesn't enter the unit itself. Both Biopettes permit rapid switching from one liquid to another by simply changing tips. And both Biopettes eliminate contact between the operator and liquid.

The new 1 ml Biopette pipettes 0.1 ml to 1.0 ml in 0.1 ml increments with an accuracy of ± 2% and a reproducibility of ± 1%. Its Biotip disposable tip is of autoclavable polypropylene and suffices for all volumes from 0.1 to 1.0 ml. The tips are supplied in cartons containing four boxes of 250 oriented tips each. The tips are oriented to permit direct extraction from the box with the Biopette itself rather than by hand.

THE ORIGINAL 0.2 ML BIOPETTE

First let it be noted that the second-born Biopette diminishes our enthusiasm for the original device not one whit. Although both Biopettes are conceptually alike, the delivery volumes differ. This original Biopette delivers 0.1 ml or 0.2 ml (immediately adjustable from one to the other), or with adapters, 0.025, 0.050, 0.075 and 0.150 ml. Another difference: the Biotip disposable tips for this unit are of polyethylene.

Now request detailed information on both Biopettes. Thank you.

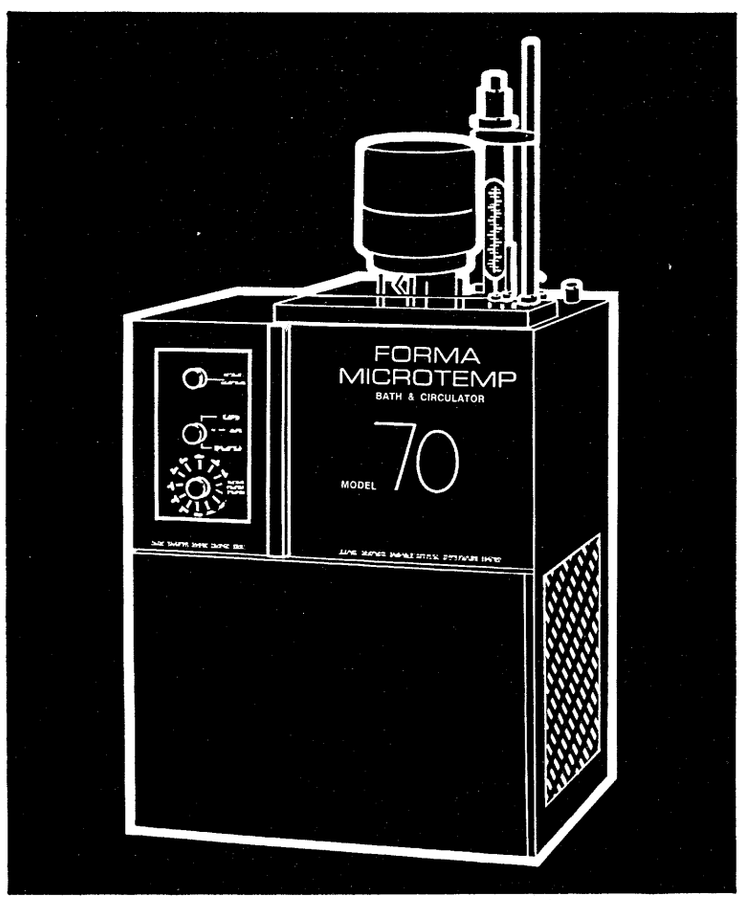


Schwarz BioResearch
Orangeburg, N.Y. 10962
Division of Becton, Dickinson and Company. B·D

Introducing The Magnificent Midget

It's one-half the size of other compact refrigerated baths, yet it holds three times more.

The new MICROTEMP 70 bath and circulator consumes less than one square foot of bench space, yet has a bath capacity of 1.5 gallons. Constructed of quality stainless steel, The Magnificent Midget combines all the features of our refrigerated and heated baths. And it only costs $525.



MICROTEMP 70 has a temperature range from −10° to 70° C (with a control of better than ±0.02°C). The 13" x 11" x 18" bath also features a solid state electronic control circuit with no relays. And a control thermometer enables direct reading of bath temperature.

Get the complete story on MICROTEMP 70, The Magnificent Midget. Or any other equipment for the life scientist and chemist. Just write Forma Scientific, Inc., Box 649, Marietta, Ohio 45750.

Forma Scientific

To handle the unglamorous chore of pipet cleaning, more* labs use Nalgene pipet cleaning equipment than any other brand.

The Nalgene Pipet washer-rinser has a one-piece design with "over-the-top" water inlet that eliminates pipet cleaning problems. No back-siphoning, no siphon stall, no splash, no leakage, no tinkering to get things started. Operates with water input from 1½ to 12 liters per minute, provides different cycling speeds for washing, soaking, or rinsing. Also, Nalgene pipet baskets with recessed screens for complete drainage, and pipet jars.

Like all Nalgene Labware, this equipment is unbreakable, easy to handle and clean. When you specify Nalgene Labware, 20 years leadership says you're right.

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Order from your Lab Supply Dealer. Ask him for our Catalog or write Dept. 8511,

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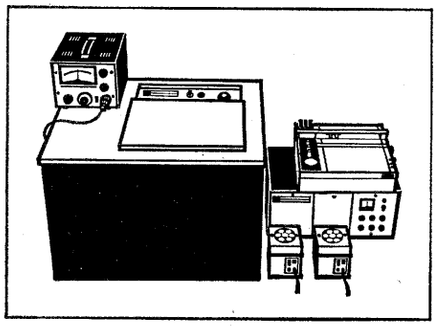
capable of a precision
of 0.05% for large heat quantities
and better than 1% if 1.10^{-3} cal. is evolved.



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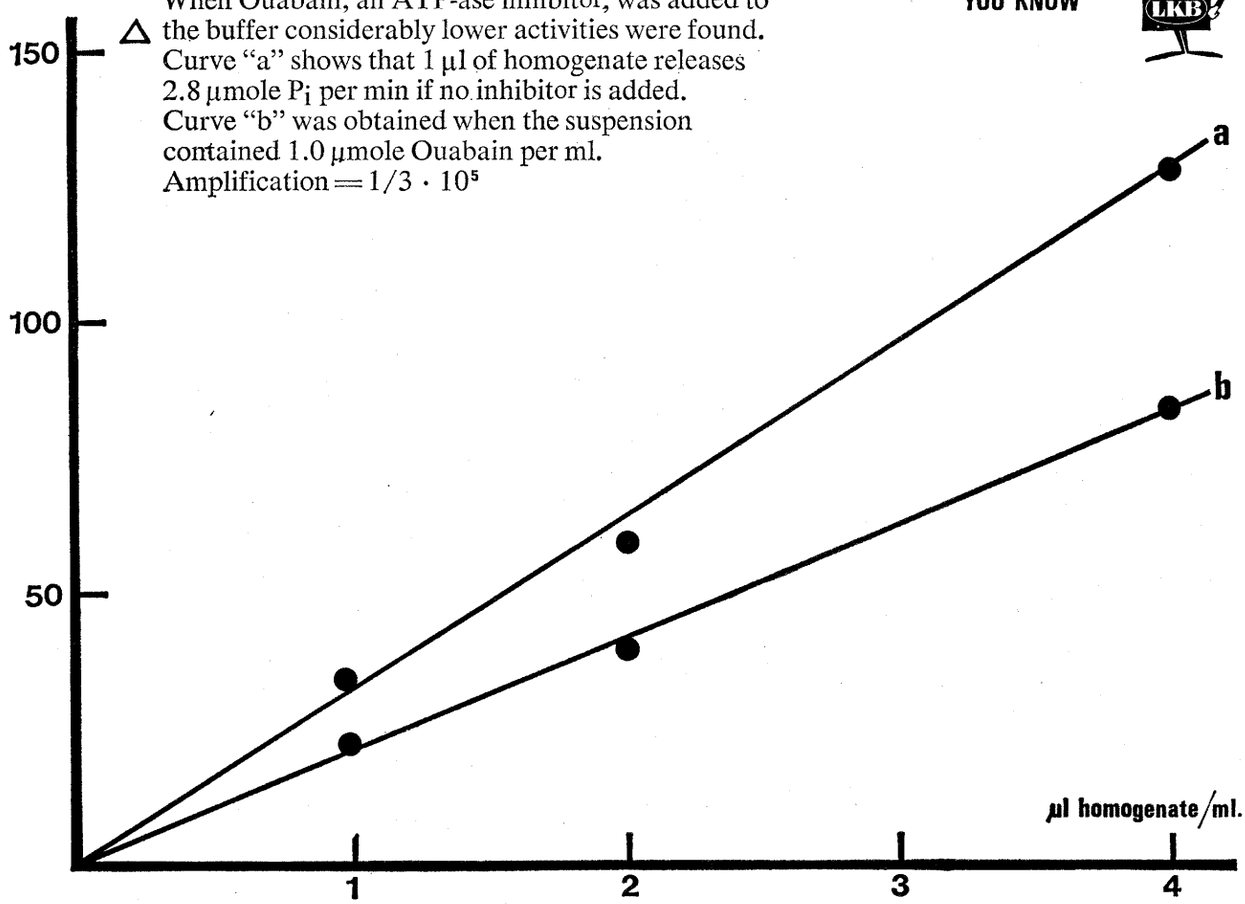
Microcalorimetry for the Biochemist

An Application that shows the unique possibilities that exist for physicists, biologists, physical chemists and biochemists to use biochemical calorimetry. Determination of ATP-ase activity in a tissue homogenate. Prepared from rat Kidney cortex, the homogenate, in suspension in an imidazole buffer containing excess ATP, was circulated through the calorimeter. Steady state values were obtained and the plot of calorimetric response values, △, versus amount of homogenate formed a linear relationship. When Ouabain, an ATP-ase inhibitor, was added to the buffer considerably lower activities were found. Curve "a" shows that 1 µl of homogenate releases 2.8 µmole P_i per min if no inhibitor is added. Curve "b" was obtained when the suspension contained 1.0 µmole Ouabain per ml. Amplification = $1/3 \cdot 10^5$

BOTH BATCH AND FLOW
YOU KNOW



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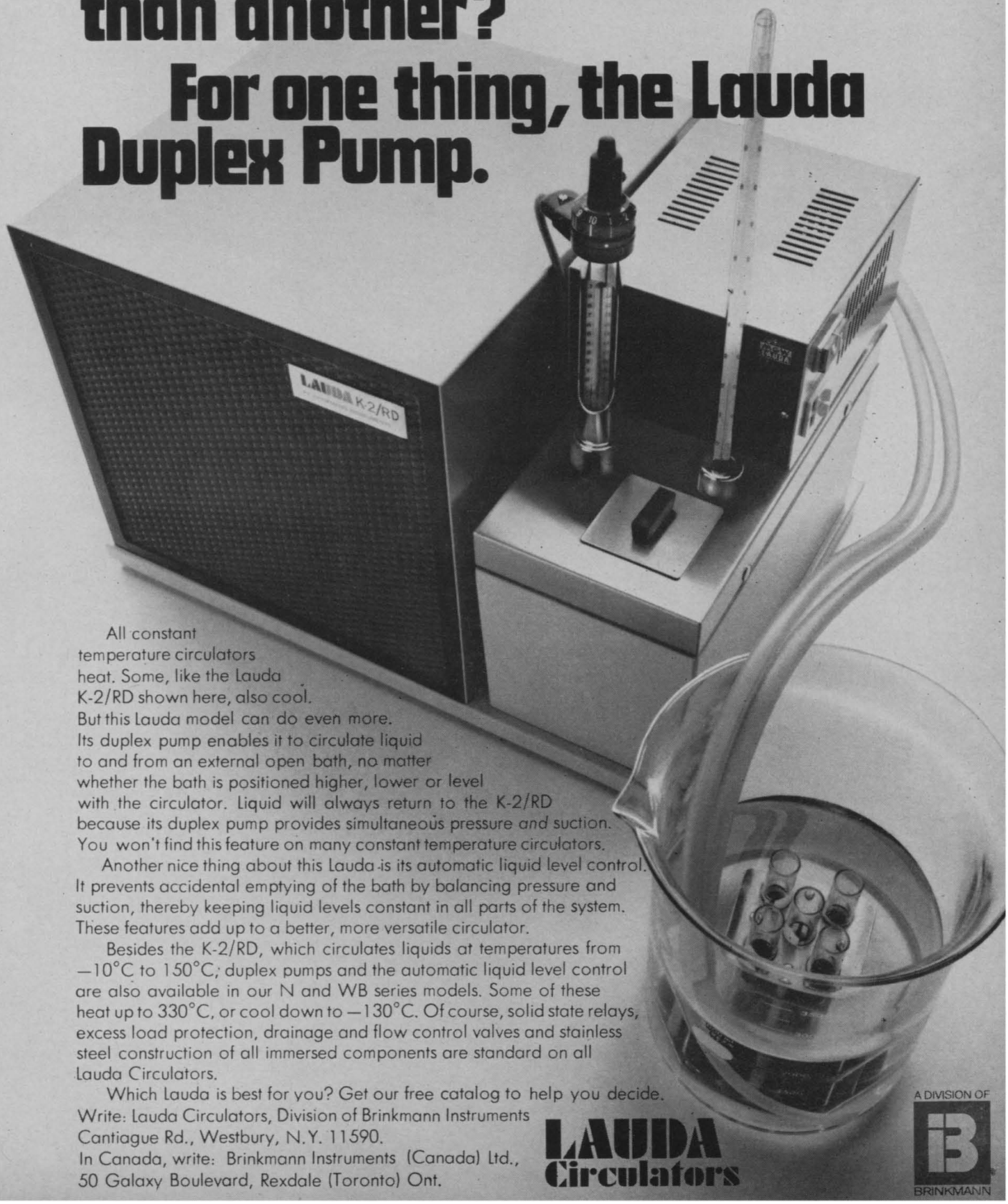
What makes one constant temperature circulator better than another?

For one thing, the Lauda Duplex Pump.



All constant temperature circulators heat. Some, like the Lauda K-2/RD shown here, also cool. But this Lauda model can do even more. Its duplex pump enables it to circulate liquid to and from an external open bath, no matter whether the bath is positioned higher, lower or level with the circulator. Liquid will always return to the K-2/RD because its duplex pump provides simultaneous pressure *and* suction. You won't find this feature on many constant temperature circulators.

Another nice thing about this Lauda is its automatic liquid level control. It prevents accidental emptying of the bath by balancing pressure and suction, thereby keeping liquid levels constant in all parts of the system. These features add up to a better, more versatile circulator.

Besides the K-2/RD, which circulates liquids at temperatures from −10°C to 150°C, duplex pumps and the automatic liquid level control are also available in our N and WB series models. Some of these heat up to 330°C, or cool down to −130°C. Of course, solid state relays, excess load protection, drainage and flow control valves and stainless steel construction of all immersed components are standard on all Lauda Circulators.

Which Lauda is best for you? Get our free catalog to help you decide.
Write: Lauda Circulators, Division of Brinkmann Instruments
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LAUDA Circulators

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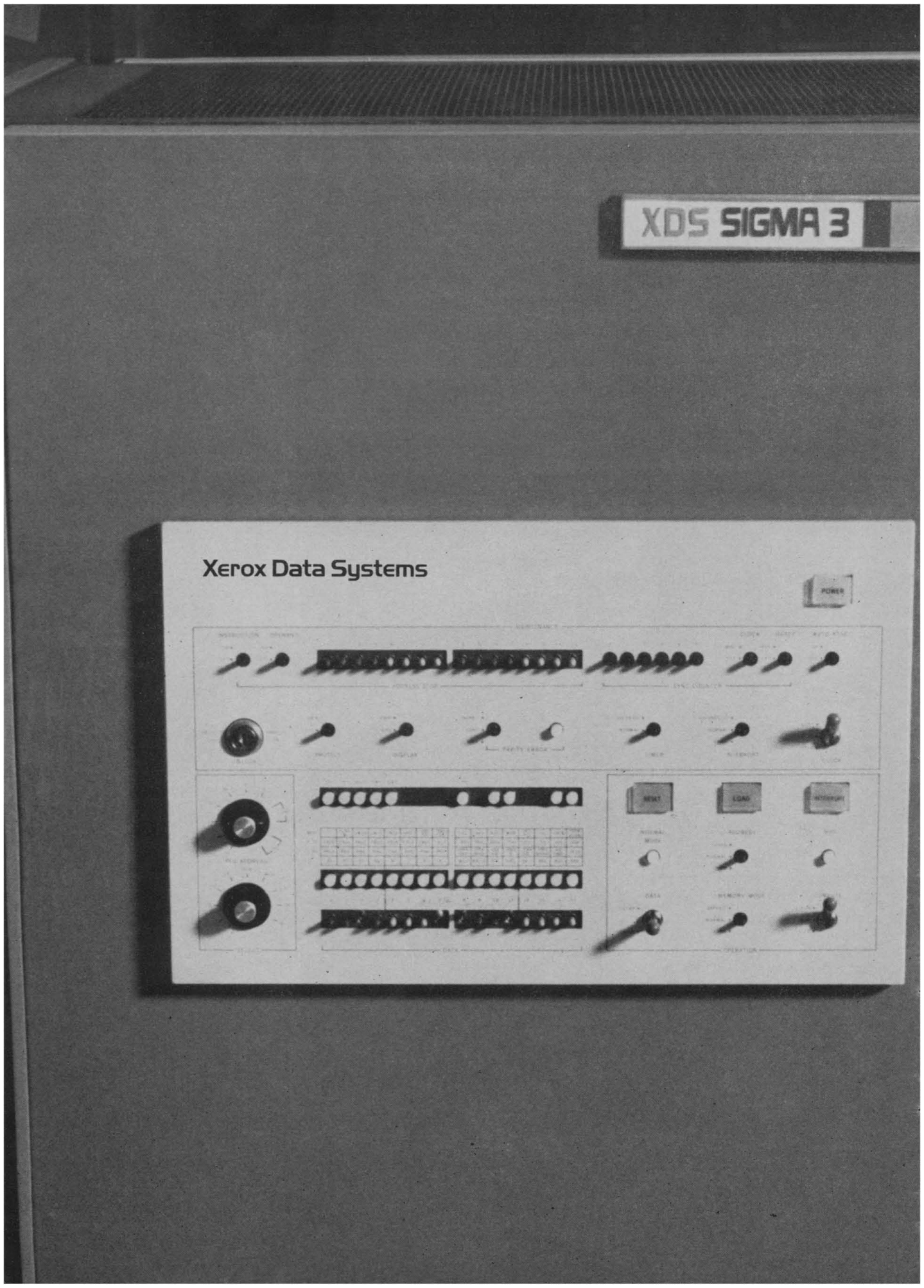
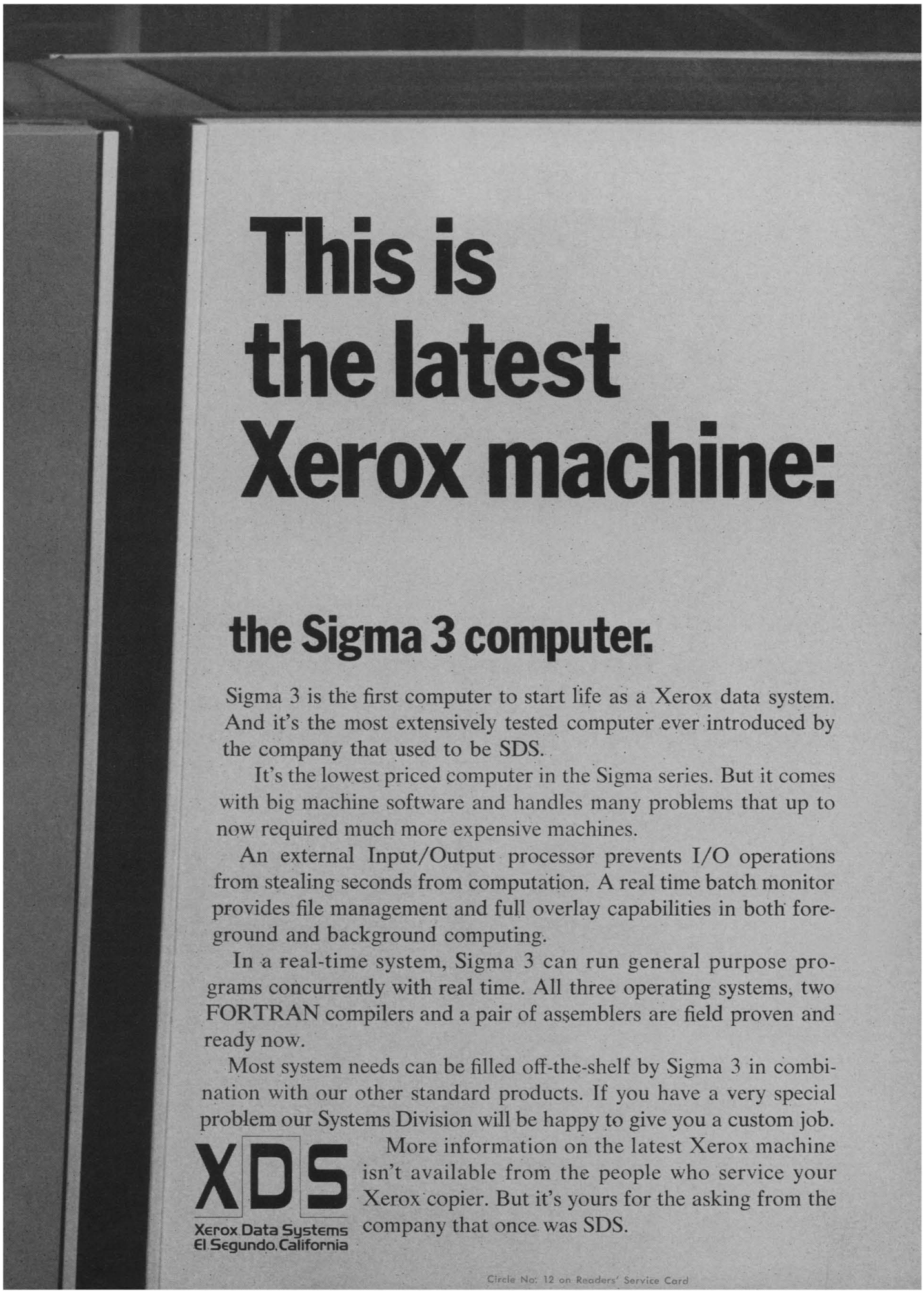

XDS SIGMA 3
Xerox Data Systems


This is
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Xerox machine:
the Sigma 3 computer.
Sigma 3 is the first computer to start life as a Xerox data system. And it's the most extensively tested computer ever introduced by the company that used to be SDS.
It's the lowest priced computer in the Sigma series. But it comes with big machine software and handles many problems that up to now required much more expensive machines.
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Most system needs can be filled off-the-shelf by Sigma 3 in combination with our other standard products. If you have a very special problem our Systems Division will be happy to give you a custom job.
XDS
Xerox Data Systems
El Segundo, California
More information on the latest Xerox machine isn't available from the people who service your Xerox copier. But it's yours for the asking from the company that once was SDS.
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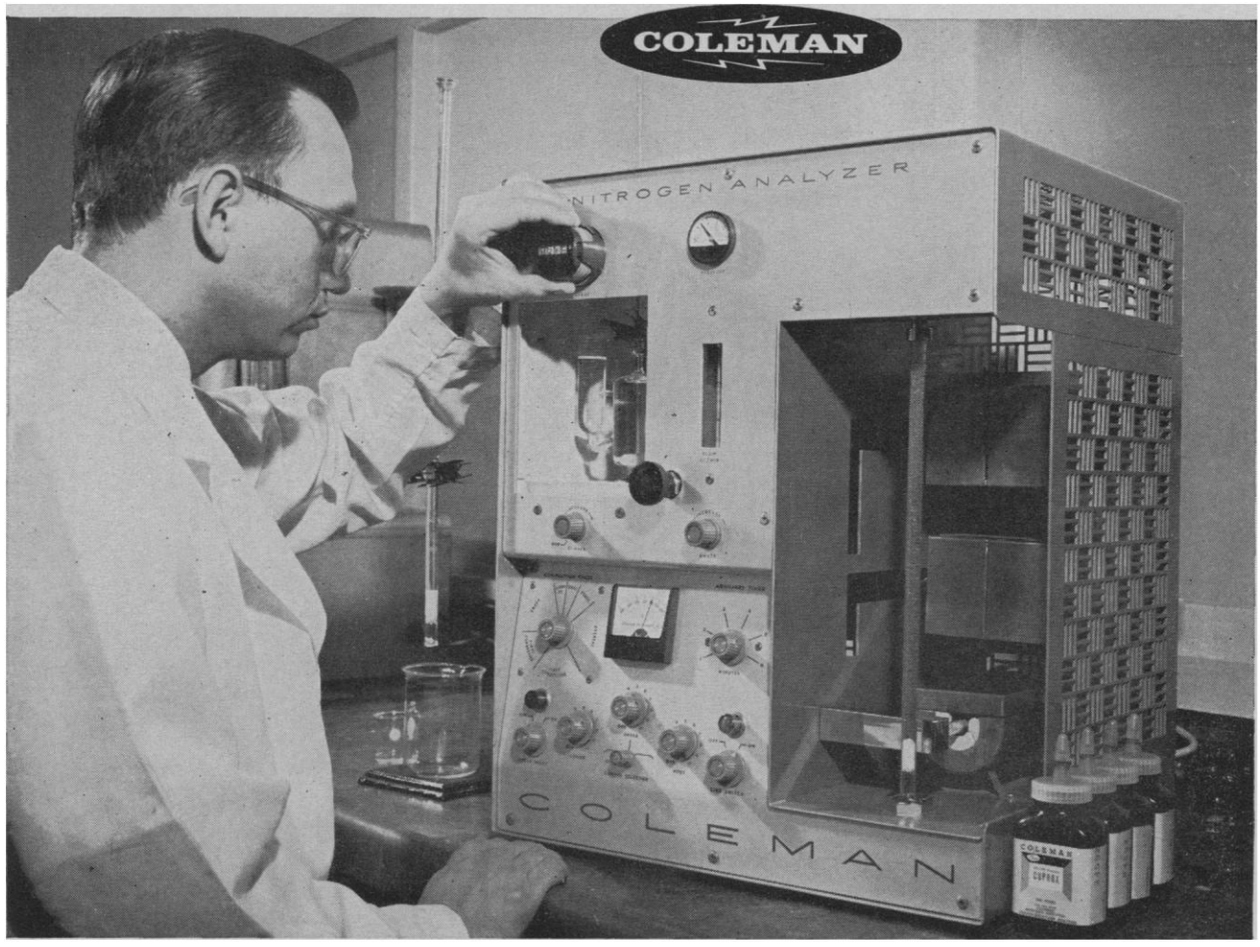

Scope of Coleman Nitrogen Analyzer extended to 20 ppm in trace studies by Chevron Research Company*

**Chevron Research Company is the research arm of Standard Oil of California. Results of the work are reported in trade journal articles. Reprints and product literature are available from Coleman Instruments.*

With the Coleman Model 29 Nitrogen Analyzer, trace quantities of nitrogen in lubricating oils and additives are determined at Chevron Research and in an increasing number of the Chevron Chemical Company** (Oronite) customers' laboratories. With only slight procedure modifications, the instrument is being used with samples containing as little as 0.2% nitrogen.

At lower nitrogen levels—down as far as 20 ppm—a specially-developed concentration technique provides adsorption of the nitrogen compounds on alumina. The trace analyses are then made on this nitrogen-bearing absorbent.

Expanded use of nitrogen-containing additives in lubricating oils brought increased interest in nitrogen determination, a convenient method for correct preparation of additives and for proper product blending.

Prior to the use of the Coleman Nitrogen Analyzer in this application, Chevron Research employed alternate methods which left much to be desired from standpoints of speed, convenience and economy.

** Chemical marketing company of Standard Oil Company of California.

With sample materials from rose petals to natural fertilizers, from industrial compounds to biological fluids, the unit is proving its versatility in laboratories throughout the world. It is equally valuable in process control and in research, in both the physical and life sciences.

If your work involves any aspect of nitrogen determination, investigate the Coleman Nitrogen Analyzer. Send for Bulletin S-291.

CONDENSED SPECIFICATIONS:	
Sample Size	Normally 5 to 50 mg; 1 to 500 mg or more, depending upon nitrogen content of sample.
Speed	Normal operating cycle is 8 minutes; automatically extendable by delay circuit.
Accuracy	Within 0.2% nitrogen at routine levels.
Range	Accepts any sample that combusts at temperatures up to 1000°C.

Write to Coleman Instruments Division,
The Perkin-Elmer Corporation,
42 Madison St., Maywood, Illinois 60153

PERKIN-ELMER

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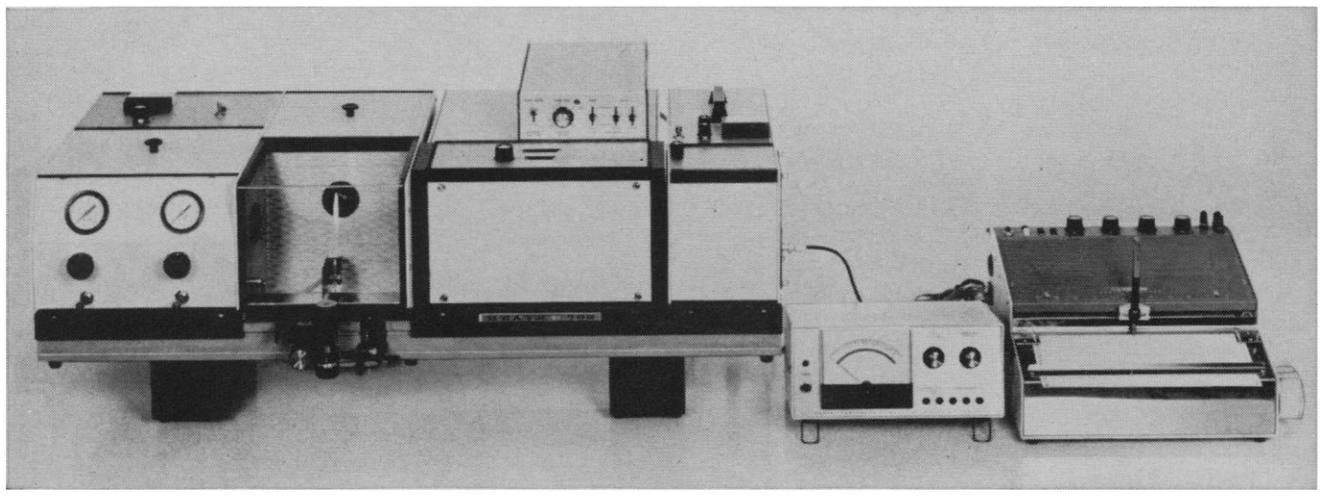
atomic absorption
atomic fluorescence
atomic flame emission

$2998*



The New Heath "703" Spectrophotometer Does All Three And More At Lowest Cost

A Versatile High Performance Spectrophotometer . . . ideal for use in research in the instrumental laboratory or for routine analyses. The new Heath "703" System is a departure from classical spectrophotometer design. Each component module has many versatile features that permit easy application to new problems; the monochromator, PM and readout modules can be removed in minutes and used in many other types of spectrophotometers for research or teaching applications; the design is readily adaptable to computer control; the flame module is directly applicable for atomic absorption, flame emission and atomic fluorescence methods. All of these and many more features make the Heath EU-703 by far the best buy in AA-AE-AF spectrophotometers.

EU-700 Monochromator . . . the widely accepted Heath "700" monochromator provides the very high resolution, wavelength accuracy, low scattered light, and versatile wavelength drive that make it ideal as the wavelength isolation device for atomic absorption, emission and fluorescence spectrophotometry. The wavelength scan is by a stepper motor that is adaptable to computer control. Fixed scan rates vary from 0.05 to 20 angstroms/sec. The scan rate is also programmable by an external signal generator.

EU-703-70 Flame Module. Mounted on the front panel of the Flame Module are the needle valves, gauges & controls for the burner system and quick shutoff controls for both fuel and oxidant. A total consumption burner is standard but the large flame compartment will accommodate virtually all types of total consumption and laminar flow burners with the brackets supplied. A precision micrometer adjustment system provides accurate and repeatable X-Y, Y-Z positioning of the flame for optimum performance. Four hollow-cathode lamps can be mounted in the precision rotating turret, and other lamps easily interchange. The hollow-cathode power supply provides optical stability to 0.1% and is designed to handle all high-intensity lamps and most multi-element types. A chopper is built-in for discrimination against background radiation.

EU-701-30 PM Module. One compartment in this module contains a very stable, programmable power supply with output adjustable from 150-1500 volts. The other compartment contains a highly sensitive 1P28A PM tube and shutter assembly. Other photomultiplier tubes can be interchanged for the 1P28A because of the versatile PM tube mounting system used.

EU-703-31 Photometric Readout Module . . . a versatile new instrument applicable to all types of spectrophotometry where photomultipliers, phototubes or other photon-to-current transducers are used. Front panel pushbuttons select the output to be linear in Absorbance in 0-1, 0-2 or 1-2 spans, or 0-100% Transmittance for direct analog readout on a 6" taut-band meter. The Readout Module can be used with either chopped or unchopped input current signals and can function as a current-to-voltage interface between the PM Module and a recorder or DVM such as Heath EU-20 Series chart recorders or the EU-805A DVM. Output accuracy to recorder or DVM terminals is 0.25%.

EU-20V Multi-Speed Chart Recorder features 21 electronically-accurate, switch-selected chart speeds from 12 inches/minute to 1/2 inch/hour. Five input sensitivity ranges—10, 25, 50, 100 and 250 mV full scale, with true potentiometric null-point balance on all ranges. Accuracy better than 1%, with 0.2% or better repeatability. Response is 0.1 second per inch. An auxiliary input to the chart drive circuitry allows electronic synchronization of recorder time base with external events.

The 703-A system is less readout; the 703-B system includes the Photometric Readout Module; the 703-D system includes the Photometric Readout Module and 21-Speed Chart Recorder.

Versatile high performance spectrophotometers don't have to be expensive. Write us for a copy of the Heath Scientific Instrumentation Catalog for complete specifications.

EU-703-A System	**$2736.***
EU-703-B System	**$2998.***
EU-703-D System	**$3278.***

Discrete Modules . . .

EU-700, Monochromator	**$1195.***
EU-703-70, AA-AE-AF Flame Module	**$1145.***
EU-701-30, PM Module	**$ 350.***
EU-703-02, Base, provides accurate references for setting up the complete "703" System with precise optical alignment	**$ 190.***
EU-703-31, Photometric Readout Module	**$ 275.***
EU-20V, 21-Speed Chart Recorder	**$ 295.***

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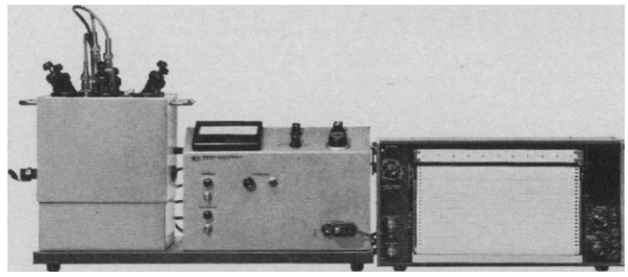

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...and do away with stopwatches, bridge-balancing and note-taking

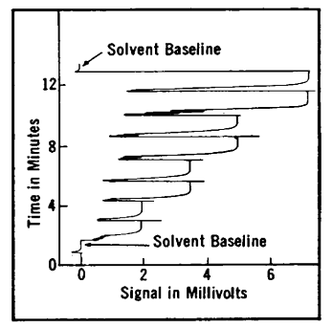
The unique recorder capability of our Model 302B Vapor Pressure Osmometer allows you to get a continuous and permanent record of your $\overline{M}_n$ determinations . . . automatically.

No longer do you have to stand over the VPO with stopwatch in hand while balancing the bridge and noting the instrument reading: the recorder does it all for you. The chart record of a four-dilution concentration series reproduced below illustrates the advantages. First, you can recognize the equilibrium point clearly from the shape of the recorder trace . . . hence there's no need for a stopwatch. Second, you can read the output signal at equilibrium directly from the chart . . . a much easier procedure than the manual bridge balancing method. Third, the chart gives you a permanent and accurate record of the sample measurement . . . thus eliminating the note-taking chore.

Perhaps the most significant advantage of the 302B recorder capability is the way that it makes the entire measurement process visible, discloses washing errors and generally acquaints you with the instrument characteristics, leading to more effective utilization.

For a full description of the second-generation 302B VPO, write for Data Sheet 3021 or call your local HP sales office. Prices start at $2990.

Hewlett-Packard, Route 41, Avondale, Pennsylvania 19311. In Europe: 1217 Meyrin-Geneva, Switzerland.



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43909

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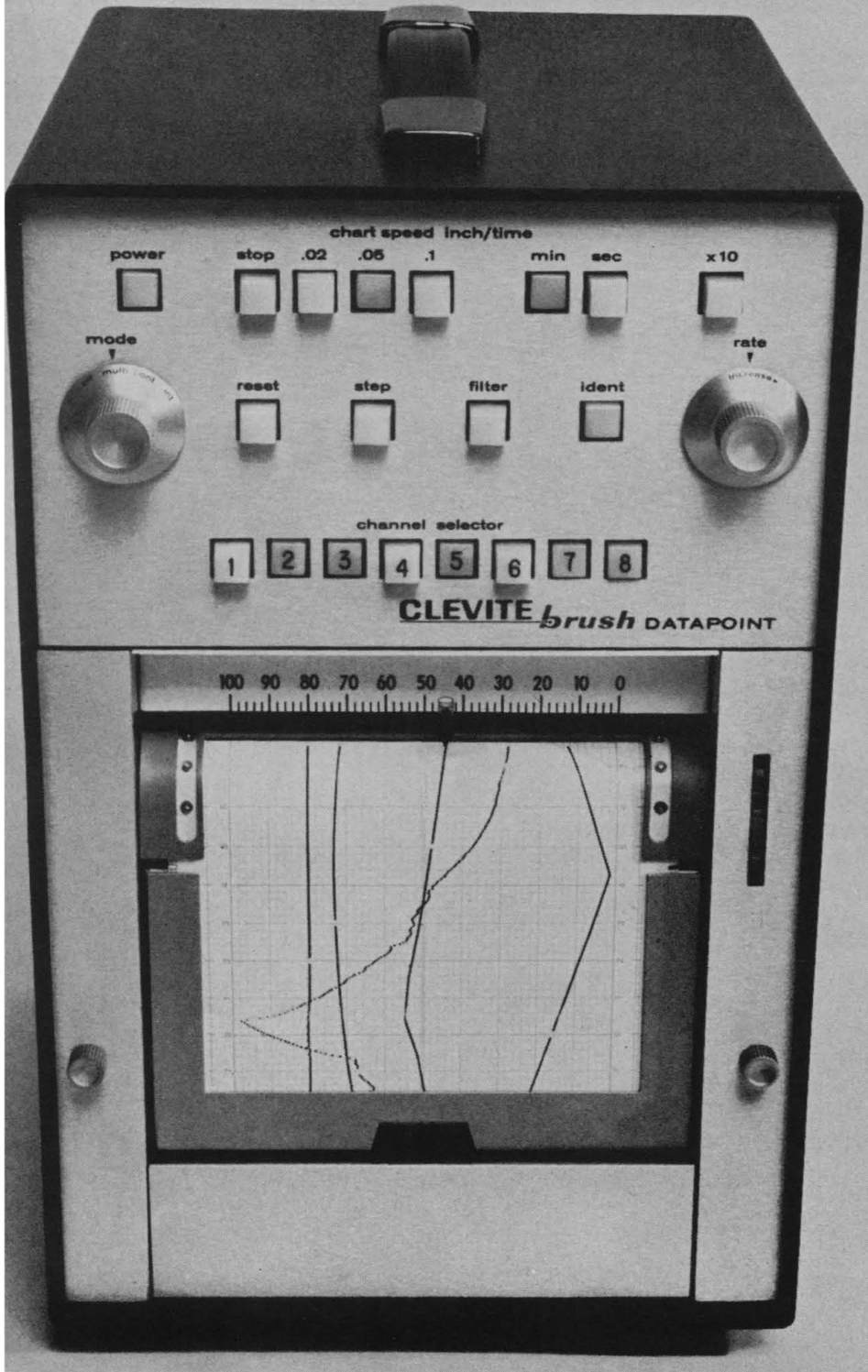


This new high-speed multipoint recorder by Brush runs off as many as 20 samples per second on 2 to 8 patients. So it's great for monitoring fast-changing variables in systemic and wound temperature, heart rate, ECG and the like.

Datapoint handles mixed inputs from high and low level inputs. All on one chart. Recordings come out clear, crisp, uncluttered. And Z-folded. You've got a choice of 12 chart speeds, pushbutton controlled.

About that versatility. Datapoint works in three modes: multipoint sampling, intensified sampling, for channels of high dynamic content, or continuous single channel recording. So you get much more than just a fast multipoint recorder. Without paying more to get it.

And Datapoint is accurate, too. A full 99.5%, enforced by a non-contact position-feedback system. It's a first in this type of recorder. (But a proven success in countless Brush direct writing oscillographs.)

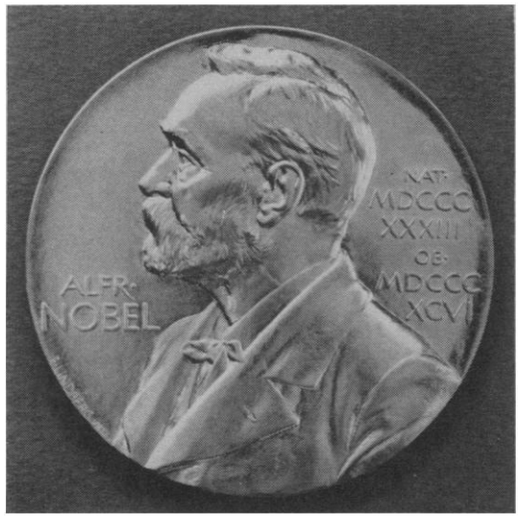
Speed. Versatility. Accuracy. These make Datapoint a new concept in recording. There's never been anything like it. You'll find more proof in the Datapoint brochure. Send for your copy today. Brush Instruments Division, Gould Inc., 3631 Perkins Avenue, Cleveland, Ohio 44114.

GOULD BRUSH

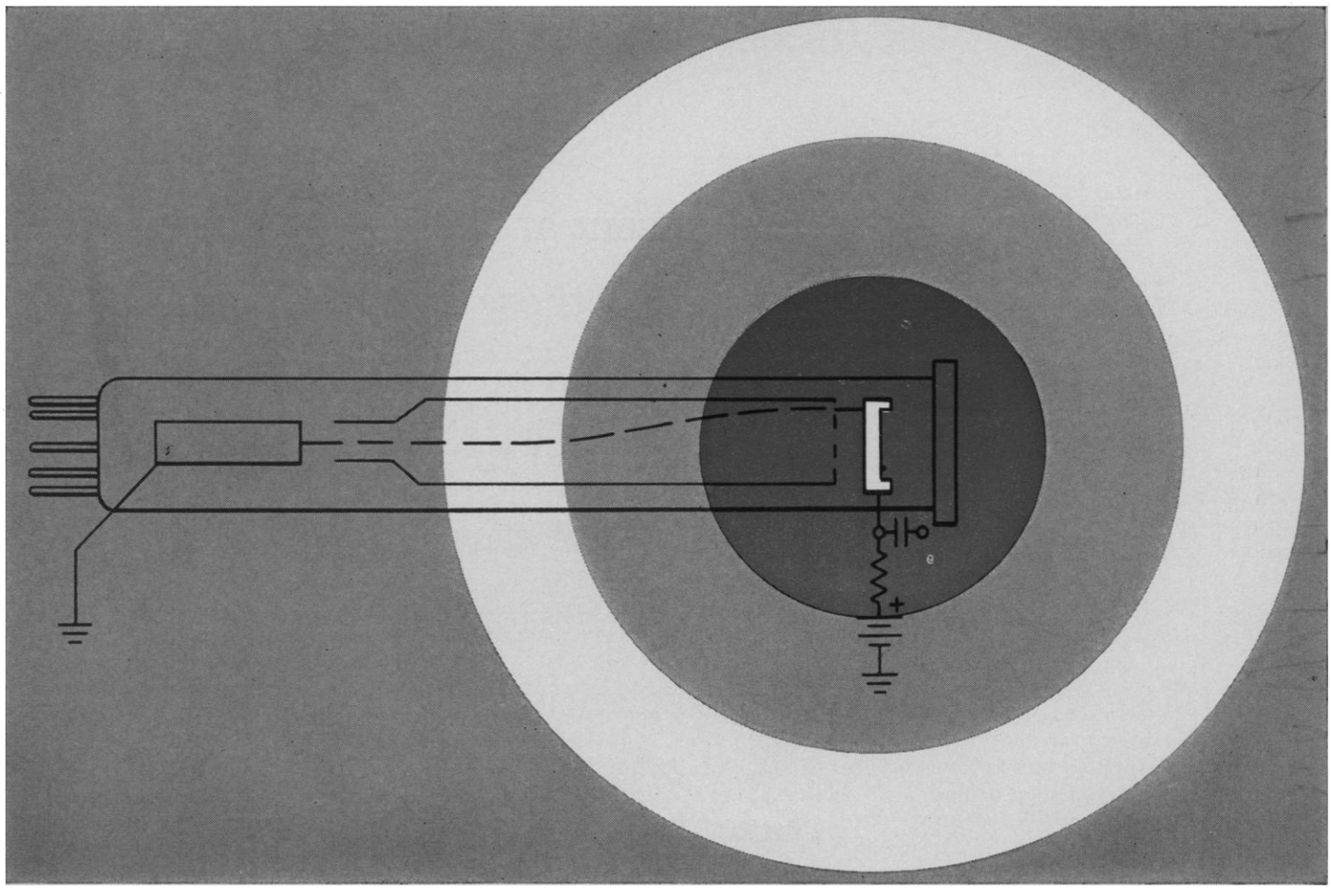
From *The Nation,* October 20, 1969

"... the present and forthcoming realities —whether those of an over-populated world or of a humanity that can remake itself in whatever image it chooses—are stirring and disturbing the imaginations of more and more scientists.

... Scientists must assume the responsibility to tell society, in a forceful and persistent manner, what the technological consequences are likely to be."



Salvador E. Luria
Co-recipient of the 1969
Nobel Prize in Physiology/
Medicine



A solid state target in a camera tube

Bell System PICTUREPHONE® service will need small, reliable TV camera tubes for use in offices and homes, where lighting ranges from dim to very bright. Conventional vidicon tubes are unsuitable, so Bell Labs developed a new kind.

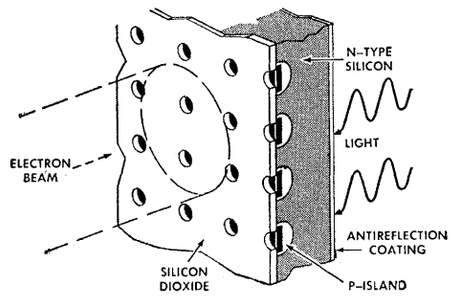
The heart of the new tube is a light-sensitive target containing nearly 700,000 silicon photodiodes in an area less than a half inch square. They are made by diffusing boron, a p-type impurity, through a silicon-dioxide mask into n-type silicon.

A scanning electron beam charges the p material negatively, reverse-biasing the diodes. Holes, created by incident light, are collected by the electric field at the p-n junctions, and individual diodes discharge by an amount proportional to the local light intensity. Recharging of the diodes by the scanning electron beam produces a varying current . . . the output signal.

Among the tube's advantages:

Its target tolerates high-temperature baking . . . a processing step to improve reliability. Conventional vidicon targets cannot stand this.

Silicon's high thermal conductivity and chemical stability help make the new tube immune to "burn-in" (degradation of performance from continuous exposure to a fixed image, very bright light, or a strong scanning electron beam).



The time between a change in target illumination and a like change in output is much shorter with the new target. This improves response to fast-changing scenes.

The light-sensitive face of the new target is optically flat. So, a multilayer antireflection coating can be applied for better sensitivity and minimum received-picture "halo".

Silicon targets have relatively uniform response through the visible and near-infrared—from 4,000 to 9,000 A. Quantum efficiency (electrons per photon) exceeds 0.5. So, these targets have at least 10 times the sensitivity of a standard vidicon camera tube in incandescent light.

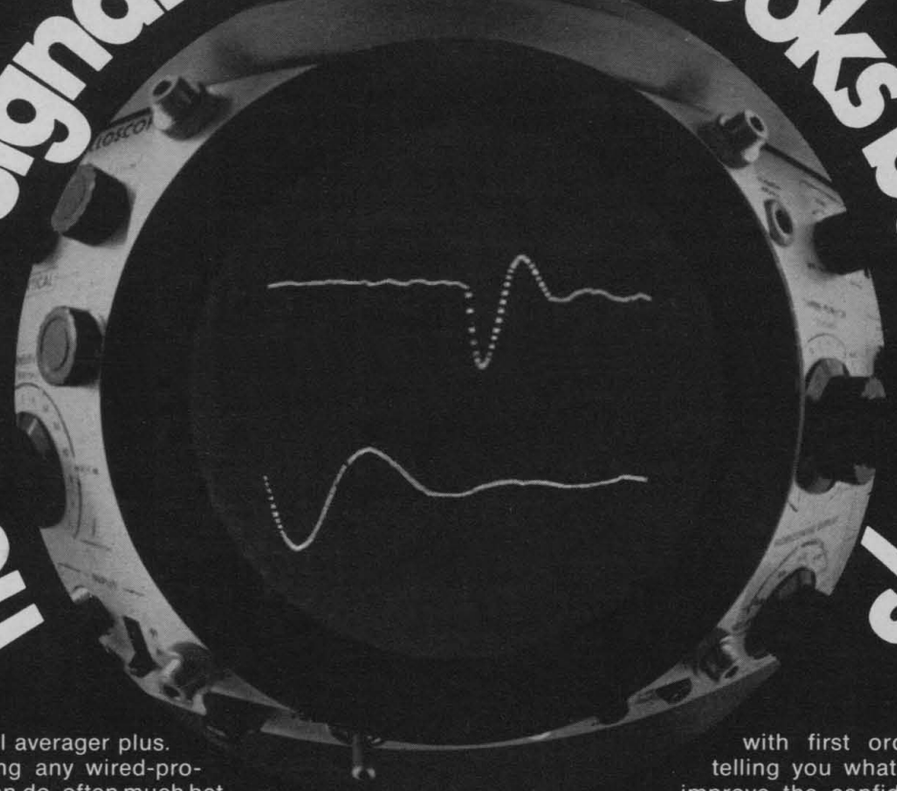
This new camera tube is in the latest model PICTUREPHONE set, now undergoing field trials.

From the Research and Development Unit of the Bell System—

Bell Labs

Circle No. 19 on Readers' Service Card

no other signal averager looks both ways



LAB-8 is a signal averager plus. It does everything any wired-program averager can do, often much better. Plus pre-sync averaging, contingency sorting, blowups of parts of curves, displays of 95% confidence limits, displays of first order trends, and a few other useful things.

Take pre-sync averaging, for example. If you want to collect and display an epoch *before* a sync pulse arrives, LAB-8 will digitize the incoming signal and store it in a temporary buffer. When the sync pulse arrives, there it is—on the oscilloscope. The most recent complete epoch prior to the sync.

LAB-8 can do this because it has a computer buried inside—the most popular small computer ever made: PDP-8. You may never want to use it as the full general purpose computer that it is. But it gives the LAB-8 features that no other signal averager has.

LAB-8 can sample channels at two different rates, permitting simultaneous EMG and EEG studies. Blowups of particular areas of interest, without affecting the averaging process or display, also result from the ability to sample—at different rates. LAB-8 permits sorting of data contingent on some external event. LAB-8 displays averaged signals along with 95% confidence limits, along with first order trend curves, telling you what must be done to improve the confidence in the data.

Yet LAB-8 costs approximately as much as a conventional averager. The basic price includes everything you need to get the job done better. And it is ready to run the day it comes into the laboratory. Write for a complete brochure.

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work against, instead of with, the ecological dynamics of the vegetation. Working contrary to the ecosystem is always expensive and difficult, especially so with chaparral species because they are adapted to an environment that is submarginal or detrimental for most species. Furthermore, chaparral is a fire type and the plants sprout or have seed that can survive in the soil for many years.

Fire records in southern California show that all the mountainous chaparral-covered land is burned periodically. The fires may be caused by man or nature and even the best protected areas are not immune to destruction. In 1960 the 17,000-acre San Dimas Experimental Forest, almost pure chaparral, and used for watershed research, was swept by fire even though the forest was closed to the public, had a network of roads, and several fire fighting units located on its perimeter. The fires started by lightning and consumed 12,000 acres of brush the first day and 15,000 by the end of the week.

To prevent such extensive and hazardous forest fires which occur especially in southern California, I suggest that more effort be expended at working with, instead of against, the ecological characteristics of the vegetation. The brush on the San Dimas area is now 9 years old. This is an ideal area to test a controlled burning program as prevention against a major fire in the future. The watersheds have contour trails at 500-foot elevation intervals, and in some areas after the 1960 fire trenches were established at 40- to 90-foot elevation intervals. I propose that each year a band of vegetation on the slopes be burned starting at the tops of the ridges and mountains. In this way the burn of the previous year would act as a fire break for the present year's burn. Since the elevation difference between the top and bottom of the forest is approximately 4000 feet, it would take 8 years to burn the entire area using 500-foot elevation strips. At that time the natural vegetation would be dense enough to start the process again. If at any time during the process a fire is started at the higher elevations it would be prevented from spreading downward by the burned zones below. Fire starting low on the slopes would stop at the previously burned area and would not generate sufficient heat to cross ridges and jump canyons.

Although this controlled burning would involve the risk of some flooding in heavy rain years, it couldn't be as severe as what happened this past winter below whole mountain slopes which had been denuded by fire. Furthermore, the vegetation below and above the burned strip would serve to some extent as a barrier to erosion and flooding.

HENRY HELLMERS
Department of Botany,
Duke University,
Durham, North Carolina 27706

XYY Chromosome: Medical and Legal Aspects

Kennedy McWhirter's discussion of the XYY chromosome and criminal acts (Letters, 6 June) and comments on that discussion by C. B. Goodhart (Letters, 5 Sept.) point up a basic weakness in society's approach to the control of antisocial or criminal behavior. . . .

McWhirter rightly emphasizes that restraints placed upon individuals must be minimal, and that their purpose must be protection, not retribution. But this principle really should apply no matter what the nature or cause of the behavior that society (or the individual himself) is being protected against.

Behavior is generally believed to be determined by a complex of relatively unalterable genetic factors, more easily alterable effects of previous environment, and freely chosen values and objectives. Current judicial processes presuppose that malefactors with congenital defects, those with temporary mental aberrations, and those that have freely chosen to do wrong can be clearly and readily differentiated; that the legal rights of the individual vis-à-vis those of society, and the legal processes required to adjudicate those rights, differ for these different classes of malefactors (and with the age of the malefactor); and finally, that appropriate, different processes are known and available for rehabilitating malefactors of each class.

However, information currently available offers little assurance that the various factors affecting human behavior are sufficiently well understood to permit reliable diagnosis and effective treatment. . . . For example, it seems likely that when reliable diagnostic procedures are available, they will reveal that most malefactors suffer from combinations of all three general types of defects, and hence will require the same basic kind of treatment in the same basic kind of facility for effective rehabilitation. It also seems likely that

← Circle No. 8 on Readers' Service Card

such a facility and its staff would resemble those of present-day medical and educational institutions rather more than those of present-day penal institutions.

The judicial procedure may also turn out to be the same for malefactors of all classes and ages and much like that now used for those judged to be criminally insane. That is, it may concentrate on evaluating the threat to society and determining the minimum amount and duration of restraint necessary to protect society against that threat. Society and the individual would probably be represented by prosecuting and defending attorneys and experts in order to ensure the fullest possible presentation of relevant facts and principles; however, since the objectives would be protection and rehabilitation rather than retribution, the introduction of evidence of specific criminal acts would be primarily for the purpose of determining the threat to society rather than the treatment of the malefactor. Appropriate consideration would be given both to society's right of self-defense and to the "every dog may have his bite" principle. . . .

P. ROGER GILLETTE
Operations Analysis Division,
Stanford Research Institute,
Arlington, Virginia 22209

Although the majority of recent letters on the XYY complement primarily discussed the legal implications connected with this chromosomal anomaly, Kessler and Moos (1 Aug.) referred to pathophysiological associations found with this karyotype. Our findings from research projects covering cytogenetic studies on either sociopaths or diseases related to myotonic dystrophy—which, incidentally, is the only disease which can be sometimes associated with an extra Y chromosome—tend to agree with the views expressed by Kessler and Moos.

The initial concept of the XYY syndrome included the well-known features of tallness, aggressiveness, and genital abnormalities. Now, however, attention is being given to many pathological features which are not consistently associated with an XYY karyotype. In some cases these features are found in other genetic syndromes; in other cases the clinical signs are symptomatically related to diseases of an orthopedic or neurological nature. The number of reports on single cases is still insufficient to detect a consistent clinical sign or dermatoglyphic pattern which could be

used to identify members of the general population by a cytogenetic means.

We believe that more meaningful findings of physical defects will be obtained when extensive cytogenetic studies are performed on a large sampling of patients who possess those pathological features which are already recognized in XYY individuals.

WOLFGANG LEHRNBECHER
GEORGE J. LUCAS
Cytogenetics Unit, Department of Health, Education, and Welfare, St. Elizabeths Hospital, Washington, D.C. 20032

Are, Not Acre

According to my Senator, some progress is being made in the United States Senate toward the passage of legislation which will replace the British system of weights and measures with the metric system. Although we are educating our legislators to the need for this legislation, three recent experiences I have had show that we need to get our scientific house in order: (i) Of 200 students in a general botany course, most of whom had taken a course in chemistry or physics, none of the Americans knew what a degree Celsius was, although all had heard of the degree centigrade. These students represented most of the 50 states. (ii) When I referred to "density of plants per *are*" in a manuscript submitted for publication, my spelling was "corrected" to read *acre* at every review, the last time in galley proof, even after I had defined the are, in parentheses, as (100 m^2). (iii) In an article by a noted ecologist dedicated to the scientists attending the XIth International Botanical Congress, I found reference to a plateau of 26 million *square* hectares (reminiscent of the frequent references one sees of wind velocities in knots per hour).

Perhaps these annoyances are merely the result of confusion in trying to deal with two systems at one time and will disappear when we have adopted the metric system for daily use. A Swedish friend recalled the conversion to the metric system in his country as a time when housewives frequently requested a kilometer of butter or a gram of milk. . . .

LORENTZ PEARSON
Department of Biological Sciences, Ricks College, Rexburg, Idaho 83440

21 November 1969, Volume 166, Number 3908 **SCIENCE**

Assessing Technology

The National Academy of Sciences (*Science*, 5 September 1969) and the National Academy of Engineering (*Science*, 14 November 1969) have independently responded to a congressional request for advice on the possibility of analyzing in advance the benefits and the risks of exploiting new technological capabilities. The reports differ considerably in content and style, but agree that technology assessment is feasible. Neither, however, makes the job sound easy; analyzing the probable consequences of a proposed development will require an extensive amount of scientific, technological, and social information, the explicit formulation of assumptions concerning the future, and a substantial amount of work by a group of experts from several disciplines. The two studies also agree that the proposal is highly desirable and relatively inexpensive.

A good deal of technology assessment is already conducted by industry, government regulatory bodies, such agencies as the AEC, and organizations that seek to protect environmental and human values. The NAE and NAS reports expect these efforts to continue. What they recommend is an additional level of assessment—one that would work for the nation as a whole rather than for any special interest; one that could take account of the economic, human, and environmental values involved as well as the values of an advocate or an opponent; and one that could then render a comprehensive and impartial judgment of the probable secondary and tertiary as well as primary consequences of a proposed technological development or of alternative means of solving a particular problem.

The assessing agency should stop at this point, leaving decisions to the politically responsible executive and legislative agencies. Nevertheless, because every problem it took up would be controversial, it is important that the assessment agency be well insulated from political pressures. Yet if its reports are to be influential, it should be as close to the centers of congressional and executive power as possible. This organizational dilemma will be considered by the House Committee on Science and Astronautics in hearings later this year.

There are several ways in which the organizational problem might be solved, but none may have a chance to be tried out. Any proposed program of technology assessment will threaten the freedom of action of those interests whose plans and proposals would be subject to review. If this opposition can be overcome, the country will have gained a better means of using scientific and technological advice than it now has. On such matters as drugs, pollution, defense, and environmental problems, scientists and technologists frequently disagree. Congress, the executive agencies, and an often bewildered public must then decide whose advice to follow. A technology assessment program would not stop disagreements. But the varied individual judgments would be appraised by a panel of experts from different disciplines who would consider the evidence, the competing arguments, and the values involved, and would then publish their best judgment as to what would happen if one or another course of action were to be followed.

Such objective assessments could raise the level of public debate about the desirability and risks of new technology. The NAE and NAS reports can raise the level of discussion of how to go about the business of developing this national competency.—DAEL WOLFLE

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though the inclusion of coconut milk in the medium first made it possible to grow callus tissues of monocots successfully, it is believed that much of the recent success with these plants can be attributed to the development of effective synthetic media. Such media usually have higher amounts of auxin than those used for dicots, as well as raised concentrations of inorganic constituents.

In the final session, in addition to discussing such topics as research support, publications, more effective channels of communications, and problems of shipping cultures from one country to another, the conferees agreed upon those qualities which would make a particular plant ideal for research. Desirable characteristics would include absence of endopolyploidy, stable low chromosome number, stable concentrations of deoxyribonucleic acid, large chromosomes, good growth rate, good growth on defined medium, easy separation into suspension, easy organ regeneration, and a well-defined genetic background. Regrettably, no known plant has all of these attributes.

L. G. NICKELL
Experiment Station, Hawaiian Sugar Planters' Association, Honolulu 96822

J. G. TORREY
Biological Laboratories, Harvard University, Cambridge, Massachusetts 02138

Note

1. Conferees from eight countries included ten plant physiologists who have specialized in plant cell and tissue culture, two geneticists, and two scientific observers. Participants were: A. C. Braun, United States; E. C. Cocking, United Kingdom; F. D'Amato, Italy; T. Eriksson, Sweden; O. L. Gamborg, Canada; A. C. Hildebrandt, United States; G. Morel, France; L. G. Nickell, United States; J. Reinert, Germany; R. Riley, United Kingdom; J. G. Torrey, United States; Y. Yamada, Japan; L. M. Roberts, Rockefeller Foundation; and H. J. Carlson, National Science Foundation.

Forthcoming Events

December

7–9. American Soc. of **Hematology**, Cleveland, Ohio. (F. H. Gardner, Presbyterian–Univ. of Pennsylvania Medical Center, Philadelphia 19104)

7–12. American Soc. for **Testing and Materials**, Cincinnati, Ohio. (T. A. Marshall, Jr., ASTM, 1916 Race St., Philadelphia, Pa. 19103)

8–10. **Applications of Simulation**, 3rd conf., Los Angeles, Calif. (P. J. Kiviat, Simulation Associates, Inc., 1263 Westwood Blvd., Los Angeles 90024)

8–10. **Circuit Theory**, intern. symp., San Francisco, Calif. (B. J. Leon, School of

Electrical Engineering, Cornell Univ., Ithaca, N.Y. 14850)

8–10. National **Electronics** Conf. and Exhibition, 25th, Chicago, Ill. (R. J. Napolitan, NEC, Oakbrook Executive Plaza #2, 1211 W. 22 St., Oak Brook, Ill. 60521)

8–10. Southern **Surgical** Assoc., Hot Springs, Va. (D. C. Sabiston, Jr., Duke Univ. Medical Center, Durham, N.C. 27706)

8–11. Oak Ridge Associated Universities Symp. in **Medicine**, 12th, Oak Ridge, Tenn. (R. M. Kniseley, Medical Div., Oak Ridge Associated Universities, Oak Ridge 37830)

11–12. Conference on **Holography and the Computer**, Houston, Tex. (J. A. Jordan, Jr., IBM, Houston Scientific Center, 6900 Fannin St., Houston 77025)

12–14. American **Psychoanalytic** Assoc., New York, N.Y. (H. Fischer, 1 E. 57 St., New York 10022)

14–18. American Assoc. of **Hospital Pharmacists**, Washington, D.C. (J. A. Oddis, AAHP, 4630 Montgomery Ave., Bethesda, Md. 20014)

15–17. **Phylogenesis and Morphogenesis in the Algae** Conf., New York, N.Y. (J. F. Fredrick, Director of Chemical Research, Dodge Chemical Co., 3425 Boston Post Rd., Bronx, N.Y. 10469)

15–18. American **Geophysical** Union, San Francisco, Calif. (W. E. Smith, AGU, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

17–18. British **Biophysical** Soc., London, England. (E. M. Bradbury, Biophysics Lab., Physics Dept., College of Technology, Park Rd., Portsmouth, England)

17–19. Symposium on **Infections and Immunosuppression in Sub-Human Primates**, Rijswijk, Netherlands. (H. Balner, Radiobiological Institute TNO, Lange Kleiweg 151, Rijswijk Z.H.)

18–20. International Symp. on **Computer and Information Science** (COINS-69), Miami Beach, Fla. (J. T. Lou, Univ. of Florida, Gainesville 32601)

26–30. **Sigma Delta Epsilon**, Boston, Mass. (M. Myers, 6234 Mary Lane Dr., San Diego, Calif. 92115)

26–31. American Assoc. for the **Advancement of Science**, 136th mtg., Boston, Mass. (Meetings Manager, 1515 Massachusetts Ave., NW, Washington, D.C. 20005)

26–31. **Ecological Soc.** of America, Boston, Mass. (W. A. Niering, Dept. of Botany, Connecticut College, New London 06320)

26–31. American Soc. of **Naturalists**, Boston, Mass. (B. H. Judd, Dept. of Zoology, Univ. of Texas, Austin 78712)

26–31. Society of **Protozoologists**, Boston, Mass. (M. Hammond, Dept. of Zoology, Utah State Univ., Logan 84321)

26–31. **Scientific Research** Soc. of America, Boston, Mass. (C. A. Walker, SRSA, 155 Whitney Ave., New Haven, Conn. 06510)

26–31. **Sigma Pi Sigma**, Boston, Mass. (C. G. Shugart, Society of Physics Students, State Univ. of New York, Stony Brook 11790)

26–31. Society for the **Study of Evolution**, Boston, Mass. (D. L. Jameson, Dept. of Biology, Univ. of Houston, Houston, Tex. 77004)

26–31. American Soc. of **Zoologists**, Boston, Mass. (J. R. Shaver, Dept. of Zoology, Michigan State Univ., East Lansing 48823)

27–29. American Philosophical Assoc., New York, N.Y. (A. Pasch, 117 Lehigh Rd., Univ. of Maryland, College Park 20742)

27–30. **Archaeological** Inst. of America, San Francisco, Calif. (J. S. Ord, AIA, 260 West Broadway, New York 10013)

27–30. Western Soc. of **Naturalists**, Los Angeles, Calif. (D. H. Montgomery, Dept. of Biological Sciences, California State College, San Luis Obispo 94301)

28–30. American **Historical** Assoc., Washington, D.C. (W. D. Harris, AHA, 400 A Street, SE, Washington, D.C. 20003)

29–31. American **Physical** Soc., Los Angeles, Calif. (W. W. Havens, Jr., APS, 335 E. 45 St., New York 10017)

January

6–8. **Solid State Physics** Conf., 7th annual, Manchester, England. (Meetings Officer, Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1)

6–10. National Soc. of **Professional Engineers**, Atlanta, Ga. (P. H. Robbins, NSPE, 2029 K St., NW, Washington, D.C.)

7–9. **Polymer Chain Flexibility** Conf., Colchester, Essex, England. (M. Gordon, British Polymer Physics Group, University of Essex, Wivenhoe Park, England)

8–10. Society for **Historical Archaeology**, 3rd annual, Bethlehem, Pa. (B. Salwen, Dept. of Anthropology, New York Univ., 25 Waverly Pl., New York 10003)

8–13. **Taxonomy and Biology of Blue-Green Algae**, Madras, India. (T. S. Sadasivan, University Botany Lab., Madras 5)

11–13. Association of **American Colleges**, Houston, Tex. (R. H. Sullivan, 1818 R St., NW, Washington, D.C. 20009)

12–14. **Biological Effects of Carbon Monoxide**, New York, N.Y. (A. Selwyn, 2 E. 63 St., New York 10021)

12–15. National Assoc. of **Private Hospitals**, 37th annual, Nassau, Bahamas. (M. Herman, Executive Secretary, NAPH, 353 Broad Ave., Leonia, N.J. 07605)

12–16. **Automotive Engineering** Congr. and Exposition, Detroit, Mich. (W. I. Marble, Soc. of Automotive Engineers, 2 Pennsylvania Plaza, New York 10001)

12–16. **Highway Research** Board, 49th annual, Washington, D.C. (J. C. Allen, Assistant Director for Administration, 2101 Constitution Ave., NW, Washington, D.C. 20418)

14–16. **Engineering with Nuclear Explosives**, Las Vegas, Nev. (P. Kruger, Stanford Univ. School of Engineering, Stanford, Calif. 94305)

18–20. **Drug Information for the Medical Profession**, Washington, D.C. (R. L. Marlin, Sandoz Pharmaceuticals, Hanover, N.J. 07054)

19–20. **Biochemistry**—Papanicolaou Cancer Research Inst., winter symp., Miami, Fla. (W. J. Whelan, P.O. Box 847, Biscayne Annex, Miami 33152)

19–21. American Soc. of **Heating, Refrigerating**, and **Air-Conditioning Engineers**, San Francisco, Calif. (A. T. Boggs

III, American Soc. of Heating, 345 E. 47 St., New York 10017)

21–23. Instrumentation for the **Process Industries** Symp., College Station, Tex. (R. G. Anthony, Dept. of Chemical Engineering, Texas A & M Univ., College Station)

21–24. American **Group Psychotherapy** Assoc., New Orleans, La. (M. Schiff, Administrative Secretary, AGPA, Room 702, 1790 Broadway, New York 10019)

22–26. American **Mathematical** Soc., Miami, Fla. (G. L. Walker, AMS, P.O. Box 6248, Providence, R.I. 02904)

24–26. **Mathematical** Assoc. of America, Miami, Fla. (A. B. Willcox, MAA., 1275 Connecticut Ave., NW, Washington, D.C. 20036)

26–29. American Assoc. of **Physics Teachers**, Chicago, Ill. (M. W. Zemansky, American Inst. of Physics, 335 E. 45 St., New York 10017)

26–30. Federacion **Odontologica** de Centro America, Panama City, Panama. (R. Eisemann, Secretario del Exterior, FOCAP, P.O. Box 6406, Panama City 5)

27–29. **Automatic Lab. Techniques** Exhibition, London. England (M. Duck, Pressaids Ltd., 5 New Bridge St., London E.C.4)

27–29. **Reliability** Symp., Los Angeles, Calif. (W. R. Abbott, D-60-01/B104, Lockheed Missiles & Space Co., P.O. Box 504, Sunnyvale, Calif. 94022)

27–30. Canadian **Pulp** and **Paper Assoc.**, 56th annual, Montreal, Canada. D. H. Paterson, CPPA, 2280 Sun Life Bldg., Montreal 2, P.Q.)

28–30. **Health Physics Soc.**, Louisville, Ky. (W. H. Parr, U.S. Army Medical Research Lab., Fort Knox, Ky. 40121)

February

1–14. **Alcholism** and **Drug Dependence**, Sydney, Australia. (P. Diehm, Foundation for Research and Treatment of Alcholism, P.O. Box 3284, Sydney)

2–6. American Soc. for **Testing and Materials**, 3rd, Cincinnati, Ohio. (T. A. Marshall, Jr., 1916 Race St., Philadelphia, Pa.)

9–12. American Soc. of **Range Management**, Denver, Colo. (F. T. Colbert, 2120 Birch St., Denver 80222)

9–13. American **Meteorological** Soc., Washington, D.C. (K. C. Spengler, AMS, 45 Beacon St., Boston, Mass.)

11–12. **Source and Control**, Urbana, Ill. (R. S. Engelbrecht, 3230 Civil Engineering Bldg., Univ. of Illinois, Urbana)

15–18. American Inst. of **Chemical Engineers**, Atlanta, Ga. (H. A. McGee Jr., Dept. of Chemical Engineering, Georgia Inst. of Technology, Atlanta)

15–19. Society of **Economic Geologists**, Denver, Colo. (R. A. Laurence, Secretary, SEG, P.O. Box 1549, Knoxville, Tenn.)

15–19. American Inst. of **Mining, Metallurgical and Petroleum Engineers**, Denver, Colo. (G. T. Moffatt, Activities Manager, 345 E. 47 St., New York 10017)

16–20. **Handling of Nuclear Information**, Vienna, Austria. (J. H. Kane, Div. of Technical Information, Atomic Energy Commission, Washington, D.C. 20545)

BOOKS RECEIVED

(*Continued from page 991*)

Air Pollution Primer. Rena Corman. National Tuberculosis and Respiratory Disease Association, New York, 1969. 104 pp., illus. Paper.

American Education in Foreign Perspectives. Twentieth Century Essays. Stewart E. Fraser, Ed. Wiley, New York, 1969. xviii + 526 pp. Cloth, $9.95; paper, $5.95.

American Government. Conscious Self Sovereignty. John M. Dorsey. Center for Health Education, Detroit, 1969. xviii + 142 pp., illus. $4.95.

Analysis and Design of Structural Sandwich Panels. Howard G. Allen. Pergamon, New York, 1969. xvi + 284 pp., illus. Cloth, $7; paper, $5.50. Commonwealth and International Library: Structures and Solid Body Mechanics Division.

Analytic Functions and Distributions in Physics and Engineering. Bernard W. Roos. Wiley, New York, 1969. xvi + 528 pp., illus. $19.95.

Annapolis Visit. A Photographic Essay on Maryland's Ancient City. Mary Mitchell. Barre Publishers, Barre, Mass., 1969. 122 pp. $10.

Annual Review of Astronomy and Astrophysics. Vol. 7. Leo Goldberg, David Layzer, and John G. Phillips, Eds. Annual Reviews, Palo Alto, Calif., 1969. viii + 718 pp., illus. $8.50.

Apache Odyssey. A Journey between Two Worlds. Morris E. Opler. Holt, Rinehart and Winston, New York, 1969. xviii + 302 pp., illus. Paper, $3.95. Case Studies in Cultural Anthropology.

Archaeological Excavations at 'Ubeidiya, 1964–1966. M. Stekelis, O. Bar-Yosef, and Tamar Schick. Israel Academy of Sciences and Humanities, Jerusalem, 1969. 30 pp. + plates. Paper, $4.

Archeology on the Shonto Plateau, Northeast Arizona. Keith M. Anderson. With an Appendix on Bird Remains from Vicinity of Navajo National Monument, Arizona. Lyndon L. Hargrave. Published in cooperation with the National Park Service by Southwestern Monuments Association, Globe, Ariz., 1969. xii + 68 pp., illus. Paper, $2. SWMA Technical Series, vol. 7.

Arid Lands in Perspective. Including AAAS Papers on Water Importation into Arid Lands. William G. McGinnies and Bram J. Goldman, Eds. AAAS, Washington, D.C.; University of Arizona Press, Tucson, 1969 (order from University of Arizona Press). x + 422 pp., illus. $18.

Bedside Diagnostic Examination. Elmer L. DeGowin and Richard L. DeGowin. Macmillan, New York; Collier-Macmillan, London, ed. 2, 1969. xiv + 946 pp., illus. $9.95.

Behavior Control. Perry London. Harper and Row, New York, 1969. x + 246 pp. $6.95.

Biochemical Predestination. Dean H. Kenyon and Gary Steinman. McGraw-Hill, New York, 1969. xviii + 302 pp., illus. Cloth, $12.50; paper, $4.95.

The Biochemistry of Alkaloids. Trevor Robinson. Springer-Verlag, New York, 1968. x + 152 pp., illus. $9.75. Molecular Biology, Biochemistry, and Biophysics, vol. 3.

The Biochemistry of Folic Acid and

Related Pteridines. R. L. Blakley. North-Holland, Amsterdam; Interscience (Wiley), New York, 1969. xxii + 570 pp., illus. $29. Frontiers of Biology, vol. 13.

Biochemistry of Ribosomes and Messenger-RNA. An International Symposium, Castle Reinhardsbrunn, 1967. Ruth Lindigkeit, Peter Langen, and Jochen Richter, Eds., Akademie-Verlag, Berlin, 1968. 612 pp., illus.

Biology and the Physical Sciences. Samuel Devons, Ed. Columbia University Press, New York, 1969. xvi + 384 pp., illus. $12.50.

Calculus. Lipman Bers. Holt, Rinehart and Winston, New York, 1969. xvi + 1056 pp., illus. $13.95.

The Calculus of Physics. McAllister H. Hull, Jr. Benjamin, New York, 1969. xiv + 138 pp., illus. Cloth, $8.50; paper, $2.95.

Canadian Cancer Conference. Vol. 8, Proceedings of the Eighth Conference, Honey Harbour, Ontario, June 1968. J. F. Morgan, Ed. x + 442 pp., illus. $19.

Cognitive Anthropology. Stephen A. Tyler, Ed. Holt, Rinehart and Winston, New York, 1969. xvi + 528 pp., illus. $9.95.

Comparative Anatomy of the Vertebrates. George C. Kent, Jr. Mosby, St. Louis, ed. 2, 1969. xii + 440 pp., illus. $9.75.

Congress and the New Politics. John S. Saloma III. Little, Brown, Boston, 1969. xvii + 298 pp. Cloth, $5.75; paper, $3.95. Study of Congress Series.

Contributions in Mammalogy. A Volume Honoring Professor E. Raymond Hall. J. Knox Jones, Jr., Ed. Museum of Natural History, University of Kansas, Lawrence, 1969. 428 pp., illus. $5. Museum of Natural History Miscellaneous Publication No. 51.

Contributions to Mechanics. Markus Reiner Eightieth Anniversary Volume. David Abir, Ed. Pergamon, New York, 1969. xiv + 446 pp. + plates. $21.

A Course on Programming in FORTRAN IV. V. J. Calderbank. Chapman and Hall, London; Science Paperbacks, London, 1969 (U.S. distributor, Barnes and Noble, New York). viii + 88 pp., illus. Cloth, $4; paper, $2.50.

A Critical Review of the Marine Science Commission Report. Proceedings of a seminar, Washington, D.C., January 1969. Marine Technology Society, Washington, D.C., 1969. iv + 114 pp. + addendum. Paper, $6.50.

Culture and Society. Twenty-Four Essays. George Peter Murdock. University of Pittsburgh Press, Pittsburgh, 1965. xii + 376 pp. $7.95.

Design Synthesis. J. H. Ellinger. Wiley, New York, 1968. Vol. 1 (xx + 132 pp., illus.); vol. 2 (unpaged, illus. + folio). Boxed, $41.50.

Detection of Signals by Template Matching. David H. Friedman. Johns Hopkins Press, Baltimore, 1969. x + 62 pp., illus. $6.50.

Developmental Plant Anatomy. Alan R. Gemmell. St. Martin's, New York, 1969. iv + 60 pp. + plates. Paper, $1.50. Institute of Biology's Studies in Biology, No. 15.

Development of the Functions of the Small Intestine in Mammals and Man. O. Koldovský. Karger, Basel, 1969 (U.S.

distributor, Phiebig, White Plains, N.Y.). viii + 204 pp., illus. $12.70.

Dos Mamiferos Marinos de Baja California. Daniel Lluch Belda, Lowell Adams, and S. G. Losocki. Instituto Mexicano de Recursos Naturales Renovables, Mexico, D.F., 1969. viii + 118 pp., illus. Paper, $3.

Drugs and Alcohol. Kenneth L. Jones, Louis W. Shainberg, and Curtis O. Byer. Harper and Row, New York, 1969. x + 134 pp., illus. Paper, $2.50.

Earthquake Interpretations. Ruth B. Simon. Colorado School of Mines, Golden, ed. 2, 1969. 100 pp., illus. Paper, $2.

Ecological Aspects of the Mineral Nutrition of Plants. Ninth symposium of the British Ecological Society, Sheffield, England, April 1968. I. H. Rorison, A. D. Bradshaw, M. J. Chadwick, R. L. Jefferies, D. H. Jennings, and P. B. Tinker, Eds. Blackwell Scientific Publications, Oxford, 1969 (U.S. distributor, Davis, Philadelphia). xxii + 486 pp. + plates. $17.50.

Ecological Notes on Wall Vegetation. S. Segal. Junk, The Hague, 1969. 326 pp., illus. + appendices. Paper, $16.65.

Edward Stevens. Gastric Physiologist, Physician and American Statesman. With a complete translation of his inaugural dissertation "De Alimentorum Concoctione" and interpretive notes on gastric digestion along with certain other selected and diplomatic papers. Stacey B. Day, Ed. Cultural and Educational Productions, Cincinnati, Ohio, 1969. 180 pp., illus. $11.95.

Electrical Network Theory. Norman Balabanian and Theodore A. Bickart. With contributions from the work of Sundaram Seshu. Wiley, New York, 1969. xxii + 839 pp., illus. $19.95.

Electronic and Ionic Impact Phenomena. In four volumes. H. S. W. Massey, E. H. S. Burhop, and H. B. Gilbody. Oxford University Press, New York, ed. 2, 1969. Vol. 1, Collision of Electrons with Atoms, H. S. W. Massey and E. H. S. Burhop, xx + 684 pp., illus. $32; vol. 2, Electron Collisions with Molecules and Photo-ionization, H. S. W. Massey, xviii + pp. 665–1316 + plates, $32. International Series of Monographs on Physics.

Elementary Cryptanalysis. A Mathematical Approach. Abraham Sinkov. Random House, New York; Singer, New York, 1969. x + 190 pp. Paper, $1.72; to schools, $1.29. New Mathematical Library, vol. 22.

Emergency and Disaster Planning. Richard J. Healy. Wiley, New York, 1969. xii + 292 pp., illus. $12.95.

Encyclopaedia of Linguistics, Information and Control. A. R. Meetham and R. A. Hudson, Eds. Pergamon, New York, 1969. xiv + 718 pp., illus. $40.

The Ethnography of Franz Boas. Letters and Diaries of Franz Boas Written on the Northwest Coast from 1886 to 1931. Ronald P. Rohner, Ed. Translated from the German by Hedy Parker. University of Chicago Press, Chicago, 1969. xxx + 334 pp. + plates. $12.50.

Feldspars. Tom. F. W. Barth. Wiley-Interscience, New York, 1969. xii + 264 pp., illus. $14.50.

The Fertile Crescent. Travels in the Footsteps of Ancient Science. Clifford N. Anderson. Exposition, New York, 1969. 332 pp. + plates. $7.50.

Focus on Physics. Optics I—Lenses, Mirrors, and Optical Instruments. J. Warren Blaker. Barnes and Noble, New York, 1969. x + 118 pp., illus. Paper, $1.25. College Outline Series, No. 129.

Focus on Understanding and Support. A Study in College Management. John W. Leslie. Statistical analysis by Charles Newton and Annette L. Bacon. American College Public Relations Association, Washington, D.C., 1969. xiv + 130 pp., illus. $3.95.

Fungal Parasitism. Brian J. Deverall. St. Martin's, New York, 1969. iv + 60 pp. + plates. Paper, $1.50. Institute of Biology's Studies in Biology, No. 17.

De Fysiologische, Biochemische en Enzymatische Klassifikatie van de Pseudomonadales. Karel Kersters. Koninklijke Vlaamse Academie voor Wetenschappen, Brussels, 1968. xii + 124 pp., illus. Paper. Verhandelingen van de Koninklijke Vlaamse Academie voor Wetenschappen, Letteren en Schone Kunsten van België, Klasse der Wetenschappen, Jaargang 30, No. 105.

General and Social Systems. F. Kenneth Berrien. Rutgers University Press, New Brunswick, N.J., 1968. viii + 232 pp., illus. $9.

General Report on the Ground-Water Investigation of the Azraq Basin. Prepared for the Government of Jordan by the United Nations, New York, 1966. iv + 64 pp., illus. + folio. Paper. U.N. Development Programme.

Genetic Counseling. A Guide for the Practicing Physician. Walter Fuhrmann and Friedrich Vogel. Translated from the German edition (Berlin, 1968) by Sabine Kurth. Springer-Verlag, New York, 1969. viii + 106 pp., illus. Paper, $3. Heidelberg Science Library, vol. 10.

Genetics Lectures. Vol. 1. Ralph Bogart, Ed. Published for the Genetics Institute of Oregon State University by Oregon State University Press, Corvallis, 1969. 196 pp., illus. Paper, $4.

Heat and Mass Transfer in Recirculating Flows. A. D. Gosman, W. M. Pun, A. K. Runchal, D. B. Spalding, and M. Wolfshtein. Academic Press, New York, 1969. xii + 340 pp., illus. $9.50.

A History of the First Hundred Years of the Mineral Collection in the British Museum. With Particular Reference to the Work of Charles Konig. W. Campbell Smith. Trustees of the British Museum (Natural History), London, 1969. Paper, 13s. Bulletin of the British Museum (Natural History): Historical Series, Vol. 3, No. 8, pp. 235–59.

How To Know the Aquatic Plants. G. W. Prescott. Brown, Dubuque, Iowa, 1969. x + 182 pp., illus. Cloth, $3.25; spiral bound, $2.50. Pictured-Key Nature Series.

How To Know the Lichens. Mason E. Hale. Brown, Dubuque, Iowa, 1969. x + 230 pp., illus. Cloth, $3.75; spiral bound, $3. Pictured-Key Nature Series.

How To Raise a Human Being. A Parents' Guide to Emotional Health from Infancy through Adolescence. Lee Salk and Rita Kramer. Random House, New York, 1969. xiv + 210 pp. $5.95.

Human Afflictions and Chromosomal

Aberrations. Raymond Turpin and Jérôme Lejeune. Translated from the French edition (Paris, 1965). Pergamon, New York, 1969. xii + 392 pp., illus. $21. International Series of Monographs in Pure and Applied Biology: Modern Trends in Physiological Sciences, vol. 32.

Human Neuroanatomy (Formerly Strong and Elwyn's *Human Neuroanatomy*). Raymond C. Truex and Malcolm B. Carpenter. Williams and Wilkins, Baltimore, ed. 6, 1969. xiv + 674 pp., illus. $16.50.

Hunters of the Northern Ice. Richard K. Nelson. University of Chicago Press, Chicago, 1969. xxiv + 432 pp. + plates. $8.50.

The Immortalist. An Approach to the Engineering of Man's Divinity. Alan Harrington. Random House, New York, 1969. x + 326 pp. $6.95.

Immunity to Parasitic Animals. Vol. 1. G. J. Jackson, Robert Herman, and Ira Singer, Eds. Appleton-Century-Crofts, New York, 1969. xiv + 294 pp., illus. $14.

The Immunology of Nematode Infections. Trichinosis in Guinea Pigs as a Model. David Catty. Karger, Basel, 1969 (U.S. distributor, Phiebig, White Plains, N.Y.). xiv + 134 pp., illus. $9.35. Monographs in Allergy, vol. 5.

Industrial Technologies for Developing Economies. Jack Baranson. Praeger, New York, 1969. xvi + 172 pp. $12.50. Praeger Special Studies in International Economics and Development.

Insects and Insecticides. R. C. Reay. Oliver and Boyd, Edinburgh, 1969. viii + 152 pp. + plates. Paper, 7/6d. Contemporary Science Paperbacks, vol. 39.

Institute of Public Administration. General report prepared for the Government of Ghana by the United Nations, New York, 1967. 108 pp., illus. Paper. U.N. Development Programme.

Introduction to Computers and Programming. Jessica Hellwig. Columbia University Press, New York, 1969. xiv + 218 pp., illus. $5.50. Reprint of the 1965 edition.

Introduction to Crystallography. Donald E. Sands. Benjamin, New York, 1969. xii + 180 pp., illus. Cloth, $12.50; paper, $4.95. Physical Chemistry Monograph Series.

Introduction to General Chemistry. Jerome K. Holmes. Mosby, St. Louis, ed. 2, 1969. xii + 460 pp., illus. $8.75.

Introduction to Linear Algebra and Differential Equations. Samuel Wolfenstein. Holden-Day, San Francisco, 1969. xvi + 256 pp., illus. $9.75. Holden-Day Series in Mathematics.

Introduction to Neuropathology. Raymond D. Adams and Richard L. Sidman. Blakiston (McGraw-Hill), New York, 1968. viii + 632 pp., illus. $29.50.

Introductory Probability Theory. Y. A. Rozanov. Translated and edited from the Russian edition (Moscow, 1968) by Richard A. Silverman. Prentice-Hall, Englewood Cliffs, N.J., xii + 148 pp., illus. $6.95. Selected Russian Publications in the Mathematical Sciences.

Knowing and Being. Essays by Michael Polanyi. Marjorie Grene, Ed. University of Chicago Press, Chicago, 1969. xviii + 246 pp. $4.95.

Laboratory Instructions in Biology of Microorganisms. Marjorie S. Sharp and Sanders T. Lyles. Mosby, St. Louis, 1969. x + 282 pp., illus. Paper, $4.95.

Lasers and Holography. An Introduction to Coherent Optics. Winston E. Kock. Doubleday, Garden City, N.Y., 1969. xvi + 104 pp. + plates. Cloth, $4.50; paper (Anchor Books), $1.25.

Learning. Processes. Melvin H. Marx, Ed. Macmillan, New York; Collier-Macmillan, London, 1969. x + 518 pp., illus. $9.95.

Lecture Notes on Histology. William A. Beresford. Blackwell Scientific Publications, Oxford, 1969 (U.S. distributor, Davis, Philadelphia). viii + 296 pp., illus. $4.50. Lecture Notes Series.

Life Sciences and Space Research VII. Proceedings of the Open Meeting of Working Group V at the Eleventh Plenary Meeting of the Committee on Space Research, Tokyo, May 1968, and the Symposium on Biological Effects of Radiation in Space, Tokyo, May 1968. W. Vishniac and F. G. Favorite, Eds. North-Holland, Amsterdam, 1969. xii + 212 pp., illus. $14.

Linear Algebra. John de Pillis. Holt, Rinehart and Winston, New York, 1969. xii + 516 pp., illus. $8.95.

The Magic of the Senses. New Discoveries in Animal Perception. Vitus B. Dröscher. Translated from the German edition (Munich, 1966) by Ursula Lehrburger and Oliver Coburn. Dutton, New York, 1969. viii + 300 pp. + plates. $8.95.

Marine Algae of the Monterey Peninsula, California. Gilbert M. Smith. Stanford University Press, Stanford, Calif., ed. 2, 1969. x + 758 pp., illus. $15. Incorporates the 1966 *Supplement* by George J. Hollenberg and Isabella A. Abbott, and includes restructured Keys to the Genera, consolidated index, and revised introduction to the *Supplement*.

Mathematical Foundations of Systems Analysis. Vol. 1. Robert H. Kupperman and Harvey A. Smith. Addison-Wesley, Reading, Mass., 1969. x + 214 pp., illus. $11.50.

Men of Physics: L. D. Landau. Vol. 2, Thermodynamics, Plasma Physics and Quantum Mechanics. D. ter Haar. Pergamon, New York, 1969. xii + 198 pp., illus. Cloth, $5.50; paper, $3.25. Commonwealth and International Library: Selected Readings in Physics.

Mental Health in Public Health Training. Proceedings of the national conference, Warrenton, Va., May 1968. Stephen E. Goldston, Ed. National Institute of Mental Health, Washington, D.C., 1969 (available from the Superintendent of Documents, Washington, D.C.). viii + 92 pp., illus. Paper, 60¢. Public Health Service Publication No. 1899.

Mesas Redondas sobre Utilización y Conservación del Suelo en México. A meeting, Mexico, D.F., November 1968. Instituto Mexicano de Recursos Naturales Renovables, Mexico, D.F., 1969. x + 234 pp. Paper, $5.

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Modern Elementary Mathematics. An Introduction to Its Structure and Meaning. Anne E. Kenyon. Prentice-Hall, Englewood Cliffs, N.J., 1969. xiv + 370 pp., illus. $8.95.

Nebraska Symposium on Motivation, 1968. William J. Arnold, Ed. University of Nebraska Press, Lincoln, 1968. x + 342 pp., illus. Cloth, $6.95; paper, $3.25. Current Theory and Research in Motivation, vol. 16.

The Nervous System. Peter Nathan. Lippincott, Philadelphia, 1969. 400 pp. + plates. $7.95.

Nutrition of Animals of Agricultural Importance. Part 1, The Science of Nutrition of Farm Livestock. David Cuthbertson, Ed. (xiv + 592 pp. + plates). Part 2, Assessment of and Factors Affecting Requirements of Farm Livestock. David Cuthbertson, Ed. (xvi + 952 pp. + plates). Pergamon, New York, 1969. $56. International Encyclopedia of Food and Nutrition, vol. 17.

The Physiological Aspects of Photosynthesis. O. V. S. Heath. Stanford University Press, Stanford, Calif., 1969. x + 310 pp. + plates. $8.50.

Physiology and Pathophysiology of Plasma Protein Metabolism. Proceedings of a symposium, Stockholm, May 1967. G. Birke, R. Norberg, and L.-O. Plantin, Eds. Pergamon, New York, 1969. x + 264 pp., illus. $12.50. Wenner-Gren Center International Symposium Series, vol. 12.

Plant Anatomy. Experiment and Interpretation. Part 1, Cells and Tissues. Elizabeth G. Cutter. Addison-Wesley, Reading, Mass., 1969. viii + 168 pp., illus. $8.50. Contemporary Biology Series.

Plant Symbiosis. G. D. Scott, St. Martin's, New York, 1969. iv + 60 pp., illus. Paper, $1.50. Institute of Biology's Studies in Biology, No. 16.

The Present Status of Psychotropic Drugs. Pharmacological and Clinical Aspects. Proceedings of the sixth international congress of the Collegium Internationale Neuro-Psychopharmacologicum, Tarragona, Spain, April 1968. A. Cerletti and F. J. Bové, Eds. Excerpta Medica Foundation, Amsterdam, 1969. xii + 572 pp., illus. $36.

Proceedings of the VIIth International Congress of Psychotherapy, Wiesbaden, August 1967. Th. Spoerri and W. Th. Winkler, Eds. Part 1, Psychotherapy—Prevention and Rehabilitation (xiv + pp. 1–130). Part 2, Community Psychiatry—Therapeutic Community (iv + pp. 1–188). Part 3, Myocardial Infarct and Other Psychosomatic Disturbances (iv + pp. 189–292). Part 4, Family Investigation (iv + pp. 293–384, illus.). Part 5, Rehabilitation (iv + pp. 1–72, illus.). Part 6, The Student and Neurosis (iv + pp. 1–68). Karger, Basel, 1969 (U.S. distributor, Phiebig, White Plains, N.Y.). Boxed, paper, $23.50.

Protozoa. Part 1 (Recent), compiled by R. A. Neal and Mary Tobias. Part 2 (Fossil), compiled by Mary Tobias and Margaret Oxenham. Zoological Society, London, 1969. vi + 190 pp. Paper, $8.40. Zoological Record, vol. 103, section 2, 1966.

Quantitative Analytical Chemistry. H. A. Flaschka, A. J. Barnard, Jr., and P. E. Sturrock. Vol. 1, Introduction to Principles (xiv + 594 pp., illus., paper, $5.95). Vol. 2, Short Introduction to Practice (x + 294 pp., illus.; paper, $2.95). Barnes and Noble, New York, 1969. Barnes and Noble International Textbook Series.

"Ramona I." A Fortran Code for Transient Analysis of Boiling Water Reactors and Boiling Loops. P. Bakstad and K. O. Solberg. Institutt for Atomenergi, Kjeller, Norway, 1968. Unpaged. Paper. KR 135.

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