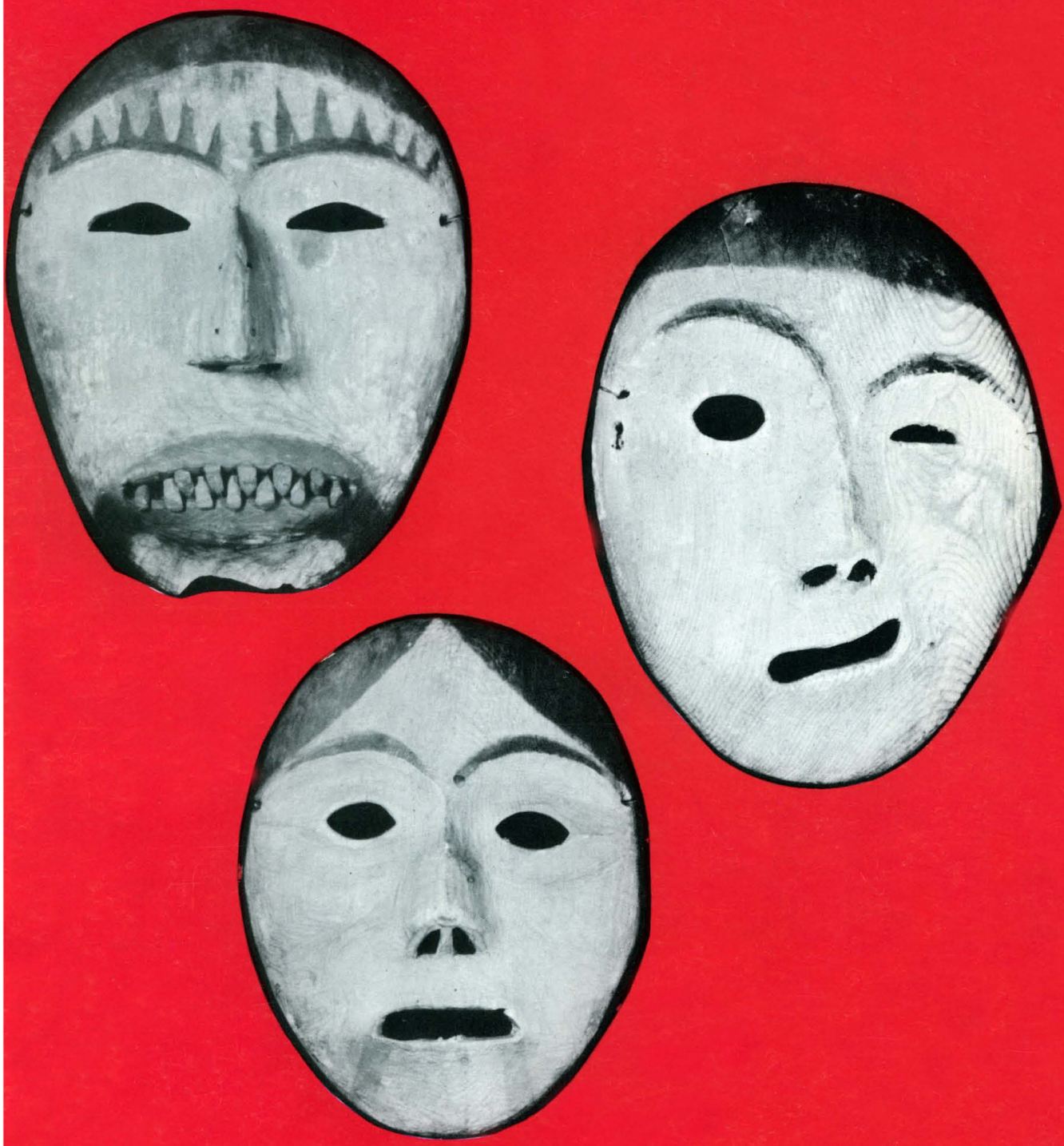
SCIENCE

29 December 1967

Vol. 158, No. 3809

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

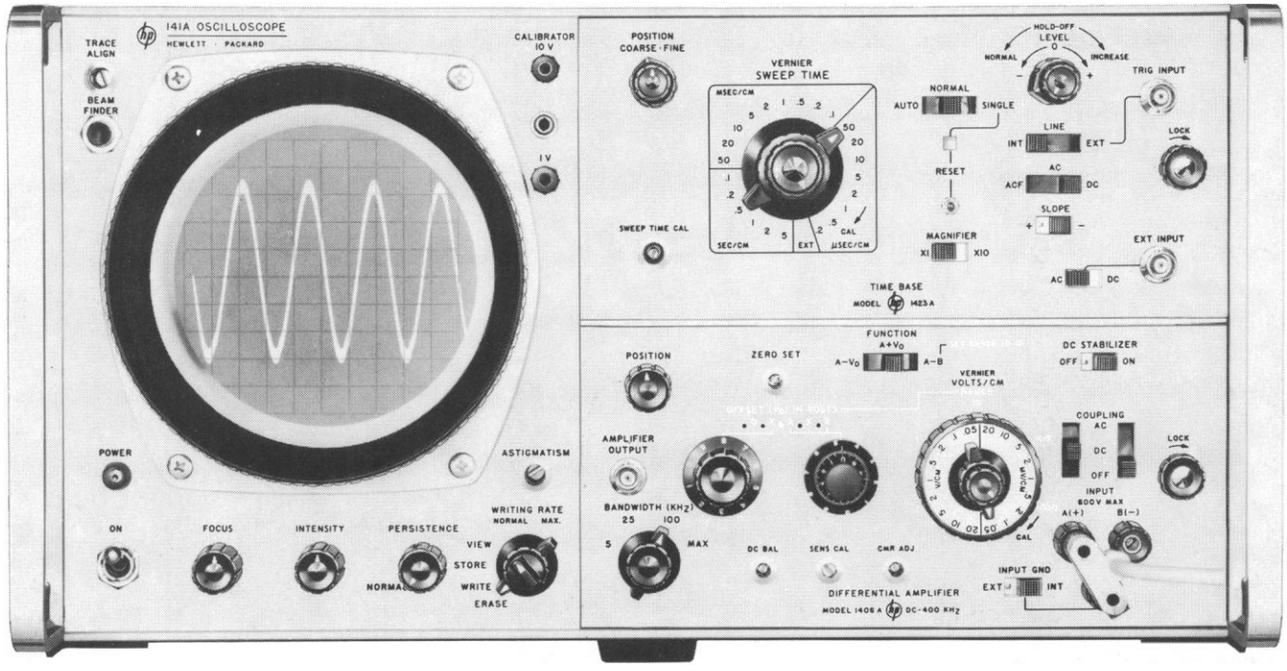


Index Issue

ESKIMO MASKS

hp 140A—The Scope System that gives you

PRECISION DC & AC MEASUREMENTS



hp 140A: PERFORMANCE IN ANY DIRECTION
20 MHz Wideband • High-Sensitivity, no drift • 150 ps TDR • 12.4 GHz Sampling • Variable Persistence and Storage

Zero drift, calibrated offset, DC coupled, 50 μv/cm The versatile hp 140A Scope System gives you a choice of 17 plug-ins—five of them especially designed for high sensitivity measurements. For example, the 1406A vertical plug-in offers high 50 μv/cm sensitivity with no dc drift—plus precision calibrated dc offset for extreme magnification.

With the hp calibrated offset feature, the 1406A gives you all the advantages of a dc and ac voltmeter—four-digit readout, auto decimal placement, better than 0.5% accuracy. As a dc voltmeter, the 1406A offers you the additional advantages of no drift in the measurement instrument, and the ability to observe and measure any ac riding on the dc voltage. With these capabilities, you can make measurements never before possible. For example, you can simultaneously display a 10 V dc output at 50 μv/cm (giving a magnification of 200,000), measure signal levels accurately to four digits, see short term dc drift in microvolts, and view all ac ripple—an impossible measurement with a meter. (CRT display above is at 50 μv/cm at 8.500 dc offset.)

The hp 1406A plug-in operates in two modes: as a dc coupled, no drift differential amplifier with 80 dB common mode rejection, or as a single ended amplifier with no dc drift and large offset capability. Maximum sensitivity is 50 μv/cm. The 400 kHz bandwidth may be reduced with a bandpass filter to 5, 25 or 100 kHz, eliminating high-frequency noise in the unused bandwidth. There are five offset voltage ranges from ±0.1 V to ±1000 V.

Price of the 1406A is $850. Time bases start at $225. The 140A mainframe is $595. The Variable Persistence and Storage 141A mainframe, $1395.

Ask your hp Sales Engineer for brochure (Data Sheet 140A) with specs on the 140A high-sensitivity dc & ac measurement systems. Hewlett-Packard, Palo Alto, California, 94304. Phone 415 326-7000. In Europe: 54 Route des Acacias, Geneva. **140A-087/15R**

HEWLETT hp PACKARD
An extra measure of performance

Four new P's in the Mettler pod: some stay level, some weigh backwards, and some even weigh conventionally

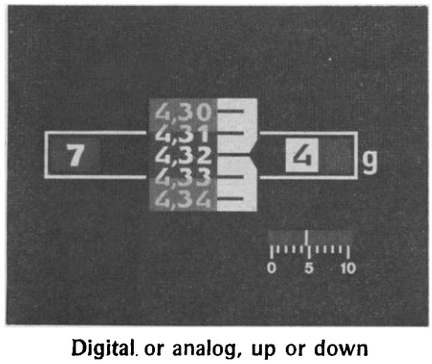
P160, P2000, P5 and P6 – these are the four new instruments we've added to our widely-accepted series of top-loading balances. They bring improved precision/capacity relationships while offering special advantages for particular applications.

WEIGH UP, WEIGH DOWN...

Perhaps the most unusual of the new group is the P160. It has the 160 g capacity of our finest analytical balances and the milligram precision of our best top-loader.

Its scale reads two ways. Operating conventionally, it tells you, with milligram precision, just how much weight you have on the pan.

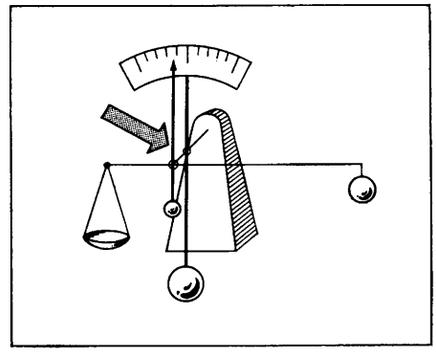
A turn of a knob wipes out all traces of conventionality – your scale now tells you, in positive values and with milligram precision, just how much weight the object on the pan has **lost**. This reversible scale is important in all work involving weight loss studies such as drying and evaporation experiments and determination of residues. It makes possible, for the first time, gravimetric titration, in which titrant is dispensed directly by weight instead of indirectly by volume. We have done some homework on this subject.[1]



Digital or analog, up or down

...BUT NEVER SIDEWAYS

Some of the new P balances have the exclusive Mettler **level-matic** feature. This automatically compensates for slight changes in balance level which are due to working on a less-than-ideal balance table. Essentially a fail-safe system, it protects the unwary balance operator against himself. If tilt exceeds its compensation range, **level-matic** automatically covers the readout scale. Faulty readings are impossible.



Secrets of **level-matic**

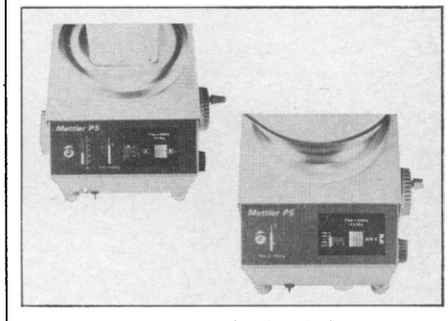
Level-matic, available as an option on the P160 and P2000 instruments, is supplied as an integral feature on the larger P5 balance.

TWO KILOS IN A ONE-KILO CASE

The model P2000 stands out by not really standing out. It is a remarkably compact unit that offers twice the capacity and 60% more taring than other instruments in its precision and size class. It has 2-kilo capacity with precision of ±0.05 g and readability of 0.1 g.

MEET THE BIG BOYS

The P5 and P6 are the higher-capacity members of the new breed of P's. With comparable capacities, 5000 g and 6000 g respectively, the two units distinguish themselves in terms of performance and precision.



P5 and P6 – top-loading balances

The P6 offers fully automatic operation – place the sample on the pan and read the result – across its full capacity. It provides precision of ±0.25 g.

The P5, on the other hand, provides about another decimal precision – ±0.05 g – with automatic operation over its 1000 g optical scale.

FOR PRODUCT LITERATURE...

All the new Mettler balances are described in a new 10-page booklet. Get your copy from your laboratory supply dealer or request it from Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540.

Mettler ®

1) We've found 44 citations which suggest useful applications for, or advantages of, dispensing titrant by weight. If you'd like a copy, ask for Technical Information Bulletin 1014, "Gravimetric Titrimetry – a Review of the Literature."

29 December 1967
Vol. 158, No. 3809

SCIENCE

SCIENCE is published weekly on Friday and on the fourth Tuesday in November by the American Association for the Advancement of Science, 1515 Massachusetts Ave., Washington, D.C. 20005. Now combined with **The Scientific Monthly**®. Second-class postage paid at Washington, D.C. Annual subscriptions $8.50; foreign postage, $1.50; Canadian postage, 75¢; single copies, 50¢ (back issues, $1), except **Guide to Scientific Instruments**, which is $2. School year subscriptions: 9 months, $7, 10 months, $7.50. New rates effective 1 January 1968: Annual subscriptions $12.00; foreign postage: Americas overseas $5; single copies, 50¢ (back issues, $1), except **Guide to Scientific Instruments**, which is $2. School year subscriptions: 9 months, $9; 10 months, $10. Provide 4 we notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature**.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Masks collected from King Island, Alaska, about 1915. Mask on left represents a wolf. Triangles on the eyebrows illustrate the peaks of the Kigluaik Mountains south of Teller. Middle mask represents a man's face and is worn in general dances for the entertainment of the people. Mask on right is half-man, half-animal. See review of *Eskimo Masks: Art and Ceremony*, page 1660. [University Museum, University of Pennsylvania; photographs by Dorothy Jean Ray]

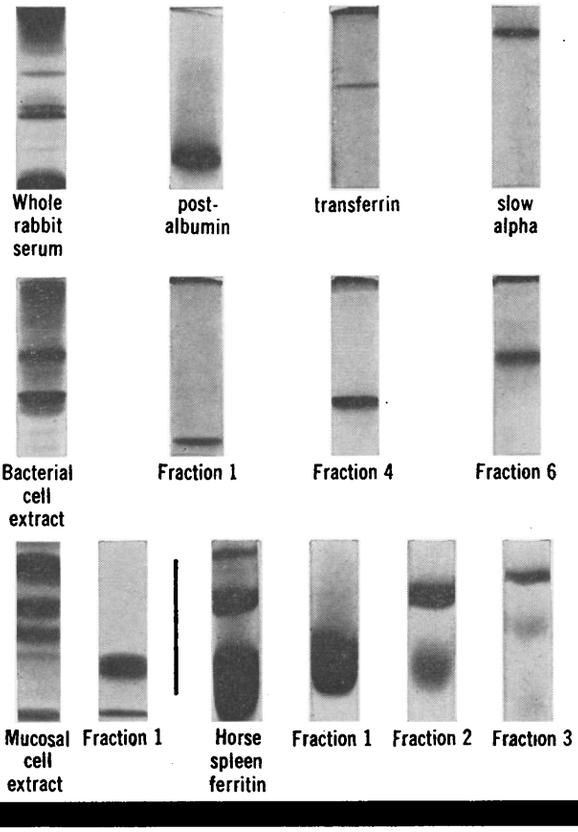
HOW PURE CAN A FRACTION BE?

(PREP-DISC ELECTROPHORESIS GIVES AN ILLUMINATING ANSWER!)

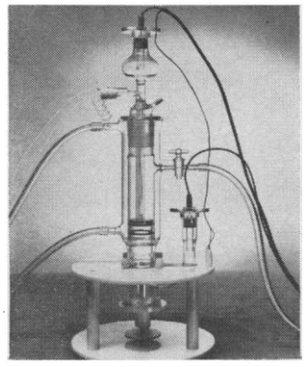
Many researchers have seen analytical Disc Electrophoresis reveal heterogeneity in fractions thought to be pure, prepared by conventional separation techniques. Now, the high-resolution capabilities of the Disc technique can be put to work on the preparative scale to eliminate this heterogeneity in samples of useful size. More than two hundred investigators are already using Prep-Disc for separations of proteins, enzymes, polynucleotides, polypeptides and hormones. Here are just a few of the many materials Prep-Disc is purifying:

isolated insulin granule proteins
fibrinogen
prothrombin
other blood factors
macroglobulins
$\alpha 1$ and $\alpha 2$ globulins
transferrin
mycobacterum tuberculosis proteins
milk proteins
histones
ribosomal proteins
glycoprotein
serum lipoprotein
L-asparaginase
pituitary gonadotropins
LDH
denatured collagen
horse spleen ferritin
staphylococcus enzymes
cytochrome
various plant enzymes and proteins
RNA
tumor tissue proteins
phosphorylases and dehydrases from bacterial extracts
beta glucuronidase
saliva proteins
mucosal cell extracts
polypeptides (PTH)
body fluid proteins
carbonic anhydrase
placental lactogens
isocitric dehydrogenase
5-carboxymethyl protein derivatives

EVIDENCE: Shown here are typical examples, in the form of high-resolution analytical-Disc Electrophoresis patterns, of separated fractions taken from Prep-Disc columns. Each set shows starting material, plus one or more purified components separated from it.

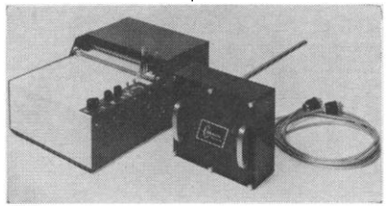


APPARATUS: The Canalco Prep-Disc equipment offers unique advantages over any other form of large-scale gel electrophoresis apparatus. Included:

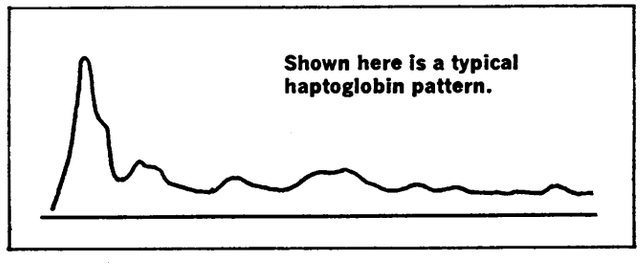


Prep-Disc Apparatus

- a fully visible, externally adjustable elution slit eliminates clogging and optimizes wash-off for highest fraction concentrations;
- you can use either of two tested gel systems for fast (1-4 hour) cuts of both high and low molecular weight materials, and for fine cuts of closely-related materials as well;
- interchangeable gel columns of three sizes allow gel preparation outside the basic apparatus. You can prepare for a run while one is already in progress;
- reversible electrodes (for anodic or cathodic migrating materials) are safety-interlocked with Canalco power supplies;
- pretested Canalco chemicals minimize or eliminate problems of gel shrinkage or swelling and other artifacts;
- you get detailed procedural instructions and the full backup of the Disc Electrophoresis Information Center for continuing guidance and assistance in problem-solving.



WIDE-TRACK FLOW ANALYZER Canalco's Wide-Track flow monitors are a useful adjunct to the Prep-Disc technique, providing a record of fraction elution. ←



Write today for a detailed bulletin describing Prep-Disc!

CANALCO

CANAL INDUSTRIAL CORPORATION
5635 Fisher Lane **Dept. S-12P**
Rockville, Maryland 20852/(301) 427-1515

Sales Offices in—

• BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DENVER
• HOUSTON • LOS ANGELES • MINNEAPOLIS • NEW YORK
• OTTAWA • PHILADELPHIA • PITTSBURGH • SAN FRANCISCO
• WASHINGTON, D.C.

dents from both formal and casual affiliates is vested in the VIMS administration.

Virginia has led most other states in its expenditures in oceanography. When the present biennium is over, Virginia will have invested about $2.4 million of its own money in a total oceanographic budget of over $3.5 million.

The Institute facilities are at Gloucester Point on the York estuary of the Chesapeake Bay and on the Virginia coast at Wachapreague on the Eastern Shore. Three research vessels (55 to 90 feet), a group of smaller boats, IBM 360 and 1130 computers, library TWX hook-up, and electron microscope facilities, along with other equipment are operated by over 180 staff members and 55 resident graduate students. A hydraulic scale model of the tidal James River is operated and maintained by VIMS in cooperation with the Corps of Engineers Waterways Experiment Station at Vicksburg, Mississippi.

The chief study areas concern the biological, chemical, geological, and physical processes of estuarine and coastal waters. Year-around and summer graduate and advanced undergraduate courses in oceanography are offered and special undergraduate and postdoctoral programs receive support from the National Science Foundation.

WILLIAM J. HARGIS, JR.
Virginia Institute of Marine Science, Gloucester Point 23062

Rubber Tubing Disadvantages

I wish to confirm Middlebrook's warning on the use of rubber tubing ("Chromatography warning," 17 Nov., p. 855). We have experienced interferences in the 200- to 230-mμ range and trace the source to the tubing in our deionized water storage bottles.

JAMES C. BUZZELL, JR.
Department of Civil and Environmental Engineering, Washington University, St. Louis, Missouri 63130

Social Sciences Report to DOD

Inquiries addressed to our offices indicate that inadequacies in Greenberg's story, "Social sciences: expanded role urged for defense department" (17 Nov., p. 886) have created some misunderstandings. These should be corrected.

The Summer Study Panel whose report Greenberg reviewed came into being at the request of the director of the Department of Defense Research and Engineering. Under a contract with the Academy, the Defense Science Board conducted a number of study panels, including the one on "defense social and behavioral sciences," at the Academy's summer study center at Williamstown, Massachusetts. While the Academy was responsible for the administration of the summer study, the study panels alone were responsible for the findings they made and the reports they submitted. As Greenberg observed in his account, the report in question is being circulated for comment. Its findings and recommendations have not as yet been accepted by the Department of Defense. Nor have they been endorsed by the Academy. The summer study was conducted without involving either the Division of Behavioral Sciences as such or the National Research Council Committee on Government Programs in the Behavioral Sciences, and the report of the panel should not be read as reflecting the views of the social and behavioral scientists who are their members.

The executive secretary of the Committee on Government Programs in the Behavioral Sciences was invited to attend the study panel meeting as an observer and was present, as Greenberg reported, for only one day. Unfortunately, his name was erroneously listed in the report as a panel member.

HENRY DAVID
GENE M. LYONS
Division of Behavioral Sciences, National Academy of Sciences, 2101 Constitution Avenue, Washington, D.C. 20418

The article explicitly stated that the study was conducted at the request of the Department of Defense, and that the findings of the panel do not necessarily reflect the views of the Academy. The article did not state or imply that the views of the panel were endorsed by the Academy or that the study involved the Division of Behavioral Sciences or the NRC Committee on Government Programs in the Behavioral Sciences. Finally, it was the Academy that erred in listing Lyons as a member of the panel; it was *Science* that pointed out that he attended only one day of the panel's deliberations.

The Academy's sensitivity to revelation of its association with this blueprint for subversion of the academic social sciences is readily understandable. It is easy, of course, to charge nonexistent "inadequacies" in *Science*'s description of its report; my own view is that if any inadequacies exist, they are in the judgment process that permits the Academy to be associated with such dubious schemes.

—D. S. GREENBERG

"All We Like Sheep Have Gone Astray"

Good is absolutely right in his statement (Letters, 22 Sept.) that most scientists actually prefer to read an inflated gobbledygook style to a simple one. Knowing that such a style will cover their flimsy or vague thought when their turn to write comes along, they feel it's safe. But *should* we, as scientists—supposedly individualists, iconoclasts, mold-breakers—allow ourselves to follow the safe course like a lot of bureaucrats, "company men," or sheep? Has no one the courage not to be led astray?

Mr. Good, the graduate student, had something straightforward to say and would have gained high praise at the Rockefeller University for writing it simply (though not, perhaps, quite so colloquially). The manifold difficulties encountered by Dr. Good, the physicist, in his adult manifestations of conformity with interactive, structured communication have evidently already taken their toll, however, to judge from the gross inaccuracy of his reference to (I suppose) my article on clear writing published earlier in the year. It provides a neat further example of my contention that pompous, automatic writing—whether consciously or unconsciously adopted—leads to carelessness in everything.

F. PETER WOODFORD
Rockefeller University, New York 10021

Pollution by Consent

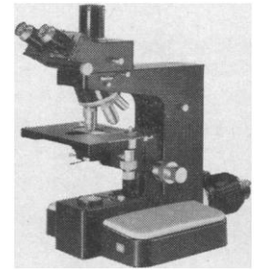
Would Gus Turbeville (Letters, 20 Oct.) agree with me that tobacco smoking might be made legal for consenting adults in private?

F. D. SOWBY
43 Roebuck House, Palace Street, London S.W.1, England

FROM LEITZ...QUALITY INSTRUMENTATION TO MEET EVERY MICROSCOPE NEED

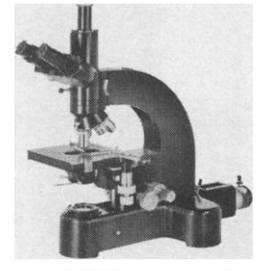
Medical Student and Laboratory Microscope—SM

Rigidly constructed modern stand, featuring rapid focusing of the microscopic image by a new combined coarse and fine adjustment with single-knob control on either side. All standard microscope accessories can be used such as dark-field condensers, phase contrast equipment, drawing heads, micro-camera attachments, etc. Microscope outfits are available fully equipped for the requirements of the medical student, practitioner, and general laboratory work. Ask for SM Catalog 51.2DSM.



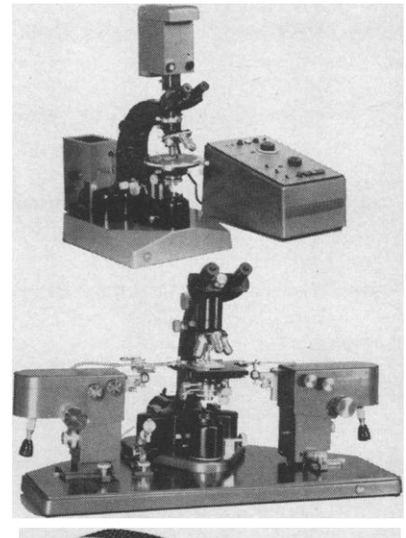
Plano Extra Large Field Research Microscope—ORTHOPLAN

Large 28mm field of view on the new Universal Research Microscope—more than twice the field area of a conventional microscope with wide-field eyepieces. Complete flatness of field and full utilization of the Leitz standard Plano objectives. Designed for both transmitted and/or reflected light. Quick-change mounts allow simplified exchange of every essential part. Supplied with Koehler illumination, this instrument is an essential building block in quality photomicrography. Ask for ORTHOPLAN Catalog 51.2D2.



Universal Research Microscope—ORTHOLUX®

The Ortholux is the most versatile Leitz Microscope. Every modern microscope technique is possible with the Ortholux, including: incident light, transmitted light (or both combined), bright-field, dark-field, polarized light, fluorescence, phase contrast, hot stage microscopy, TV microscopy, photomicrography, and others. Ask for ORTHOLUX Catalog 51.2D40.

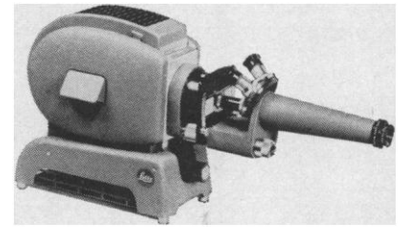


Fully Automatic Microscope Camera—ORTHOMAT

Photomicrographic automation—the new Leitz photomicrographic camera attachment has a simple automatic *push-button* exposure control. Perfect color rendition is produced by a highly sensitive photo multiplier controlling an electronic shutter that permits exposures from 1/100th of a second to any required duration. 35mm film cassettes are interchangeable, permitting swift exchange and replacement of black-and-white and color films. A diaphragm slide permits both integrating and detail exposure measurements. Ask for ORTHOMAT Catalog 54-20.

MICROMANIPULATOR

The Leitz Micromanipulator now makes possible a virtually unlimited range of horizontal, vertical, and sagittal manipulations under the microscope. Pure mechanical operation insures direct, positive control without backlash. Reduction of on-dial movement from fingertips to microinstruments in ratios of from 20-1 to 800-1. Inclination angles up to 15°. Ask for MICROMANIPULATOR Catalog 52-8.



35mm SLIDE and MICROPROJECTOR—Prado 500

Snap-off interchangeable front assemblies transform this high-performance, horizontal microprojector into a vertical microprojector, a 35mm slide projector, a demonstrator of polarizing and various classroom science phenomena. Widely used in lecture halls, schools, conference rooms, and homes. Ask for MICROPROJECTOR Catalog 31-8.

61865

Leitz

E. LEITZ, INC., 468 PARK AVENUE SOUTH, NEW YORK, N. Y. 10016
Distributors of the world-famous products of
Ernst Leitz G.m.b.H., Wetzlar, Germany—Ernst Leitz Canada Ltd.
LEICA AND LEICINA CAMERAS · LENSES · PROJECTORS · MICROSCOPES

29 December 1967, Volume 158, Number 3809 **SCIENCE**

New Words

"Antiethical" is not a word to be found in the unabridged *Webster's New International Dictionary,* at least not yet. If it does come to be accepted, future etymological dictionaries may cite the 25 August 1967 issue of *Science* as the place of its birth. The invention was quite unintentional. In the summarization of a statement by the Federation of American Scientists that held classified research on a university campus to be antithetical to the values of higher education, the typesetter misread *antithetical*; a proofreader nodded, and "antiethical" was born. It is a fine new word with a sharp and vigorous ring; it connotes a stronger attitude than does the accepted term, *unethical,* which seems weak and toneless by comparison.

Whether "antiethical" enriches the language or is quickly forgotten, it illustrates an amusing game that one can play by looking for instances in which an error creates a new word having a special aptness or logic for the context in which it appears. Not any typographical error will do, but occasionally an old word is printed by mistake, or a brand new one created, that is just right for the context. Here are a few other examples that turned up during the past year.

The debate as to whether classified research should be conducted on a university campus—the debate that produced "antiethical"—was the occasion for another error. When the University of Pennsylvania faculty arguments over this issue were much in the news, the Washington *Post* put an unintended word into the mouth of the president of the University—and expressed a suggestion that may appeal to persons who think we have gone too far in emphasizing publication of results of research as a primary responsibility of faculty. President Harnwell was quoted as saying that faculty research should always be freely *punishable.*

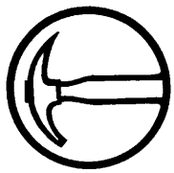
The same newspaper coined a word likely to be useful to spokesmen for government agencies (and also to spokesmen for industry and labor), who are sometimes hard pressed to respond satisfactorily to reporters' questions without jeopardizing negotiations that are still in progress. The *Post* said that State Department Press Officer Robert J. McCloskey, when questioned about Russian attitudes toward antimissile systems, had responded with "the 'mixiмum' form of diplomatic circumlocution."

A book on management of personal finances extolled the virtues of the "ownerwhip" of property. If one disregards the redundancy of the intended phrase (the ownership of that which is owned), the error evokes thoughts of the downtrodden and propertyless under the lash of the owner's "ownerwhip."

In these days of trouble over federal budgets and worries about the amount of money to be made available for the nation's research and development program, *Science* invented a new word appropriate to the times, and one likely to provoke a "that's just what I've been saying all along" reaction from those who think we spend too much on scientific activities: in the 10 February issue, *Science* referred to a scientific "expendition."

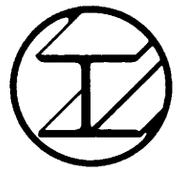
We cannot eliminate the possibility that typesetters have a sense of humor. But with their intentional or accidental help, let us hope that our 1968 typographical errors are equally creative.—DAEL WOLFLE

AGRICULTURAL
Na–.00032
K–.0007
Ca–.0001
Mg–.000025



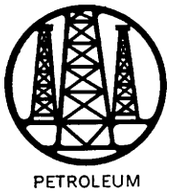
GEOLOGICAL
Au–.0035
Ag–.0010
Te–.015
Pt–.032

POLLUTION
Zn–.00035
Cr–.00030
Ni–.0050
As–.4

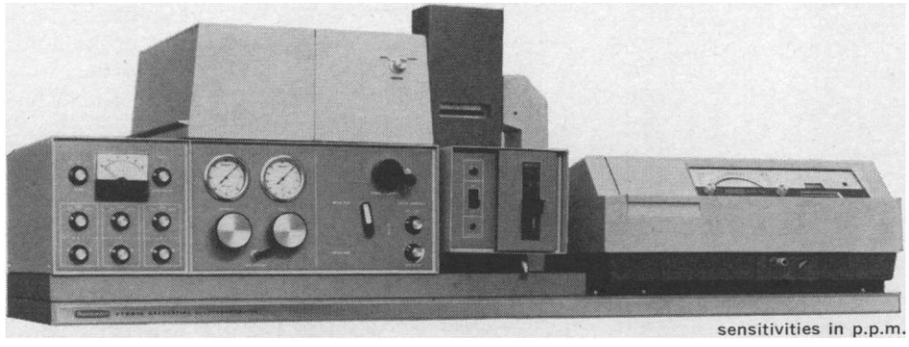


METALLURGICAL
Ni–.0050
Sn–.25
Al–.12
Tr–.012

CLINICAL/MEDICAL
Ca–.0001
Fe–.0011
Li–.001
Zn–.00035



PETROLEUM
Fe–.0011
Ni–.0050
Pb–.012
V–.025
Cu–.00030



sensitivities in p.p.m.

CHEMICAL
Cr–.00030
Mn–.00015
Ni–.0050
Si–.050
Te–.015

Talk about sensitivity!

This will test your metal to the limits of Atomic Absorption today: Beckman's multi-purpose, completely automated Model 979 AA Spectrophotometer. Check its detection limits for your area of application. Then make us prove it.

Get the facts from AA to Z—our sales representative will be glad to tell you about the "sensitivity gap" between Beckman and others. Ask him about the exclusive Laminar Flow Burner that permits the Model 979 to deliver 5 to 20 times greater sensitivity *in your field of inquiry* than any comparable instrument. Ask him where your area of application fits into the 979's wide wavelength range of from 190-770 mμ (190-852 mμ optional). Have him show you how our precision optical system can assure you the accuracy you need to resolve those perplexing analytical problems. And don't forget to pin down your Beckman man on the automation question. Make him show you how the Automated Sample Changer can hasten your analytical determinations without sacrificing accuracy. Here's a real toughy to close with—ask our man to explain what our instrument is doing in so many different fields of inquiry.

Go ahead, ask him—our instruments are sensitive, but our salesmen aren't! For openers, write for Data File 501 F.

The people out front in background and back-up...

Beckman

INSTRUMENTS, INC.
SCIENTIFIC INSTRUMENTS DIVISION
FULLERTON, CALIFORNIA • 92634

INTERNATIONAL SUBSIDIARIES: GENEVA; MUNICH; GLENROTHES, SCOTLAND; TOKYO; PARIS; CAPETOWN; LONDON; MEXICO CITY