

# SCIENCE

1 March 1974

Vol. 183, No. 4127

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





# 25 years in nuclear analysis

Over 25 years ago LKB was designing and building instruments for nuclear research. In fact, one of the earliest instruments developed for advanced work in the nuclear field was LKB's 200 million electron-volt synchrocyclotron, installed at Uppsala University in 1947.

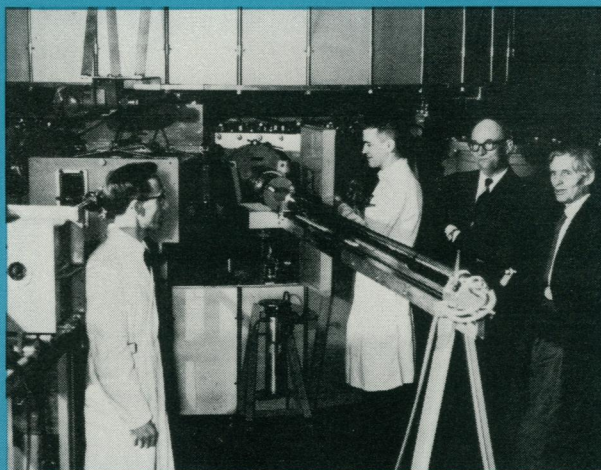
Since that time LKB has always been in the forefront with equipment for tracing and counting ra-

dioactive isotopes in the clinical field. Some of the LKB innovations of earlier years: whole-body scanners for radioactive tracing in human patients; beta-comparators; scalers, counters and automatic sample-changers; and radio-chromatogram scanners. This wealth of nuclear experience stands behind the current range of LKB-Wallac Gamma and Liquid Scintillation Counters.

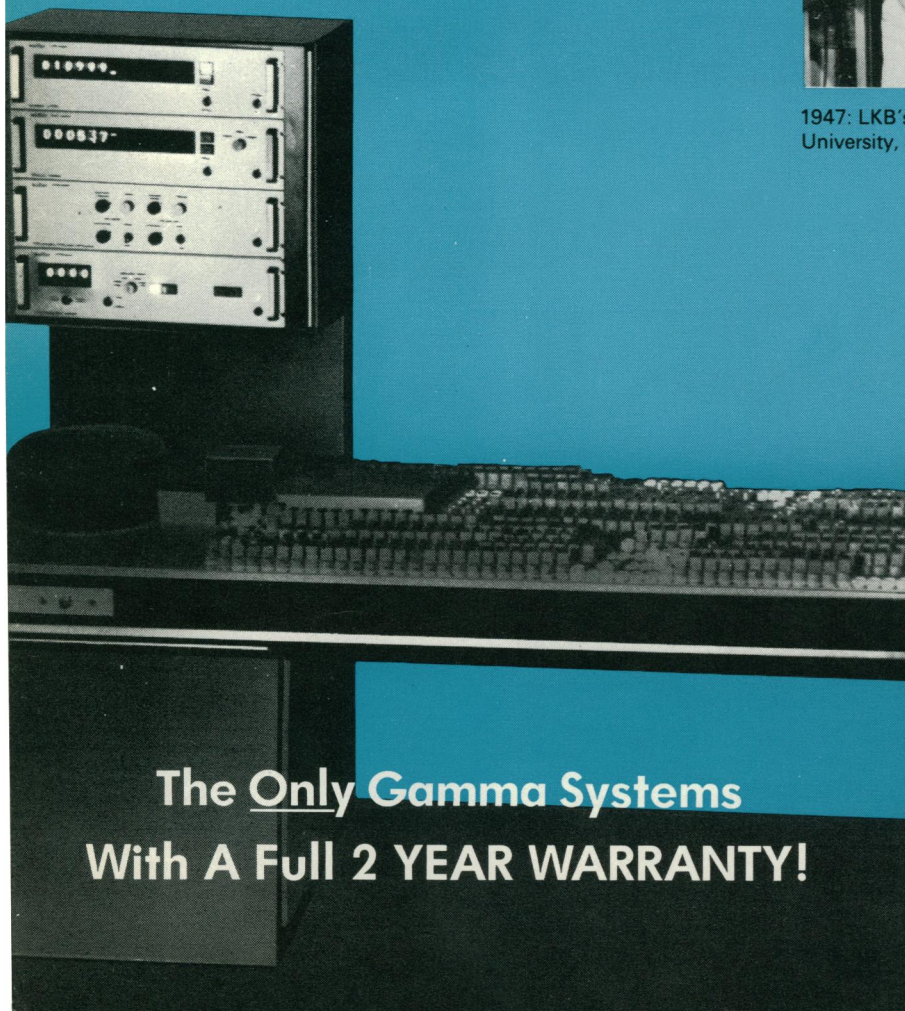
## LKB

**LKB Instruments Inc.**

12221 Parklawn Drive, Rockville MD. 20852  
11744 Wilshire Blvd. Los Angeles Calif. 90025  
6600 West Irving Park Road, Chicago Ill. 60634  
260 North Broadway, Hicksville N.Y. 11801

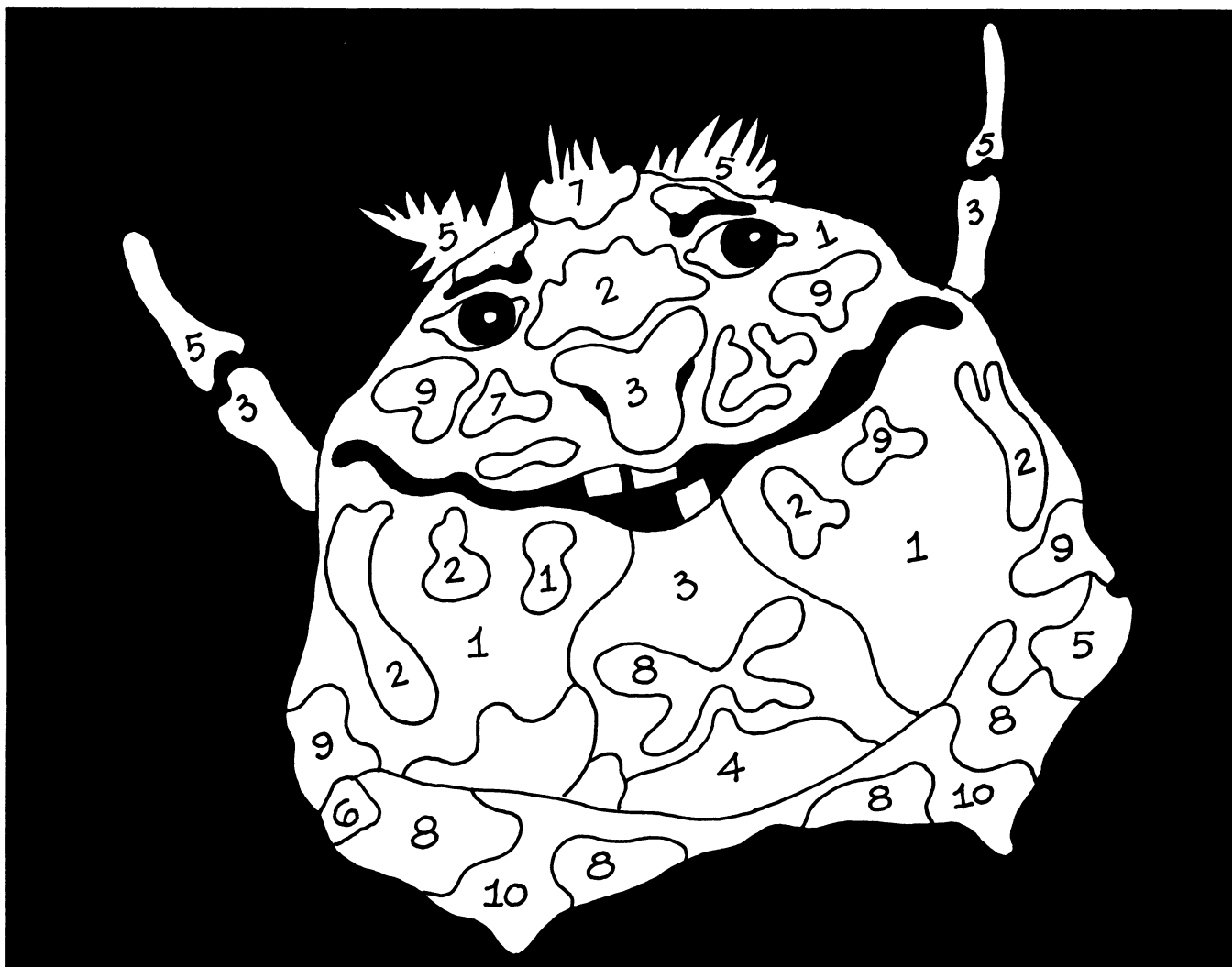


1947: LKB's 200MeV synchrocyclotron being installed at Uppsala University, Sweden.



**The Only Gamma Systems  
With A Full 2 YEAR WARRANTY!**





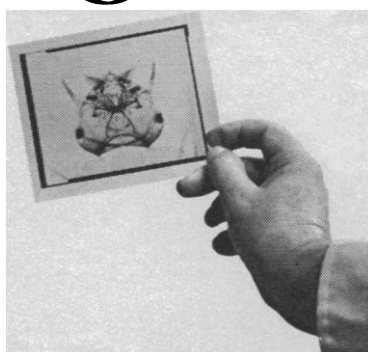
# Color it brighter than life.

You can with KODAK Photomicrography Color Film 2483. It enhances color saturation and contrast. Makes otherwise difficult-to-distinguish detail clearly visible. Makes stains more effective... especially in thin sections.

Add to this a resolving power of 200 lines/mm—quite a bit more than from currently available pictorial film—and your chances of seeing and recording minute detail are greatly improved. Ideal for research. Excellent for teaching purposes.

Process the film yourself if you like. You can get high-quality results in less than an hour's processing time.

You can also have it processed by any one of numerous commercial film-processing laboratories. For processing by Kodak, purchase the KODAK Prepaid Processing Mailer, PK 36, where you buy your film.



KODAK Photomicrography Color Film 2483 is available in 36-exposure, 35mm film magazines, 125-foot rolls, and 4 x 5-inch sheets from your usual source of Kodak products. More information is no further away than the coupon.



**EASTMAN KODAK COMPANY** 3-65  
Dept. 412-L  
Scientific Photography Markets  
Rochester, N.Y. 14650

☐ Please send publication P-302 on KODAK Photomicrography Color Film 2483.

☐ Please add my name to your mailing list.

Name

Organization

Address

City

State  Zip

1 March 1974

Volume 183, No. 4127

# SCIENCE

<b>LETTERS</b>	Protection of Human Subjects: <i>A. M. Capron</i> ; <i>A. Etzioni</i> ; Fuel Technology Directory: <i>R. H. Essenhigh</i> ; Optical Brighteners: <i>B. J. Kilbey</i> and <i>G. Zetterberg</i> ; History of Life Sciences: <i>J. H. Young</i> ; FDR's Science Policy: <i>D. J. Kevles</i> . . . . .	<b>797</b>
<b>EDITORIAL</b>	Prospectus for Science Advising: <i>E. E. David, Jr.</i> . . . . .	<b>801</b>
<b>ARTICLES</b>	Host-Guest Chemistry: <i>D. J. Cram</i> and <i>J. M. Cram</i> . . . . .	<b>803</b>
	Autogenous Regulation of Gene Expression: <i>R. F. Goldberger</i> . . . . .	<b>810</b>
	Nonhistone Chromosomal Proteins and Gene Regulation: <i>G. S. Stein</i> , <i>T. C. Spelsberg</i> , <i>L. J. Kleinsmith</i> . . . . .	<b>817</b>
	Prevention of Food-Processing Wastes: <i>S. R. Hoover</i> . . . . .	<b>824</b>
<b>NEWS AND COMMENT</b>	NIH: Who Is Running the Show—Scientists or Politicians? . . . . .	<b>829</b>
	On Reading the Federal Budget . . . . .	<b>832</b>
	World Population: U.N. on the Move but Grounds for Optimism Are Scant . . . . .	<b>833</b>
	Plutonium and the "Hot Particle Problem": Environmental Group Proposes a Draconian Answer . . . . .	<b>834</b>
<b>RESEARCH NEWS</b>	Electron-Hole Droplets: A Unique Form of Matter . . . . .	<b>837</b>
	Combinatorics: Steps Toward a Unified Theory . . . . .	<b>839</b>
<b>BOOK REVIEWS</b>	Social Stratification in Science and Originality and Competition in Science, reviewed by <i>M. R. Quillian</i> ; Laser Handbook, <i>A. E. Siegman</i> ; Domestikationsforschung und Geschichte der Haustiere, <i>E. S. Wing</i> ; The Auditory Periphery, <i>J. J. Zwislocki</i> ; Calcium and Phosphorus Metabolism, <i>H. E. Harrison</i> ; Books Received . . . . .	<b>841</b>
<b>REPORTS</b>	Wind Tunnel Simulations of Light and Dark Streaks on Mars: <i>R. Greeley et al.</i> . . . .	<b>847</b>

BOARD OF DIRECTORS		LEONARD M. RIESER Retiring President, Chairman	ROGER REVELLE President	MARGARET MEAD President-Elect	RICHARD H. BOLT BARRY COMMONER	EMILIO Q. DADDARIO EDWARD E. DAVID, JR
CHAIRMEN AND SECRETARIES OF AAAS SECTIONS		MATHEMATICS (A) John G. Kemeny Truman A. Botts	PHYSICS (B) Solomon J. Buchsbaum Rolf M. Sinclair	CHEMISTRY (C) Milton Harris Leo Schubert	ASTRONOMY (D) Ivan R. King Arlo U. Landolt	
		PSYCHOLOGY (J) Charles Cofer Edwin P. Hollander	SOCIAL AND ECONOMIC SCIENCES (K) George J. Stigler Daniel Rich	HISTORY AND PHILOSOPHY OF SCIENCE (L) Owen Gingerich George Basalla	ENGINEERING (M) Byron D. Tapley Paul H. Robbins	
		EDUCATION (Q) J. Myron Atkin Phillip R. Fordyce	DENTISTRY (R) Howard M. Myers Sholom Pearlman	PHARMACEUTICAL SCIENCES (S) Louis P. Jeffrey John Autian	INFORMATION AND COMMUNICATION (T) Martin Greenberger Joseph Becker	
DIVISIONS		ALASKA DIVISION		PACIFIC DIVISION		SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION
		Gunter E. Weller President	Irma Duncan Executive Secretary	Robert C. Miller President	Robert T. Orr Secretary-Treasurer	Gordon L. Bender President Max P. Dunford Executive Secretary-Treasurer

SCIENCE is published weekly, except the last week in December, but with an extra issue on the fourth Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with *The Scientific Monthly*. Second-class postage paid at Washington, D.C. Copyright © 1974 by the American Association for the Advancement of Science. Member rates on request. Annual subscription \$30; foreign postage: Americas \$4, overseas \$6, air lift to Europe \$18. Single copies \$1 (back issues, \$2) except *Guide to Scientific Instruments* which is \$4. School year subscriptions: 9 months \$22.50; 10 months \$25. Provide 6 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. *Science* is Indexed in the *Reader's Guide to Periodical Literature*.

# AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Predictive Simulation of the Subsidence of Venice: <i>G. Gambolati, P. Gatto, R. A. Freeze</i> .....	849
Leprosy in the Armadillo: New Model for Biomedical Research: <i>E. E. Storrs et al.</i> ..	851
Site of Biosynthesis of Galactolipids in Spinach Chloroplasts: <i>R. Douce</i> .....	852
Amorphous Semiconductor Switching in Melanins: <i>J. McGinness, P. Corry, P. Proctor</i> .....	853
Hormonal Control of Neutrophil Lysosomal Enzyme Release: Effect of Epinephrine on Adenosine 3',5'-Monophosphate: <i>L. J. Ignarro, R. J. Paddock, W. J. George</i> ..	855
Penetration of Somatic Mammalian Cells by Sperm: <i>A. Bendich, E. Borenfreund, S. S. Sternberg</i> .....	857
Mammalian Pheromone: Identification of Active Component in the Subauricular Scent of the Male Pronghorn: <i>D. Müller-Schwarze et al.</i> .....	860
Brain Hyaluronidase: Changes in Activity during Chick Development: <i>J. R. Polansky, B. P. Toole, J. Gross</i> .....	862
HL-A Antigens in Mummified Pre-Columbian Tissues: <i>P. Stastny</i> .....	864
Human DNA Polymerase III (R-DNA Polymerase): Distinction from DNA Polymerase I and Reverse Transcriptase: <i>B. J. Lewis et al.</i> .....	867
Septal Tryptophan-5-Hydroxylase: Divergent Response to Raphe Lesions and Parachlorophenylalanine: <i>J. A. Harvey and E. M. Gál</i> .....	869
Operant Control of Occipital Theta Rhythm Affects Performance in a Radar Monitoring Task: <i>J. Beatty et al.</i> .....	871
Coupling between Cortical Potentials from Different Areas: <i>E. Callaway and P. R. Harris</i> .....	873
<i>Technical Comments: On the "Square" Model of Maya Territorial Organization: M. A. Romanov; N. Hammond; J. Marcus</i> .....	875
<b>MEETINGS</b> Rubey Conference on Crustal Evolution: <i>P. Cloud</i> ; Radiation Chemistry of Condensed Phases: Report of a Joint Japan-United States Seminar: <i>A. O. Allen</i>	878

RUTH M. DAVIS  
WARD H. GOODENOUGH

CARYL P. HASKINS  
CHAUNCEY STARR

WILLIAM T. GOLDEN  
Treasurer

WILLIAM BEVAN  
Executive Officer

GEOLOGY AND GEOGRAPHY (E)  
Terah L. Smiley  
Ramon E. Bisque

MEDICAL SCIENCES (N)  
Louis G. Welt  
Richard J. Johns

STATISTICS (U)  
John W. Tukey  
Ezra Glaser

BIOLOGICAL SCIENCES (G)  
Beatrice M. Sweeney  
Jane C. Kaltenbach

AGRICULTURE (O)  
Ned D. Bayley  
J. Lawrence Apple

ATMOSPHERIC AND HYDROSPHERIC  
SCIENCES (W)  
William R. Bandeen  
Stanley A. Changnon, Jr.

ANTHROPOLOGY (H)  
Bernice Kaplan  
Philleo Nash

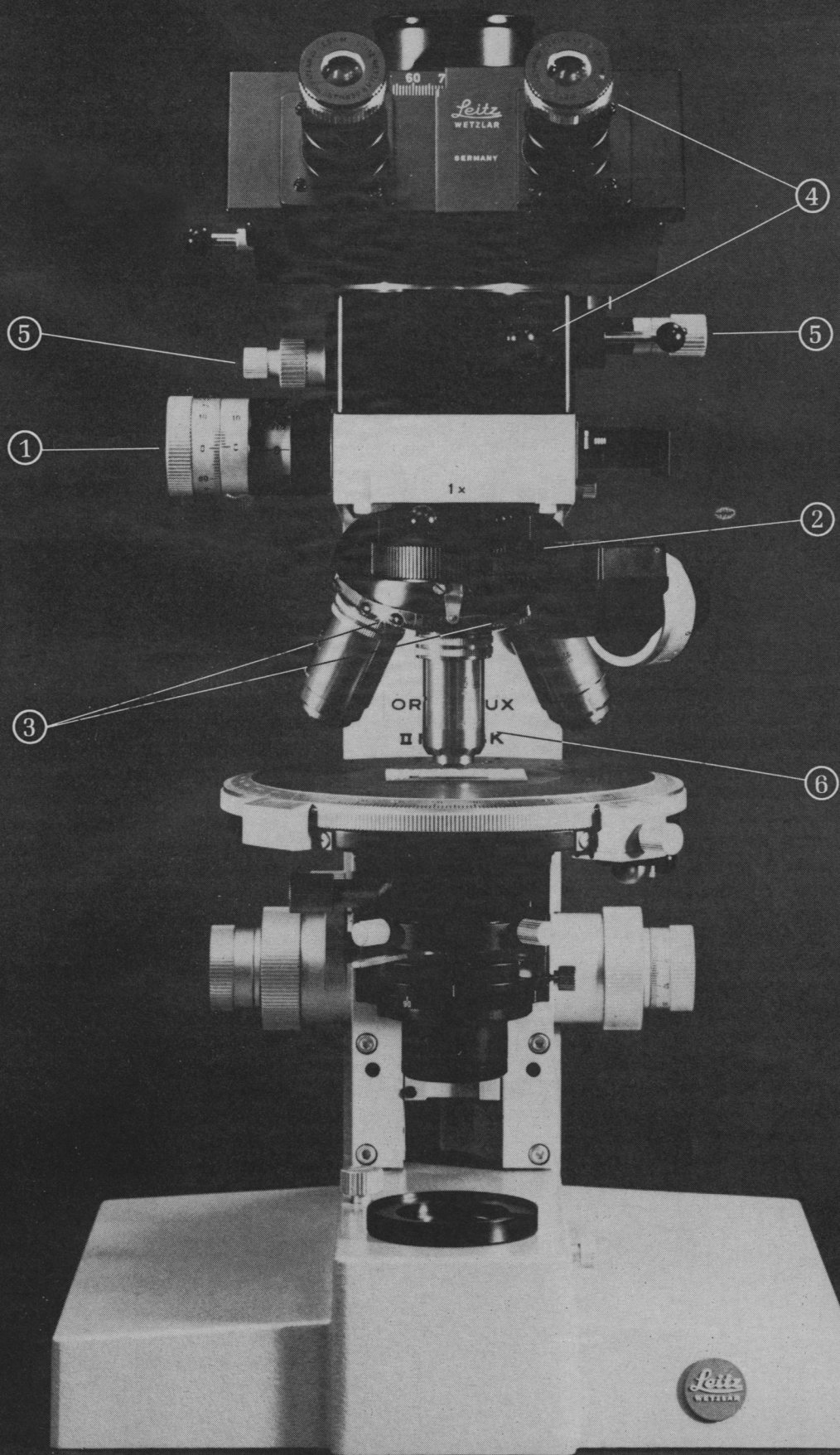
INDUSTRIAL SCIENCE (P)  
Gabor Strasser  
Robert L. Stern

GENERAL (X)  
Frederick Seitz  
Joseph F. Coates

## COVER

Head of adult male pronghorn (*Antilocapra americana*). Area below ear delineates subauricular gland. See page 860. [D. Müller-Schwarze, Utah State University, Logan]

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.



# Six reasons Leitz polarizing microscopes are now the easiest to use.

The whole idea behind the Leitz "square" shape is to make it convenient for you to use advanced methodology.

So in addition to all the general techniques, our building block-microscope systems are readily adapted to polarizing microscopy.

We have gone to special lengths to make our research polarizing systems as easy as possible for you to employ. Here are six of the ways we do it:

1. The analyzer rotates through 360 degrees by means of a drum with a vernier reading to 1/10 degree. This is especially advantageous for determining optical characteristics, such as the measurements for angular rotation and for employing the Senarmont method for strain measurements in glass, or measuring the stretch in fibers or plastic films.

2. The compensator slots have been widened to 20mm to permit the use of our new line of more accurate compensators. In fact, there are two slots at 90° to each other, eliminating the need to reorient the specimen by 90° for compensation. The slots are located in an infinite beam to prevent image shift.

3. The centering pins for the objective face the microscopist. The objectives point away to give you unobstructed access to the specimen.

4. The conoscopic image can be viewed through the binocular tube, and there is a pinhole diaphragm located in an intermediary image plane for isolation of small particles.

5. The controls to focus and center the Bertrand lens are in easy reach.

6. A new set of strain-free plano-achromatic objectives which produce

Special immersion objectives for reflected light. All are infinity-corrected and free from polarization.			
Regular oil immersion			
oil 20x/0.40P	oil 32x/0.65P	oil 50x/0.85P	oil 125x/1.30P
Immersion Contrast			
With quartz plate for oil immersion			
NPL oil 5x/0.09P	NPL oil 10x/0.20P	NPL oil 20x/0.40P	NPL oil 50x/0.85P
With sapphire plate for Methylene Iodide immersion			
NPL meth iod 5x/0.09P	NPL meth iod 10x/0.20P	NPL meth iod 20x/0.40P	NPL meth iod 50x/0.85
These objectives are corrected for absolute flatness of field and are fitted with either quartz or sapphire rotatable plates before the front lens to increase specimen contrast and to aid in the differentiation of structures with similar reflectivities.			

absolutely flat images, are available for Leitz polarizing microscopes. The reflected-light plano-achromats are available with rotatable quartz (oil) or sapphire (methylene-iodide) plates mounted before the front lens. This eliminates the normally reflected light to dramatically improve contrast of specimen structures.

Our completely redesigned line of polarizing microscopes includes the large research Orthoplan Pol and Ortholux Pol microscopes. And for routine laboratory work we offer the SM Pol, which accepts the same compensators, the same objectives, and which can easily be equipped for reflected light.

Also, the student microscope HM Pol uses the very same compensators and optics. It is a polarizing microscope, reasonably priced for classroom work.

For further information contact E. Leitz, Inc., Rockleigh, N.J. 07437.

## Leitz®

Where most new developments start.





It's not what we put in,  
it's what we take out.

Purest radioactive chemicals for research.

**NEN** New England Nuclear

575 Albany St., Boston, Mass.; NEN Canada Ltd, Dorval, Quebec; NEN Chemicals GmbH, Dreieichenhain, Germany



# Here are a few problems Olivetti is ready to solve for you on its newest, fastest, most powerful P-652 microcomputer.

How many are on your list? Check them off and send to us.

## STATISTICAL SIGNIFICANCE AND REGRESSION ANALYSIS:

- ☐ Regression coefficients with standard errors
- ☐ Paired data analysis with transformations and confidence limits
- ☐ Multiple linear regression
- ☐ Polynomial regression
- ☐ Stepwise linear regression
- ☐ Multiple correlation coefficients
- ☐ Partial correlation coefficients
- ☐ F-statistic with significance levels
- ☐ t-statistic with significance levels
- ☐ Confidence limits on statistics
- ☐ Curve fitting (we have a wide range of models)
- ☐ Test for linearity
- ☐ Test for outliers
- ☐ Test for normality
- ☐ Distribution studies (Poisson, Beta, Binomial, Erlang, Weibull, etc.)
- ☐ Biserial and point biserial correlation coefficients
- ☐ Contingency tables
- ☐ Non-parametric statistics
- ☐ Moments and statistics of frequency distributions

- ☐ Moving averages
- ☐ Smoothing
- ☐ Trend analysis (Quadratic, Exponential, Logistic, Gompertz, etc.)

## ANALYSIS OF VARIANCE:

- ☐ One-way ANOVA
- ☐ Two-way ANOVA
- ☐ Three-way ANOVA
- ☐ Analysis of Covariance
- ☐ Latin Square
- ☐ Factorial design
- ☐ Nested (hierarchical) design
- ☐ Randomized Block design
- ☐ Bartlett's Test
- ☐ Scheffe's Test
- ☐ Newman-Keuls Test
- ☐ Tukey's Test
- ☐ Least significance difference
- ☐ Comparisons among class means

We have a wide range of models.

## BIOSTATISTICS:

- ☐ Quantitative log-dose response
- ☐ Quantal log-dose response

We have both single and parallel line assays.

- ☐ Slope-ratio assays
- ☐ Logit, NED, or Probit transformations
- ☐ Variance-weighted Radioimmunoassay data reduction
- ☐ RIA kit data reduction

We have systems for most major protocols.

## OTHER

## ARE YOU MAINLY INTERESTED IN:

- ☐ Hypothesis testing?
- ☐ Parameter estimating?
- ☐ Forecasting?
- ☐ Quality control?
- ☐ Determining significant variables?

## WOULD OFF-LINE PROCESSING OF DATA FROM ANALYTIC INSTRUMENTS BE IMPORTANT?

- ☐ Yes ☐ No

Olivetti Corporation of America, 500 Park Avenue, New York City 10022  
Attn: Microcomputer Systems

**I've checked what I need. Please send me the specifics.**

- ☐ I'm already using an Olivetti P-101 or P-602

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

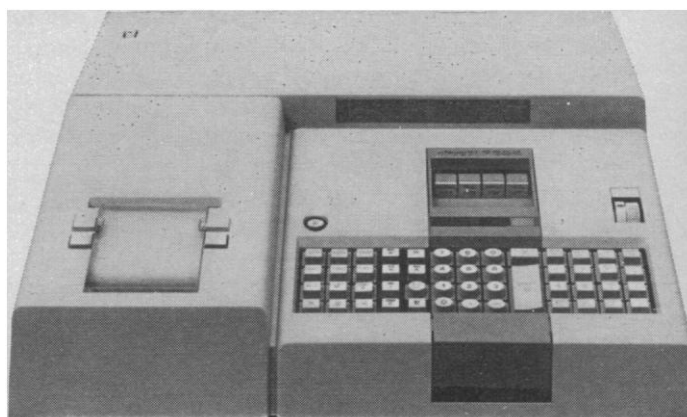
COMPANY \_\_\_\_\_ ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_ PHONE \_\_\_\_\_

S-2

This, without a doubt, is the ultimate system for statistical analysis on a small data base. It utilizes the newest, most advanced hardware—Olivetti's P-652 microcomputer (fifty times faster than our P-101, the famous statistical desk top computer used in labs and schools all over the world). And a comprehensive library of detailed, documented software offering all sorts of options for different running modes with special emphasis on error correction procedures. Take a look, there's nothing like it on the market. And, of course, it's backed by that famed reliable Olivetti service. Want to know more? Send the coupon.

OLIVETTI CORPORATION OF AMERICA, 500 PARK AVE., NEW YORK CITY 10022



# AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

*Science* serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

## Editorial Board

1974

ALFRED BROWN	FRANK W. PUTNAM
JAMES F. CROW	MAXINE F. SINGER
SEYMOUR S. KETY	GORDON WOLMAN
FRANK PRESS	

1975

HERBERT S. GUTOWSKY	DONALD LINDSLEY
N. BRUCE HANNAY	RUTH PATRICK
DONALD KENNEDY	RAYMOND H. THOMPSON
DANIEL E. KOSHLAND, JR.	

## Editorial Staff

### Editor

PHILIP H. ABELSON

### Publisher

WILLIAM BEVAN

### Business Manager

HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

Assistant Editors: ELLEN E. MURPHY, JOHN E. RINGLE

Assistant to the Editor: NANCY TEIMOURIAN

News and Comment: JOHN WALSH, LUTHER J. CARTER, DEBORAH SHAPLEY, ROBERT GILLETTE, NICHOLAS WADE, CONSTANCE HOLDEN, BARBARA J. CULLITON, SCHERRAINE MACK

Research News: ALLEN L. HAMMOND, WILLIAM D. METZ, THOMAS H. MAUGH II, JEAN L. MARK, ARTHUR L. ROBINSON

Book Reviews: SYLVIA EBERHART, KATHERINE LIVINGSTON, ANN O'BRIEN

Cover Editor: GRAYCE FINGER

Editorial Assistants: MARGARET ALLEN, ISABELLA BOULDIN, BLAIR BURNS, NINKIE BURNS, ELEANORE BUTZ, MARY DORFMAN, JUDITH GIVELBER, CORRINE HARRIS, NANCY HARTNAGEL, OLIVER HEATWOLE, CHRISTINE KARLIK, GINA BARI KOLATA, MARGARET LLOYD, ERIC POGGENPOHL, JEAN ROCKWOOD, PATRICIA ROWE, LEAH RYAN, LOIS SCHMITT, MICHAEL SCHWARTZ, RICHARD SEMIKLOSE, YA LI SWIGART, ELEANOR WARNER

Guide to Scientific Instruments: RICHARD SOMMER

Membership Recruitment: GWENDOLYN HUDDLE;  
Subscription Records and Member Records: ANN RAGLAND

## Advertising Staff

### Director

EARL J. SCHERAGO

### Production Manager

MARGARET STERLING

Advertising Sales Manager: RICHARD L. CHARLES

Sales: New York, N.Y. 10036: Herbert L. Burklund, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHICAGO, ILL. 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-DE-7-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phones: (Area code 202) Central Office: 467-4350; Book Reviews: 467-4367; Business Office: 467-4411; Circulation: 467-4417; Guide to Scientific Instruments: 467-4480; News and Comment: 467-4430; Reprints and Permissions: 467-4483; Research News: 467-4321; Reviewing: 467-4440. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv, *Science*, 28 December 1973. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

## Prospectus for Science Advising

"If you can't lick 'em, join 'em" is vintage advice, but it is not congenial to independent-minded scientists, engineers, and medical researchers. More to our liking might be, "If you can't lick 'em, kick 'em." There's mostly kick in recent complaints about lack of science advice in the White House. Indeed, the hand-wringing that accompanied abolition of the Science Adviser and his Office of Science and Technology has given way to outspoken criticism. Opinion is yet to come to a thoughtful focus, however.

Comment about the need for realistic scientific and engineering advice for top federal policy-making is fair enough. If lawyers, economists, business and military types, public relations folk, and old cronies have their say at that level, simple "justice" and "balance" call for science-based advice, too. More important, scientific insight is vital to wise and innovative federal policy. But these views have been discounted. They are shrugged off in the spirit of the reported comment by the director of the Office of Management and Budget (OMB) that science should be everywhere, but also nowhere in particular. We might add: nowhere except in the science stable where it can be contained until the lay policy-makers see a need for it.

To offset this refractory view we should propose specific duties for a modernized White House science apparatus. Specific, recognized responsibilities would enable that apparatus to transcend dependence upon a close personal presidential relationship.

One job a new White House science apparatus could do for the executive branch is the same one that congressional authorization committees do for the legislative. Executive authorization would involve a substantive review of federal R & D programs and certification of those that were worthy. The actual funding of those programs would, as now, be the task of OMB in the executive branch and of the appropriation committees in Congress. Any new science office should have the executive authorization function for all federal R & D. That function would give the new office influence over R & D second only to OMB.

Yet, authorization may sound too sterile for our liking. How are new programs, based on new technical possibilities, to be created? The mystique of government influence provides the answer. It is surprising how mere suggestions from an office with authorization prerogatives can stimulate proposals for new programs from an agency or department. The potential for creativity is there.

Another job for a new White House apparatus would be presentation of a yearly "state of science and technology report" in the fashion of the Council on Environmental Quality, the Council of Economic Advisers, and the National Security Council reports to the people and the Congress. This mode of communication is preferable to having the White House principal scientist at the beck and call of Congress. To the extent that he is exposed to Congress in that fashion, he will be obliged to support Administration positions or else make himself suspect to his political patron.

Both authorization and public reporting were attempted by the White House Office of Science and Technology before it was abolished. The results were not accepted. It was seen as being out of its stable. Before any new White House apparatus is put in place, its duties should be clearly delineated and perhaps legislated. I have suggested two duties; our community can certainly propose others. Rather than merely kick, we should point toward this level of discussion. That level is required if the synergistic relations between scientist, engineers, medical researchers, and the government are to be reestablished and sustained. Only a structure with well-recognized duties will have sufficient clout to influence policy and be robust enough to survive the winds of political fortune. —EDWARD E. DAVID, JR., Executive Vice President, Gould Inc., 8550 West Bryn Mawr Avenue, Chicago, Illinois 60631



