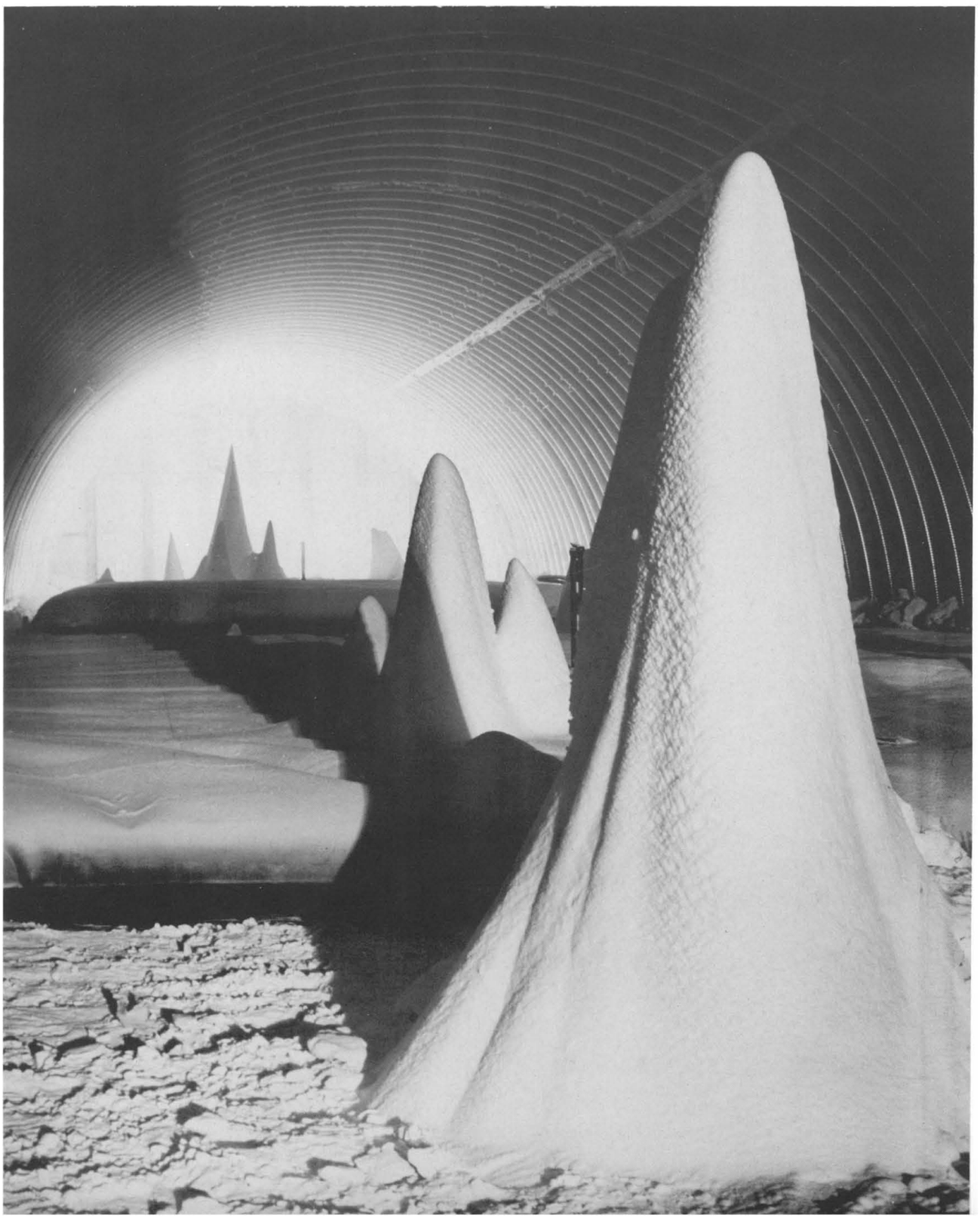
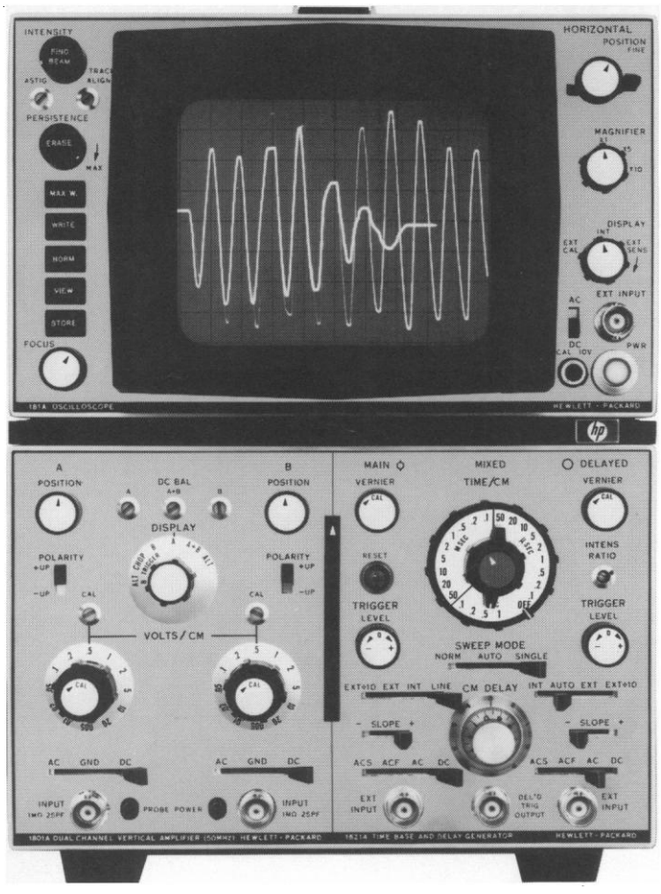
SCIENCE

26 January 1968
Vol. 159, No. 3813

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





Here is the latest hp addition to the new generation of all-solid-state, high-performance oscilloscopes!

Stop... Store... Vary Display Time!

New hp 181A Oscilloscope...You control CRT display time with variable persistence and storage!

Now for the first time you get the added dimension of variable persistence and storage in a high frequency scope—50 MHz bandwidth at 5 mV sensitivity now, and mainframe capabilities for 100 MHz. The new all-solid-state, 30-pound 181A Variable Persistence and Storage Oscilloscope lets you see even more—do even more!

See more with the new 181A's variable persistence—made possible by the extra-large rectangular CRT using hp's exclusive mesh storage design. Use it to see low rep rate pulses which brighten as each trace reinforces the previous one. Check signal trends by adjusting persistence so several traces are on CRT simultaneously. Vary persistence from 0.2 sec to more than a minute.

Do more with hp's new scope with a memory! Store traces for more than an hour—overnight or even weeks if scope is turned off. Catch and store single-shot transients with the 181A's fast writing rate of 1 cm/μsec. Use it to get a graphic display of critical parameters prior to system failure, activation of a safety device, or excursion beyond some predetermined limit.

Get an extra measure of performance! You get the same step-ahead electrical performance, lightweight portability and rugged design that you have with the standard 180A. All the 180 Series Plug-ins give full performance in the 181A mainframe. You get 50 MHz bandwidth, 7 ns rise time, 5 mV/cm sensitivity, mixed sweep—*and variable persistence and storage!*

Get the full story on the new hp scope with a memory. Ask your hp field engineer for full specifications on the new hp 181A Oscilloscope. Or, write to Hewlett-Packard, Palo Alto, California 94304. Europe: 54 Route des Acacias, Geneva. Price: hp 181A Oscilloscope, $1850; hp 181AR Oscilloscope (Rack Mount), $1925; hp 1801A Dual Channel Amplifier, $650; hp 1820A Time Base, $475; hp 1821A Time Base and Delay Generator $800.

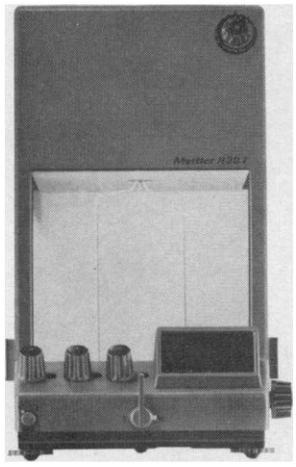
087/34

HEWLETT hp PACKARD

OSCILLOSCOPE SYSTEMS

Mettler unleashes its new breed of balances on the weighing world

The six balances of the new Mettler H series are setting the weighing world on its arrestment mechanism. Five of them – three macro analyticals and two semi-micro analyticals – have full-range taring, digital data presentation and a filling guide. Of these, one also has preweighing and two have digital printout of weighing results. The sixth is an electronic balance designed to work jack-in-plug with a computer.



the new shape

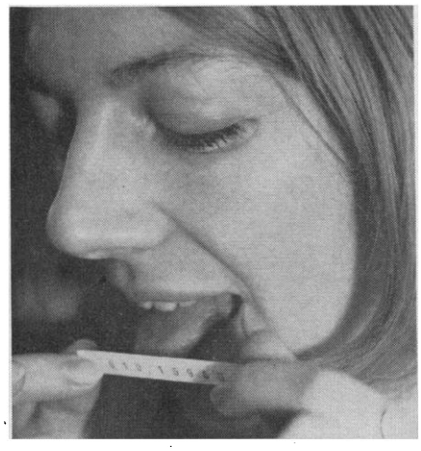
DOWN WITH ARITHMETIC

Unrestricted taring through their full capacity is a prime feature of the new analyticals. The weight of your container can be tared off in seconds, letting you begin weighing-in with the readout at zero. If you are adding several components, you can dial back to zero for each one. With all weighings beginning at zero, you just can't make a mistake. Unless you are unnecessarily obdurate.

FIRST GUTENBERG, THEN METTLER

Two of the new balances, the H10P macro and the H20P semi-micro, have the Mettler printout system. Weighing results are printed out, at the push of a button, in all-digital form. They are printed on the adhesive-backed paper tape you see on telegrams. (Mettler's Marketing Director wanted to call this feature "Tell-a-gram" but we hooted him down.)

You can affix weighing data directly to sample containers, laboratory notebooks or other records. You can't misread, transpose, or forget your weighing results.

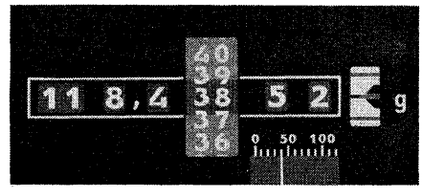


m-m-mmmm

The one thing we haven't done is to lick the tape for you – you must find a way to do it yourself. If you are too fastidious to lick it, just call a friend.

LINE UP, YOU DIGITS!

All the new analyticals have their weighing results presented in aligned, all-numerical form. This speeds reading the data and avoids errors from misreading tricky verniers and micrometers.



to 0.001 mg.

The digital readout panel and controls are conveniently grouped for easy operation and reading.

PREWEIGH OUR WAY

One instrument, the Mettler H10TW, offers improved preweighing for direct indication of rough weight. When preweighing, part of the optical scale is blocked out to avoid any risk of mistaking the preliminary value for the final result.

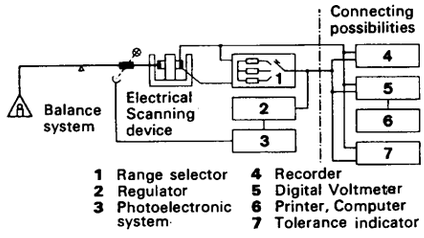
Further, the Mettler preweighing system operates over the full 160-gram range of the balance, eliminating the need for an additional dialing step if the unknown is more than 100 grams.

GUIDE TO GRACIOUS FILLING

Well over half of the hours spent before a balance are used for weighing-in. The filling guide on each of our new analyticals lets you do the job without the usual repeated interruptions. No overshooting the target weight or waiting for the optical scale to stop whizzing past . . . you proceed in orderly fashion, continuously adding your material right up to all but the final few milligrams. Our analyticals, the only ones ever to have a filling guide, can cut those hours spent at weighing-in by at least 50%.

BALANCE WITH ELECTRICAL OUTPUT

Last and most unusual of the new Mettler breed is the H20E electronic balance. It provides an analog signal for use with such instrumentation as recorders and analog-to-digital converters. It can be used to record weight changes, to code weight values into punch cards or paper tape, to print weight values by accounting machines, and to sort and control objects or processes within given weight tolerances.



1 Range selector
2 Regulator
3 Photoelectronic system
4 Recorder
5 Digital Voltmeter
6 Printer, Computer
7 Tolerance indicator

Mettler H20E, figuratively

How you use it depends upon your needs – and you know them better than we do. We don't know the answers to all your problems. Just holding our position as the world's leading balance maker takes a lot out of us.

BALANCE AFICIONADOS TAKE NOTE

The redoubtable Kolthoff and Elving TREATISE ON ANALYTICAL CHEMISTRY, Volume 7 (Interscience 1967) contains a chapter that serious students, analytical chemists and research chemists might well note. Written by Lloyd B. Macurdy, Mettler's well-known staff metrologist, it is a definitive approach to the measurement of mass. History, definitions, instrumentation, units of mass, uncertainties of weighing and the elimination thereof . . . they're all there.

DO IT NOW . . .

Write for complete product literature on the new H balances. We are Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540.

Mettler®

26 January 1968
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SCIENCE

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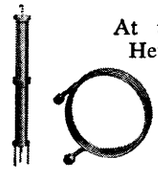
COVER

Snow cones formed in storage building at Amundsen-Scott South Pole Station. Fine snow sifting through small bolt holes in the arches gradually piles up to a height of 7 to 8 feet. Temperature within the building remains between −55° and −70°F. See page 407. [Charles Roberts, Environmental Science Services Administration, Silver Spring, Maryland]

A close look at the pill and other molecules ...with effective instruments

The Art of Making Fine Chemicals



At the 1965 Pittsburgh Conference, Hewlett-Packard introduced to the chemical industry a large-scale preparative gas chromatograph. Where prep GC had previously been limited to producing, at best, a few *milliliters* of high-purity chemicals during a long day's operation, this new H-P instrument easily separated a *liter* of equally pure materials in a few hours.

As is often the case with technological advancements that suggest a commercial value, incredulity ensued—partly because claims about the instrument were misunderstood, partly because the largest element of the scientific community is from Missouri. Large-scale prep GC became one of 1965's chemical controversies. Yet today, a scant 3 years later, H-P's large-scale prep GC is a fixture in scores of chemical companies around the world, on the basis of its *demonstrated* rather than claimed capabilities.

The characteristic elements of the H-P instrument are the 4-inch diameter column whose relative capacity ratio is more than 100 times greater than conventional prep columns; and the flow homogenizer, an ingenious piece of hardware that removed the last barrier to the use of such large columns, i.e., non-uniform carrier gas flow leading to loss of resolution. Because of these two elements, the instrument has a gargantuan appetite for performing high-purity separations. For example, it separated a gallon of rectified turpentine (that's almost 4 liters) into 1733 milliliters of α-pinene, 701 milliliters of β-pinene, both with a purity of over 98%; instrument running time was 30 hours. In a 7-hour run, the instrument separated 970 milliliters of C_8, C_9 and C_{10} methyl esters, collecting 906 milliliters in the following purities: C_8 and C_{10}, 99.8%; C_9, 99.2%. The same work would have taken 6 months on a conventional prep GC.

Based on these and many similar separations, the importance to the chemist of the H-P prep GC is easily described: it produces high-purity chemicals so fast, so conveniently, and so economically that every chemist who needs them—analytical, organic, biomedical—can now prepare his own, whether he needs a microliter or several liters of a pure substance . . . for use in reaction studies, for analysis, or even for commercial purposes. Of course if all three types of chemists work in the same lab, the H-P prep GC also creates a new problem: who gets to use it first. For help in solving most prep GC problems except this one, write for Data Sheet 775/6.

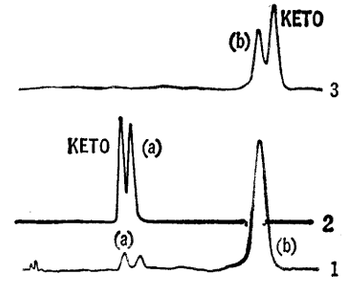
Pandora's Pill Box

Although five to seven million American women have already consumed more than four billion oral contraceptives, there is still much uncertainty concerning their long-term effect on the human body.

The issues are scientific and the questions involve chemistry, biochemistry and physiology . . . endocrinology, pharmacology, and gynecology. The answers are in widespread research in every scientific discipline concerned.

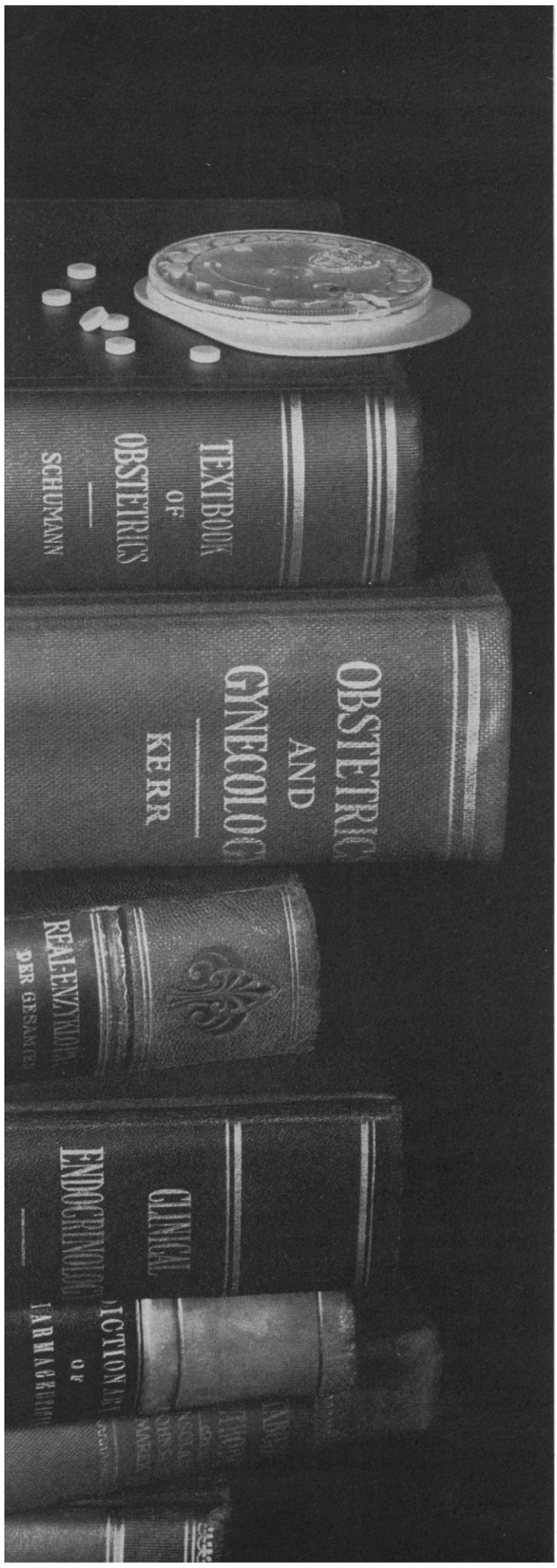
It is in the chemical and biochemical disciplines that Hewlett-Packard assumes its concern with the massive anti-fertility drug research program, specifically, through its Gas Chromatography Applications Laboratory, in Avondale, Pa. Thus far, Avondale's involvement has centered around two of the most widely used synthetic hormones: *Norethindrone* and *Mestranol*. Both are labile steroids, subject to thermal degradation. When these steroids break down—whether during manufacture, in the human environment, or during analysis—they form a keto analog so similar in chemical structure to the original molecule that it is extremely difficult to differentiate one from the other. The rub is that the scientist *must* be able to tell them apart since the steroid is an effective anti-fertility agent while the keto analog is not.

Thus there can be no confidence in any chemical analysis of the pill unless it is first demonstrated that the analytical procedure can separate the steroid from its keto analog . . . and that it can preserve the chemical integrity of the two types of molecules during the analysis.



As far back as 1964, our application chemists proved that the Model 402 High-Efficiency Gas Chromatograph has both capabilities. The proof is presented here in the form of three chromatograms. The first, an analysis of a sample containing the two steroids, shows the presence of *Norethindrone* (b) and *Mestranol* (a), and the absence of their keto analogs: this is proof that the 402 respects the chemical integrity of the steroids. If the Model 402 were causing degradation of the steroids, the chromatogram would show the presence of at least some quantity of the keto analogs. The second chromatogram shows the presence of both the steroid *Mestranol* and its keto analog, thus demonstrating the 402's ability to separate one from the other when the two coexist in a sample. The same is true of the third chromatogram, this time with respect to *Norethindrone*.

Lest it become obscure at this point, the noteworthiness of these analyses is twofold: they demonstrate the 402's ability to detect the labile steroids used in anti-fertility drugs without causing degradation during the analytical procedure; and its ability to separate compound pairs of such steroids one from the other and from their keto analogs. Extrapolating from these points, the 402 can be seen as a fast means for quality control in anti-fertility drug preparation, as the basis for investigation of its clinical progress and beyond that as a possible means for *in vivo* patient monitoring. A report of the anti-fertility drug analysis as it was originally presented in *Facts & Methods*, Vol. 5 No. 3, is available on request.



Molecules and Microwaves

Most new laboratory instruments are developed to satisfy a demand, usually at the same time the demand occurs. On rare occasions, an instrument whose unique capabilities promise to advance the state-of-the-art in a particular branch of science makes an appearance so far ahead of a clear demand for it that its immediate commercial value can be questioned.

Precisely such an instrument is the Hewlett-Packard Model 8400B Microwave Spectrometer. It fits all descriptions of a technological and scientific breakthrough, although it is much closer to home in the area of current and useful application than the preceding discourse might indicate.

In simplest operational terms, the Microwave Spectrometer looks into the molecular structure of a compound by measuring its absorption frequencies during an X, R, or K band sweep. It makes molecular determinations by using the microwave to measure changes in *rotational* energy levels in a molecule. Because differences exist in the geometry of individual molecular species, the microwave spectrum for an individual molecule is characteristic for that species. A logical objection, if you're up on your species, is that most compounds would present a tremendous number of absorption peaks. True. But with the 8400B it is relatively easy to differentiate spectra of two different species because of the inherent high resolution of microwave spectroscopy, in conjunction with an accurate means of measuring microwave frequencies.

In terms of its application, the Microwave Spectrometer provides a means of measuring the total amount of information available from gas-phase microwave spectroscopy absorption lines—frequency, intensity, line width or relaxation rates. This, in turn, permits researchers to delve into such areas as molecule identification, molecular concentration, bond distance, bond angle, molecular vibrational levels, barriers hindering internal rotation, equilibrium constants, molecular collision rates, and reaction kinetics.

Precisely where the Microwave Spectrometer fits into the pattern of modern chemistry is still being studied, but early indications show it may well establish patterns of its own. Based on a recent experiment it has already carved one niche—and an important field of study for the microwave spectroscopist—in the detection and quantitative determination of components in a complex, gaseous, molecular mixture differing only in isotopic composition. (The experiment was to determine the relative concentration of $C^{13}H_3C^{13}CH$ to $C^{13}H_3CC^{13}H$ in C^{13} enriched methyl acetylene.) Such experiments are published as regularly as they occur in H-P's newest publication, *Molecules and Microwaves,* a copy of which awaits your request to Hewlett-Packard, 1501 Page Mill Road, Palo Alto, California 94304. Europe: 54 Route des Acacias, Geneva.

HEWLETT hp PACKARD

ANALYTICAL INSTRUMENTS

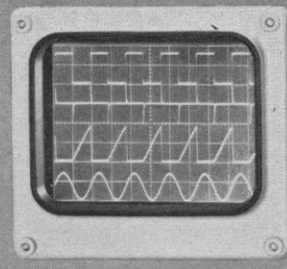
00771A

SPLIT SCREEN storage features multi-trace plug-ins

Four-trace

Use the entire screen for stored displays and make four-trace time and voltage measurements from DC-to-2 MHz with a deflection factor range from 20 mV/div to 10 V/div.

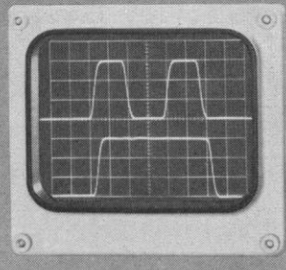
Type 3A74 Plug-in.....$ 625



Dual-trace differential

Either half of the split-screen can be used for a stored display, the other half for a non-stored display. Make dual-trace, DC-to-500 kHz differential measurements with a 100-μV/div deflection factor and a 50,000:1 common-mode rejection ratio.

Type 3A3 Differential Plug-in .....$ 825



Dual-trace

Use the entire screen for non-stored displays with dual-trace, DC-to-10 MHz bandwidth, 35-ns risetime and a 10-mV/div to 10-V/div deflection factor.

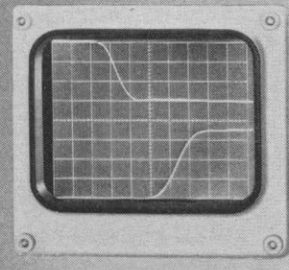
Type 3A6 Dual-Trace Plug-in $ 525

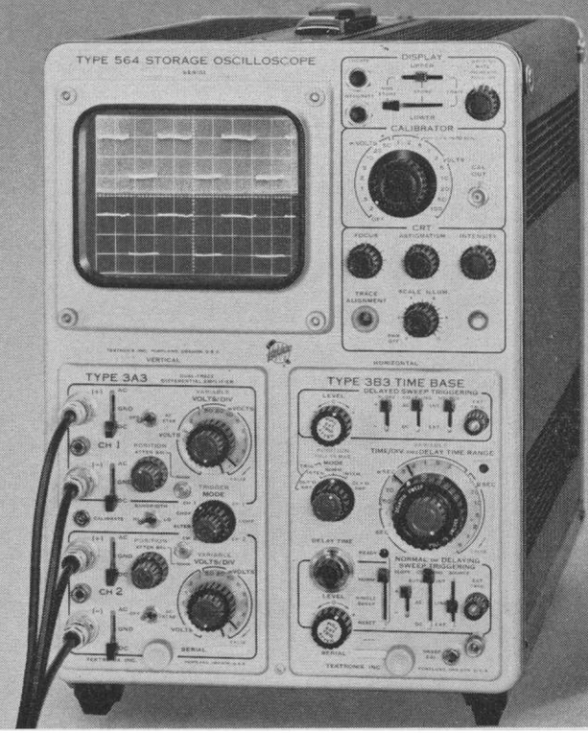
Dual-trace sampling

Each half of the split-screen can be used independently for stored displays. Extend your dual-trace measurement capabilities to 1 GHz with 350-ps risetime, internal triggering and sweep rates to 20 ps/div.

Type 3T77A Sampling Time-Base .....$ 690

Type 3S1 Dual-Trace Sampling Amplifier $1150





The Tektronix Type 564 Storage Oscilloscope is virtually two instruments in one, offering all the advantages of a split-screen storage oscilloscope, plus those of a conventional plug-in oscilloscope. A complete selection of plug-ins permits you to change your oscilloscope performance to meet your changing measurement needs.

The Type 564 Split-Screen Storage Oscilloscope enables you to use the entire screen or either half for storage and/or conventional displays. The contrast ratio and brightness of the stored displays are constant and independent of viewing time, writing and sweep rates, or signal repetition rates.

The Type 564 has dual plug-in flexibility with vertical and horizontal plug-in units. Amplifier plug-ins offer a wide range of measurement capabilities with 10-MHz multi-trace, 10-μV differential, spectrum analyzer and 350-ps sampling plug-ins. Time-base plug-ins include delayed sweep, X50 magnifier, single time-bases and sampling time-bases. Amplifier plug-ins may be placed in the horizontal position for X-Y or multiple X-Y displays and automatic seeking plug-ins are available.

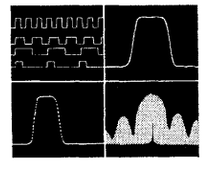
For a demonstration of the Type 564, contact your nearby Tektronix Field Engineer or write: Tektronix, Inc., P. O. Box 500, Beaverton, Oregon 97005.

Type 564 Storage Oscilloscope.....$ 925
Rack-Mount RM564 Storage Oscilloscope (7" high).....$1025
Type 3B3 Time-Base Plug-in.....$ 625
Sweep rates from 1 s/div to 500 ns/div extending to 100 ns/div with the X5 magnifier. Calibrated sweep delay from 500 ns to 10 seconds.

U.S. Sales Prices FOB Beaverton, Oregon

TEKTRONIX

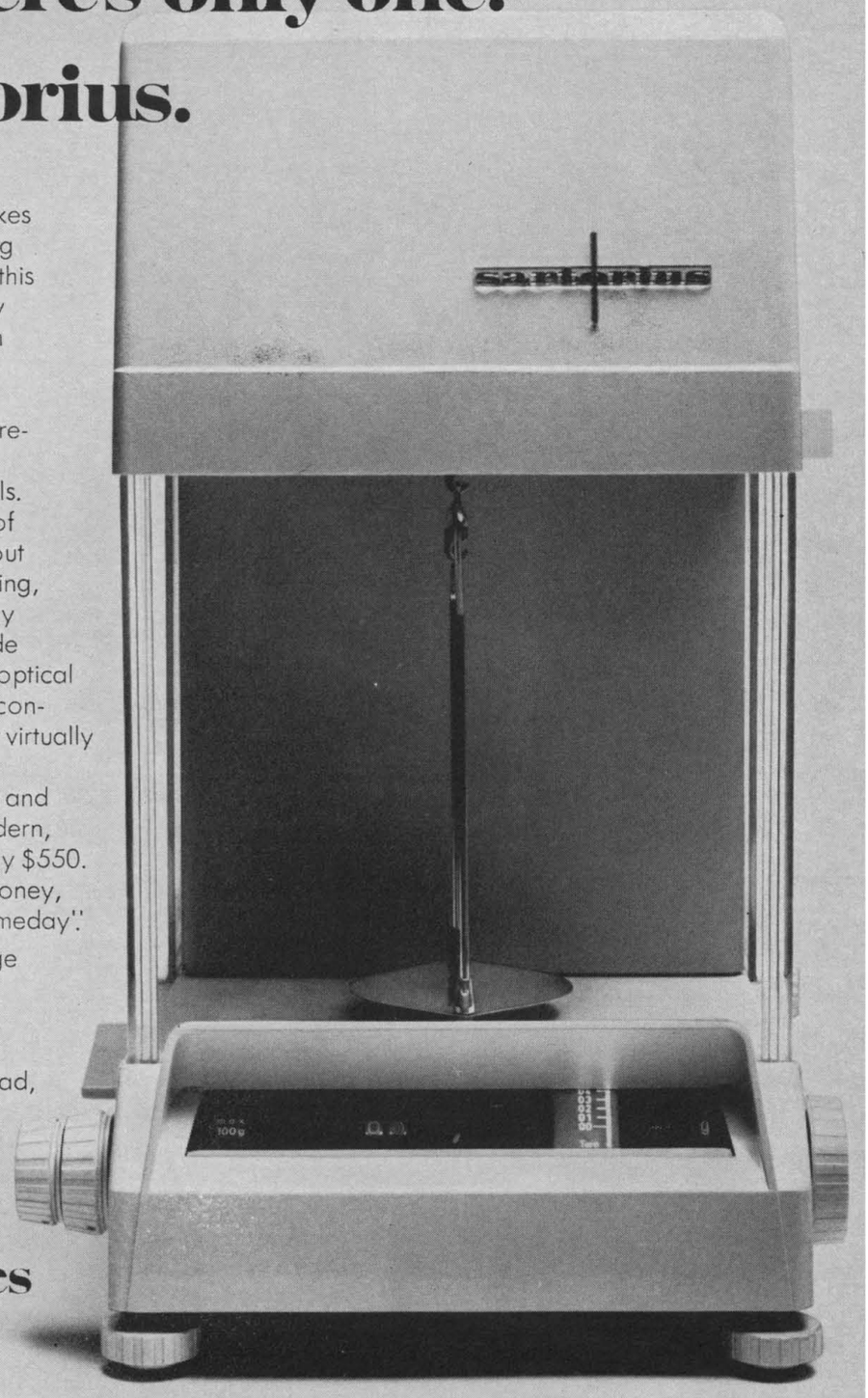
Conventional or storage oscilloscopes



...with multi-trace, differential, sampling and spectrum analyzer plug-ins

Someday, there may be other balances with automatic pre-weighing for as low as $550. Today, there's only one.

The Sartorius.



We're gratified to see other makes of laboratory balances finally offering automatic pre-weighing. We've had this important feature for years. Someday perhaps, they'll also be able to match us in price.

Meanwhile, our Model 2743 laboratory balance with automatic pre-weighing costs only $550, hundreds of dollars less than competitive models.

In addition to the convenience of obtaining instant coarse weight without time consuming "trial and error" dialing, the Sartorius 2743 also provides many other important features. These include all-digital read-out to 0.1 mg., 1 gm. optical range, readily accessible table-level controls, and a 100 gm. capacity to meet virtually all analytical weighing requirements.

The Sartorius 2743 offers all this and automatic pre-weighing too, in a modern, functionally designed balance for only $550.

That's a lot of balance for the money, and you can get it right now, not "someday".

Comparing prices? Our 28-page balance catalog may prove helpful. We'll gladly send you a copy.

Just write: Sartorius Division, Brinkmann Instruments, Cantiague Road, Westbury, N.Y. 11590

sartorius balances

to military rather than educational purposes.

Southeast Asia is considerably larger geographically and demographically than the United States, yet its publishing and educational possibilities are not usually mentioned in the same breath with our own or those of Europe. In Hong Kong, the Cathay Press has for years been producing some of the world's most expert printing. And in Singapore and Kuala Lumpur, Far Eastern Publishers, led by a young Chinese executive, issues textbooks and books for children in press runs of more than a half million copies. Their biggest sales are to governments (Australia, for one); it publishes and prints, not only in English, but in Tamil and Malay, to allow for the possibility of mass sales. Its paper, color illustrations, and printing methods are excellent. Such developments push their way into the rosy picture although low labor costs may make problems for any contemplated cooperation or competition from Europe or the United States.

PAUL BIXLER
Olive Kettering Library, Antioch College, Yellow Springs, Ohio 45387

Is Nuclear Power "Clean" Power?

Science and its contributor Nelson ("Thermal pollution: Senator Muskie tells AEC to cool it," 10 Nov., p. 755) missed an important opportunity to exorcise an irresponsible demon that has been invoked to plague the nuclear power industry. Nobody denies that power plants (except hydroelectric stations) need cooling water. Nelson's article, however, leaves the unfortunate impression that thermal pollution is a problem peculiar to nuclear plants. As nuclear engineers, we would like to know how conventional steam plants are able to circumvent the second law of thermodynamics!

Science can be more objective. It may be "ironic" to Nelson that nuclear power is advertised as "clean." We submit that clean air is preferable to dirty air. Further, inasmuch as most of the nation's hydroelectric potential is already in use, it seems that the real choice for the future is between "thermal pollution" and a shortage of electric power.

DAVID L. HETRICK
ROBERT L. SEALE
Department of Nuclear Engineering, University of Arizona, Tucson 85721

Latin America: Dangers to Rainfall

So far, the discussion of the Amazon basin (Letters, 14 July, 1 Sept., 10 Nov.) has not covered one point that, in the long run, may prove to be of greater importance than the conservation of species of animal and plant life. The evapotranspiration of a dense evergreen tropical forest is practically equal to the evaporation of an open water surface of the same area. When the huge forests of the Amazon basin are replaced by anything else (except lakes), the water budget of the region will change in the sense that runoff will be increased and evapotranspiration decreased. At the present time, a great percentage (how great is not known) is carried away to the north where it falls as rain over Venezuela and parts of Colombia. It is also probable that part of the rains falling in central Brazil is caused by the evapotranspiration of the Amazon forests.

If the vegetation of the Amazon basin should be drastically changed by man, then, in the course of time, the rainfall rates of Venezuela, parts of Colombia, and central Brazil would decrease. Since large portions of these areas receive rainfall totals that are already rather small for tropical temperatures, a systematic reduction in rainfall would produce substantial changes in the habitability of those lands.

WILFRIED HELMUT PORTIG
U.S. Army Tropic Test Center, Research Division, Fort Clayton, Canal Zone

Evaluating Dreams and the Dreamer

S. L. Washburn, in his review of *Social Communication among Primates* (27 Oct., p. 481), classes as "obsolete theories of behavior which . . . considered internal events as unascertainable in principle."

He is right, but for the wrong reason. The "internal events" which have been a stumbling block are not those which demanded specially subtle techniques, such as brain stimulation and telemetry, but those which are indeed unascertainable except through the subject's report. A class of such events exists because subjects are undeniably observers too: we can observe rapid-eye-movement sleep, but we cannot know except by asking the subject,

The new HU-11E: the world's highest resolution electron microscope. It also offers the maximum in operating convenience.

The Hitachi-Perkin-Elmer Model HU-11E has a guaranteed resolution of five Angstroms. Better than 1.5 Angstroms has been demonstrated.

And we've made the HU-11E as automatic and as easy to operate as possible. It's easy to align, easy to compensate, easy to focus. So it's easy to take ultra-high resolution micrographs with it.

For instance, we've incorporated a new electromagnetic gun-tilting device that gives you perfect alignment of the electron gun with respect to the condenser lenses. Plenty of brightness is available at direct magnifications to 300,000X.

Beneath the condensers we've added an exclusive new alignment coil. It keeps the beam centered from the lowest to highest magnifications.

There's a new electron gun airlock. If a filament burns out, you don't have to open the column to atmosphere. This is important for cleanliness, especially when you're doing ultra-high resolution work.

The magnification range is from 1000X to 300,000X direct without disturbing alignment or changing pole pieces. The magnification range is covered in 23 steps—direct reading or continuously. 250X for scanning is available just by flipping a single switch.

Accelerating voltages of 25, 50, 75 and 100 KV allow you to select the optimum voltage for any type of specimen. Lens currents are automatically changed when the accelerating voltage is changed. Super-stabilized electronics provide stabilities of 1.5 parts per million on the objective lens.

The HU-11E is equipped with a pushbutton vacuum system and a pushbutton camera system. Correct exposures are automatic. It incorporates the very latest in vacuum system design and the best anti-contamination measures, insuring a contamination rate below 0.1A/min.

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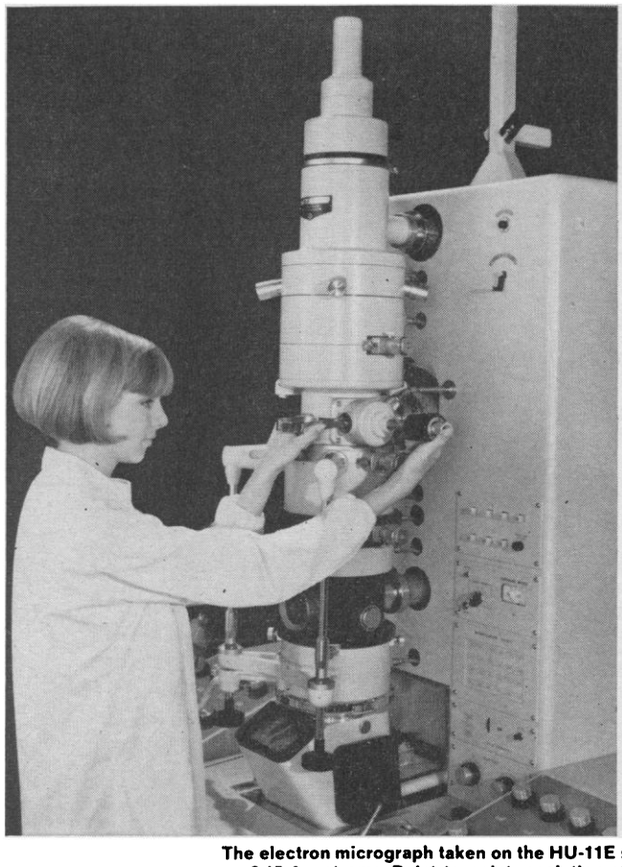

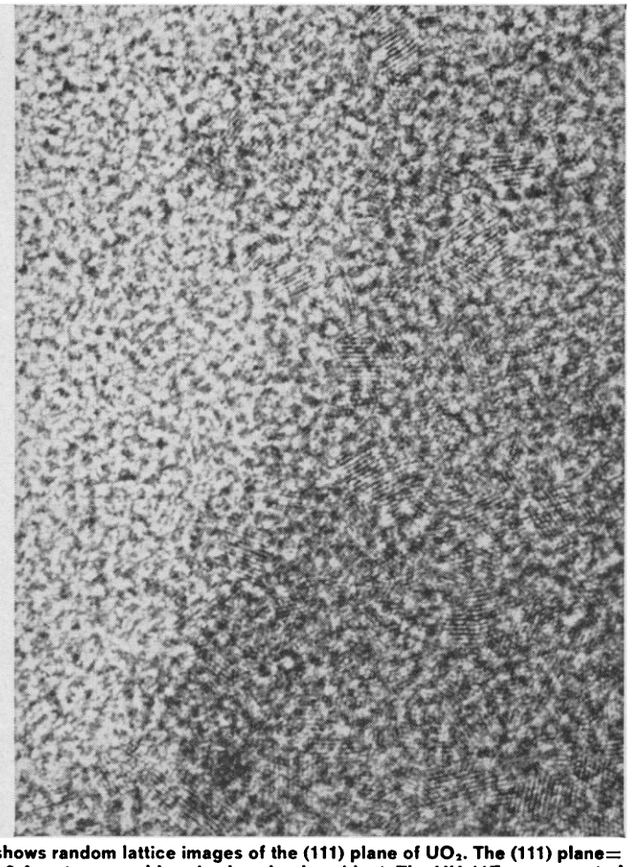

The electron micrograph taken on the HU-11E shows random lattice images of the (111) plane of UO_2. The (111) plane= 3.15 Angstroms. Point-to-point resolution of 3 Angstroms and less is also clearly evident. The HU-11E was operated at an accelerating voltage of 100 KV and an electron optical magnification of 200,000X. Final magnification is 2,000,000X.

whether and what he dreamed, for "his dream" means a particular event known only to him. The knotty problem has always been to construct theory which coordinates the subject's observations with those of the other observers. Knowing more about what happens in the "black box" may be expected to shed light on this problem, but not to annihilate it.

SAM NELKEN
2211 Post Street, Suite 1,
San Francisco, California 94115

Discriminating and Insulting

In discussing openings for Negro engineers, Oliver's logic is so foggy, I simply cannot understand it (Letters, 1 Dec.). I am reminded that as a male librarian I am often interviewed because of that fact. Whenever this happens, I am seized by an irrational anger. . . . I cannot help but feel for the engineer who is hired because he happens to be a Negro. At best this is stupid; at worst, it is a grievous insult to the particular individual's intelligence and individuality. . . .

ROBERT G. CHESHIER
Cleveland Health Sciences Library,
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Cleveland, Ohio 44106

Oliver tells of a recruiting agent who, under government pressure was actively seeking Negroes, qualified or otherwise. Can anyone explain to me just how this differs from discrimination on account of color, a procedure declared illegal by act of Congress?

EARL W. PHELAN
Department of Chemistry,
Tusculum College,
Greenville, Tennessee 37743

Government Quickens Its Information Transfer

Budington (Letters, 20 Oct.) complains that the slow process of obtaining results of Department of Defense-sponsored research discourages the belief that the government is much interested in information transfer. The Clearinghouse for Federal Scientific and Technical Information announces the availability of unclassified or unlimited government-sponsored (DOD, NASA, AEC, Commerce, and others) scientific and technical documents to the techni-

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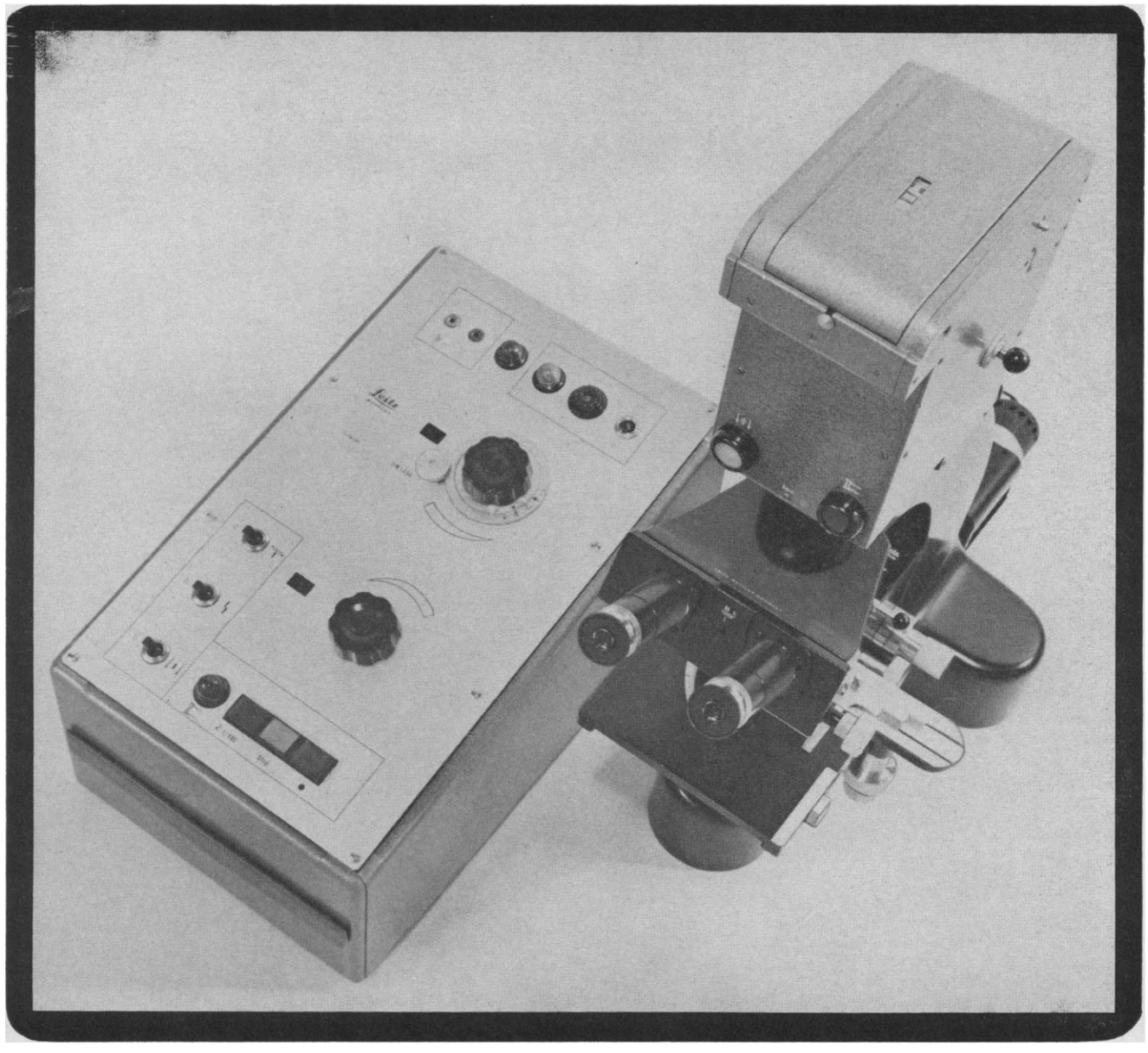
HUBERT E. SAUTER
Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151

Thoreau's Dilemma

Henry David Thoreau is treated more often these days as a philosopher or poet than as a scientist. But in his own time, he was included in the latter category; at least the Secretary of the Association for the Advancement of Science tendered him a questionnaire asking him to designate his special field of scientific interest. This question was not so easily answered, however, as Thoreau makes plain in the following entry in his *Journal* (5 March 1853):

> The Secretary of the Association for the Advancement of Science requests me, as he probably has thousands of others, by a printed circular letter from Washington the other day, to fill the blank against certain questions, among which the most important one was what branch of science I was specially interested in, using the term science in the most comprehensive sense possible. Now, though I could state to a select few that department of human inquiry which engages me, and should be rejoiced at an opportunity to do so, I felt that it would be to make myself the laughing-stock of the scientific community to describe or attempt to describe to them that branch of science which specially interests me, inasmuch as they do not believe in a science which deals with the higher law. So I was obliged to speak to their condition and describe to them that poor part of me which alone they can understand. The fact is I am a mystic, a transcendentalist, and a natural philosopher to boot. Now I think of it, I should have told them at once that I was a transcendentalist. That would have been the shortest way of telling them that they would not understand my explanations.

ELMER S. NEWMAN
Cleveland State University, Cleveland, Ohio 44115



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26 January 1968, Volume 159, Number 3813

SCIENCE

International Medical Research and the Gold Drain

Recognizing that advances in medicine in other countries are usually transmitted quickly to the United States, the National Institutes of Health has maintained modest international programs involving 1 to 2 percent of the total NIH budget. These programs have supported many of the world's best medical research workers in about 60 nations. In fiscal 1967, the NIH international effort amounted to $20 million, including $8.5 million for research grants, $1.2 million to visiting scientists to the U.S., $1.2 million to international postdoctoral fellows, and $1.7 million to U.S. fellows and trainees overseas.

Excellent mechanisms have been employed to assure that highly qualified individuals are selected for support. For instance, grant applications are examined for scientific merit by distinguished nongovernment American scientists who constitute the major fraction of the NIH study sections. Foreign applications are reviewed along with domestic proposals, and must be outstandingly good to receive a favorable rating. Foreign proposals are subject to additional review to assure that the projects funded utilize scientific resources and opportunities not available in the United States.

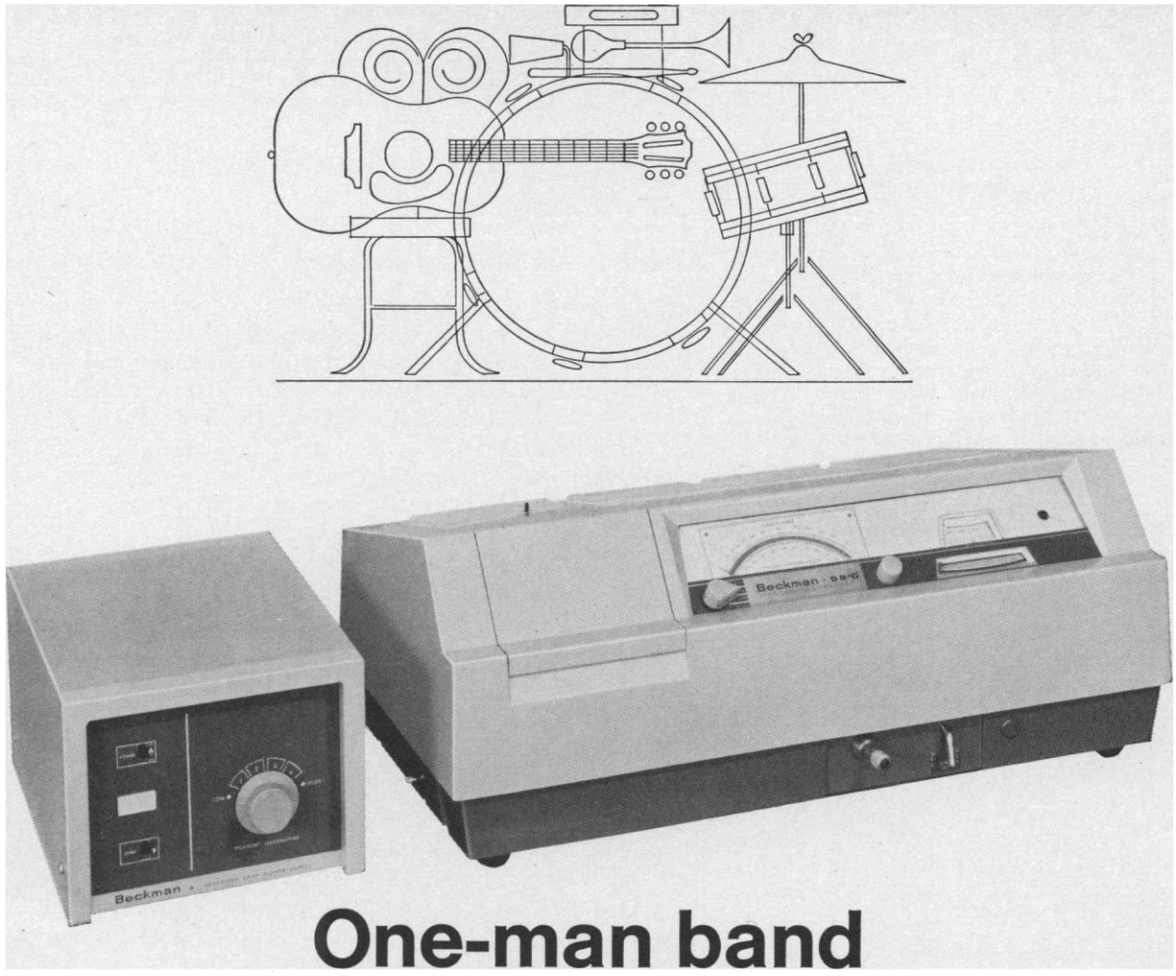
The roster of those receiving grant support in 1967 totaled 624. It included the names of leaders in biochemistry, immunology, physiology, and clinical research. The NIH, in meeting the challenge of advancing the medical sciences and improving the health of the American people, has made a wise choice in supporting excellence abroad. In effect, a comparatively few U.S. workers have been denied grants so that some of the world's best could be supported.

The international programs carry with them benefits besides the direct advancement of medicine. Today, the most rapid and effective interchange of scientific information occurs by means of informal mechanisms such as invisible colleges. These are fostered to a degree by the research grants, but especially by the Fellowship and Visiting Scientists programs. Another important aspect of the international programs is their contribution to goodwill for the United States. At a time when this country faces widespread criticism of its role in Viet Nam, even modest offsetting favorable comments are important.

Two incidents illustrate some of the benefits of the NIH programs. A year ago, Jacques Monod was a recipient of the Nobel prize. On being told of the award, he informed a world audience of the help he had received from the United States. Until a few months ago, comparatively few people knew of Dr. Christiaan Barnard of South Africa. Suddenly it was evident that he was a well-trained heart surgeon with command of the most advanced knowledge and techniques relevant to his effort. In December 1967, while he was being lionized in the United States, Barnard told of his gratitude for the training and financial support he had received from the United States during his formative years.

Financial support of the NIH international effort reached a peak in 1964 and has declined since then. One of the hardest-hit activities has been the Research Grants program. As a result of congressional pressure it declined from $15 million in fiscal 1963 to $8.5 million in fiscal 1967. The international program now faces further attrition. By meat-axing the international programs, the United States can cut its gold drain by a few million dollars. However, the cost will be severe in terms of medical progress and in terms of goodwill abroad.

—PHILIP H. ABELSON



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The proceedings of the conference were critically analyzed by Dick (London) and by Gard (Stockholm), in the form of summarizing statements. The conference was sponsored by the National Institute of Neurological Diseases and Blindness. The complete texts of the papers and the discussions will be published as a supplement to *Neurology* scheduled to appear in the beginning of 1968.

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Soil Geomorphology Field Conference: North Carolina

The Soil Science Society of America, in cooperation with the Soil Conservation Service of the U.S. Department of Agriculture and North Carolina State University, sponsored a 2-day field conference 4–5 November 1967, in the vicinity of Benson and Wilson, North Carolina, to observe geomorphic-soil interrelationships on the upper and middle Coastal Plain surfaces.

The field conference was designed to demonstrate relationships between geomorphic surfaces and soils as revealed by 8 years of field work begun in January 1960 in a cooperative project of the Soil Investigations Division of the Soil Conservation Service and the Soil Science Department of North Carolina State University, with additional support of National Science Foundation. Raymond B. Daniels (Soil Conservation Service), who has been in charge of the project since its inception, was the field conference leader.

Approximately 70 soil scientists, geologists, and physical geographers (55 of them from the District of Columbia and 12 states other than North Carolina) attended the conference, which was scheduled in conjunction with the annual meetings of the Soil Science Society of America the following week in Washington, D.C.

The detailed study divided the Coastal Plain into three subdivisions: the upper, middle, and lower areas, based on stratigraphic and geomorphic relations. In the study area the upper Coastal Plain was found to occur above the Coats scarp with a toe altitude of 275 feet; the middle area, between the Coats scarp and the Surry scarp, toe altitude 94 feet; and the lower area, between the Surry scarp and sea level.

Major changes in geomorphology, stratigraphy, and soils corresponded with the upper, middle, and lower subdivisions. Well- and moderately well-drained soils in medium and fine-textured sediments on the upper and middle Coastal Plain surfaces were found to be paleudults, whose generalized eastern boundary was the Surry scarp. The presence of plinthite characterized the soil profiles of the upper Coastal Plain; fragipans, the middle Coastal Plain.

Information obtained in this study will help explain the soil-geomorphic relationships elsewhere on the Coastal Plain in North Carolina and in the other Coastal Plain states. It is proving invaluable in establishing the new soil classification system on the Coastal Plain, in improving the accuracy and speed of mapping Coastal Plain soils, and in furnishing background information for research on fertilization and for managing the soils.

The North Carolina field conference was held in response to a request by a Soil Science Society of America soil-geomorphology committee for a field conference where graduate students and young scientists in the fields of geology, soil science, and geography could participate with their more experienced colleagues. It also aimed to foster an interdisciplinary approach among geology, soil science, and geography. Last, but certainly not least, the committee had requested the field conference be held in North Carolina to observe how an integrated use of soil morphology and geomorphology was used to determine and understand soil-landscape relationships.

In terms of planning and direction, the well-written 50-page guide book and road log, and the number of interested participants, it was an eminently successful conference.

The committee is considering the holding of a second field conference in the midwest in the fall of 1969. Should such a conference be held, sponsorship by the Geological Society of America and the Association of American Geographers in addition to the Soil Science Society of America, would be essential. Such an arrangement is more apt to accomplish the goal of the committee—the improvement of interdisciplinary relations.

O. W. BIDWELL
Soil Science Society of America, Kansas State University, Manhattan