

the feeder or feeders, silhouetted against the sky over the side of the boat, on every trial which was made. Having one feeder hold a fish while a second held nothing fails to solve this problem. Unknown and unsuspected optical stimuli may always have been present. The only adequate solution is complete screening to eliminate entirely the human observers as sources of uncontrolled visual cues. Research in comparative psychology has many times demonstrated this fundamental principle (2).

The porpoise in the *Breviora* study—even with poor eyesight—may therefore have located its fish (i) by watching the experimenters from beneath the water and noting the position of their bodies, arms, and hands; (ii) by orienting (in some cases) to the sound of the surface splash; or (iii) by echolocation; or by a combination of these methods. The methods of investigation employed, it would appear, do not permit us to say in just what way the animal discovered the fish. When possibilities other than echolocation remain uncontrolled, then echolocation has not been demonstrated to exist as a primary causal factor.

Perhaps the best that can be said of the *Breviora* evidence is that it is inferential. Other inferential evidence, which may be less questionable, was furnished by Kohler, Morris, and me in 1953 (3), when we obtained recordings of the actual echoes from porpoise noises and measured the duration of some of these echoes. In fact, I discussed echolocation in the porpoise as a possibility as far back as 1952 (4). It should be noted in this connection that two separate papers by Schevill and Lawrence concerning their earlier work with a different porpoise state clearly that "we never heard any sound from her [the porpoise] that could be in any way related to her navigation or food-getting" (5), and another states that there was "a complete lack of any evidence that she was using echolocation" (6). The most recent of these statements appeared in print in 1954.

It is gratifying to observe that these authors have finally conquered their long-time determination to ride the wrong horse and are now trying to get up on the right one.

W. N. KELLOGG

Department of Psychology,
Florida State University, Tallahassee

References

1. W. E. Schevill and B. Lawrence, *Breviora*, No. 53, 1 (1956).
2. See, for example, J. B. Watson, *Behavior, An Introduction to Comparative Psychology* (Holt, New York, 1914), pp. 300 ff.; also K. S. Lashley, *Psychol. Bull.* 37, 237 (1940).
3. W. N. Kellogg, R. Kohler, H. N. Morris, *Science* 117, 239 (1953).
4. W. N. Kellogg and R. Kohler, *ibid.* 116, 250 (1952).
5. W. E. Schevill and B. Lawrence, *J. Acoust. Soc. Am.* 25, 1016 (1953); *J. Exptl. Zool.* 124, 147 (1953).
6. ———, *J. Mammal.* 35, 225 (1954).

13 MARCH 1959

needle valve burets* now with Kimble tubes!

One of the most significant developments in buret history, the Manostat Needle Valve Buret, is now available with Kimble Tubes. Now you can perform your titrations without annoyance of stopcock adjustments.

This new instrument provides fine needle valve control of liquid flow, eliminating crude, annoying stopcock grease contamination.

The Buret tubes are accurately calibrated to the closest tolerances, and a permanent fused-in ceramic scale insures lifetime graduations.

*Patent Applied For

The EMIL GREINER Co.
20-26 N. MOORE STREET DEPT. 245, N. Y. 13, N. Y.

G3119 Needle Valve Buret Complete
MACRO SIZE

Capacity, ml.	100	50	25	10
Subdivisions, ml.	0.2	0.1	.05	.02
Each	16.05	11.70	12.45	12.45
Package of 4	57.78	42.12	44.82	44.82

G3119D Graduated tube only

	9.80	5.50	6.20	6.20
--	------	------	------	------

Note: Please do not fail to specify size as well as catalog no. with your order.

For Complete Information Write For Bulletin

IS YOUR GUESS WORTH \$100?

ENTER CONTEST TODAY

see our ad
on page 674
of the
march 6th
issue . . . or
write for
details

•
•
•
•
•
•

**NUCLEAR
ELECTRONICS
CORPORATION**

2925 N. BROAD ST., PHILADELPHIA 32, PA. • BALDWIN 6-2300
Export Representatives: AD. AURIEMA, INC., New York

P. S. See us at the Atom Fair, April 6-10
Cleveland Public Auditorium
Booth #701

Dajac LABORATORIES

Over 250 New Reagents
for Medical Research
and Biochemical Testing

Acetyl choline chloride
Choline esterase

Carbobenzoxy Chloride
Peptide synthesis

p-Chloromercuribenzoic acid, sodium salt
Sulphydryl groups

1, 1'-Dianthrime
Boron

INT. Milk test

Dimethyl acetamide
Solvent

p-Dimethylaminobenzaldehyde
Indole

p-Dimethyl phenylene diamine
Amine oxidase

Fluorescein Isothiocyanate
Antibody—antigen detection

Girard "T" . . . Ketosteroids

2-Hydroxy-3-naphthoic acid hydrazide
Ketosteroids

beta-Naphthyl caprylate
Lipase

1, 4-Naphthoquinone potassium sulfonate
Creatinine

Nitro-BT Dehydrogenase

LNA Leucine aminopeptidase

Sodium alpha-Naphthyl phosphate
Phosphatase

Write for catalog today.
Custom Syntheses Invited.

THE Borden CHEMICAL COMPANY
5000 LANGDON STREET • P. O. BOX 9522
PHILADELPHIA 24, PA.

NEW

ZOOGEOGRAPHY

Edited by CARL L. HUBBS

510 + x pp., 1958, \$12.00
AAAS members' cash orders \$10.50
115 illus., 13 tables, author index
22-page index of scientific names

Dedicated to the Memory
of Charles Darwin and
Alfred Russell Wallace
AAAS Symposium Volume No. 51

Combines two Symposia:

The Origins and Affinities of the
Land and Freshwater Fauna
of Western North America

Geographic Distribution of
Contemporary Organisms

In England:
Bailey Bros. & Swinfen, Ltd.,
Hyde House, West Central Street,
London W.C.1

AAAS
1515 Mass. Ave., NW,
Washington 5, D.C.

Get UNITRON's FREE Observer's Guide and Catalog on ASTRONOMICAL TELESCOPES

This valuable 38-page book
is yours for the asking!

With artificial satellites already launched and space travel almost a reality, astronomy has become today's fastest growing hobby. Exploring the skies with a telescope is a relaxing diversion for father and son alike. UNITRON's handbook contains full-page illustrated articles on astronomy, observing, telescopes and accessories. It is of interest to both beginners and advanced amateurs.

Contents include—

- Observing the sun, moon, planets and wonders of the sky
- Constellation map
- Hints for observers
- Glossary of telescope terms
- How to choose a telescope
- Amateur clubs and research programs



UNITRON

INSTRUMENT DIVISION of UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASS.

Please rush to me, free of charge, UNITRON's new Observer's Guide and Telescope Catalog. Dept. 4 02

Name _____
Street _____
City _____ State _____

PERSONNEL PLACEMENT

CLASSIFIED: 25¢ per word, minimum charge \$4.25. Use of Box Number counts as 10 additional words. Payment in advance is required.

COPY for classified ads must reach SCIENCE 2 weeks before date of issue (Friday of every week).

DISPLAY: Rates listed below—no charge for Box number. Monthly invoices will be sent on a charge account basis—provided that satisfactory credit is established.

Single insertion	\$26.00 per inch
13 times in 1 year	24.00 per inch
26 times in 1 year	23.00 per inch
52 times in 1 year	22.00 per inch

For PROOFS on display ads, copy must reach SCIENCE 4 weeks before date of issue (Friday of every week).

Replies to blind ads should be addressed as follows:

Box (give number)
Science
1515 Massachusetts Ave., NW
Washington 5, D.C.

POSITIONS WANTED

Bacteriologist-Biochemist, Ph.D. Varied research experience; bacterial metabolism, lipids, radioisotopes; publications. NSF research fellow, NRC research associate. Desires position, preferably academic. Box 51, SCIENCE. X

Biochemist-Microbiologist, Ph.D. Married, family, veteran, age 31. Experience: Analytical methods, intermediary metabolism of microorganisms, industrial experience. Desires responsible position in industry or teaching position with an opportunity for research. Box 57, SCIENCE. X

Biochemist, Ph.D., 36; protein chemistry and endocrinology. Desires to relocate on West Coast (excluding Los Angeles). Teaching and extensive independent research experience. Box 41, SCIENCE. 3/13

Botanist-Biologist, 45; Cornell Ph.D., 1951; 8 years' experience in southern state university: botany, general biology, plant taxonomy, ecology; AEC research contracts: floristics, ecology, isotopes. Publications. Box 52, SCIENCE. X

M.D., Ph.D. (physiology), 32. American, married, now completing internship, desires career in postclinical investigation. Broad interests; would enjoy some teaching. No military obligations. Box 56, SCIENCE. 3/20, 27; 4/3

Microbiologist, Ph.D.; biochemistry minor. Publications, experience. Desires teaching-research position. Box 55, SCIENCE. X

Ph.D., D.V.M., nutrition and biochemistry. Research and teaching experience in university and laboratory. Seeking essentially research position. Prefer Southeast. Box 53, SCIENCE. X

Plant Pathologist-Mycologist desires teaching and/or research position. Ph.D., teaching and research experience; publications in several journals; minimum salary \$9500. Box 58, SCIENCE. X

Research Administrator; Ph.D. (major, organic chemistry; minors, pharmacology and toxicology); broad experience as director of research and development. Medical Bureau, Burneice Larson, Director, 900 North Michigan Avenue, Chicago. X

Veterinarian, experienced in microbiological techniques, presently at a medical school, desires position as director of experimental animal laboratory. Box 54, SCIENCE. X

Virologist; Ph.D., 30. Tissue culture and vaccine research. Strong background in biochemistry and cell physiology. Publications. Academic or industrial. Box 46, SCIENCE. 3/13

POSITIONS OPEN

Anatomist with training and interests in pathology to head new section on comparative pathology in medical research institute. Opportunity for academic affiliation with restricted teaching responsibilities. Central states location. Box 49, SCIENCE. 3/13

POSITIONS OPEN

Anatomist. Instructor to teach gross anatomy one semester. Remainder of year for research. Position permanent. Initial salary \$6000. Send curriculum vitae, photograph, and two references to Chairman, Department of Anatomy, University of Louisville School of Medicine, Louisville 2, Kentucky. 3/20

The University of Alberta invites applications for a position in the Department of Animal Science as **Assistant Professor**. The starting salary will be between \$6000 and \$7700 according to qualifications and experience; excellent prospects for advancement. Postgraduate education equivalent to the Ph.D. is required. Duties, to commence between 1 May and 1 September 1959, include research in fundamental and applied nutrition with dairy cattle, teaching, and limited extension work.

Applications, accompanied by a recent photograph and giving age, nationality, and other personal information; academic qualifications and experience; list of publications and names and addresses of three references, should be addressed to the Head, Department of Animal Science, University of Alberta, Edmonton, Alberta. Closing date: 15 April 1959. 2/27; 3/13

Assistant or Associate Professor to develop a curriculum in electrical engineering and eventually be chairman, in a private engineering school in northern California college. Send detailed résumé, references, recent photo, state salary to Box 39, SCIENCE. 2/27; 3/6, 13

Biochemist or Physiologist. Biochemist or physiologist with biochemical orientation to participate in studies on cardiovascular-renal physiology. Experience in tissue analysis and isotope techniques desirable. May Institute, 421 Ridgeway Avenue, Cincinnati 29, Ohio. 3/6, 4/3

(a) **Medical Consultant** qualified to promote effective projects including medical educational programs; would work closely with divisions throughout West; preferably someone with 5 years' practice; \$12,000-\$15,000. (b) **Instructor in Microbiology and Immunology;** duties consist of participating in teaching program for medical students and research; starting salary about \$7000; Midwest. (c) **Ph.D.'s in Biochemistry and Pharmacology;** experience in proteins helpful but not essential; latter should be experienced in physiology and pharmacology; both candidates should possess administrative experience; starting salary \$14,000. S3-2 Medical Bureau, Burneice Larson, Director, 900 North Michigan Avenue, Chicago. X

New World-Wide Graduate Award Directories for American scientists, teachers, librarians to subsidize their education and research. Stipends \$200-\$10,000. Volume I (1957), \$3; volume II (just published, no duplication), \$3; both volumes, \$5. Limited editions. Complete, specific information on 400 awards in United States and overseas in each volume. CRUSADE, Sci., Box 99, Station G, Brooklyn 22, N.Y. eow

PHARMACEUTICAL CHEMIST

Tablet Research & Development

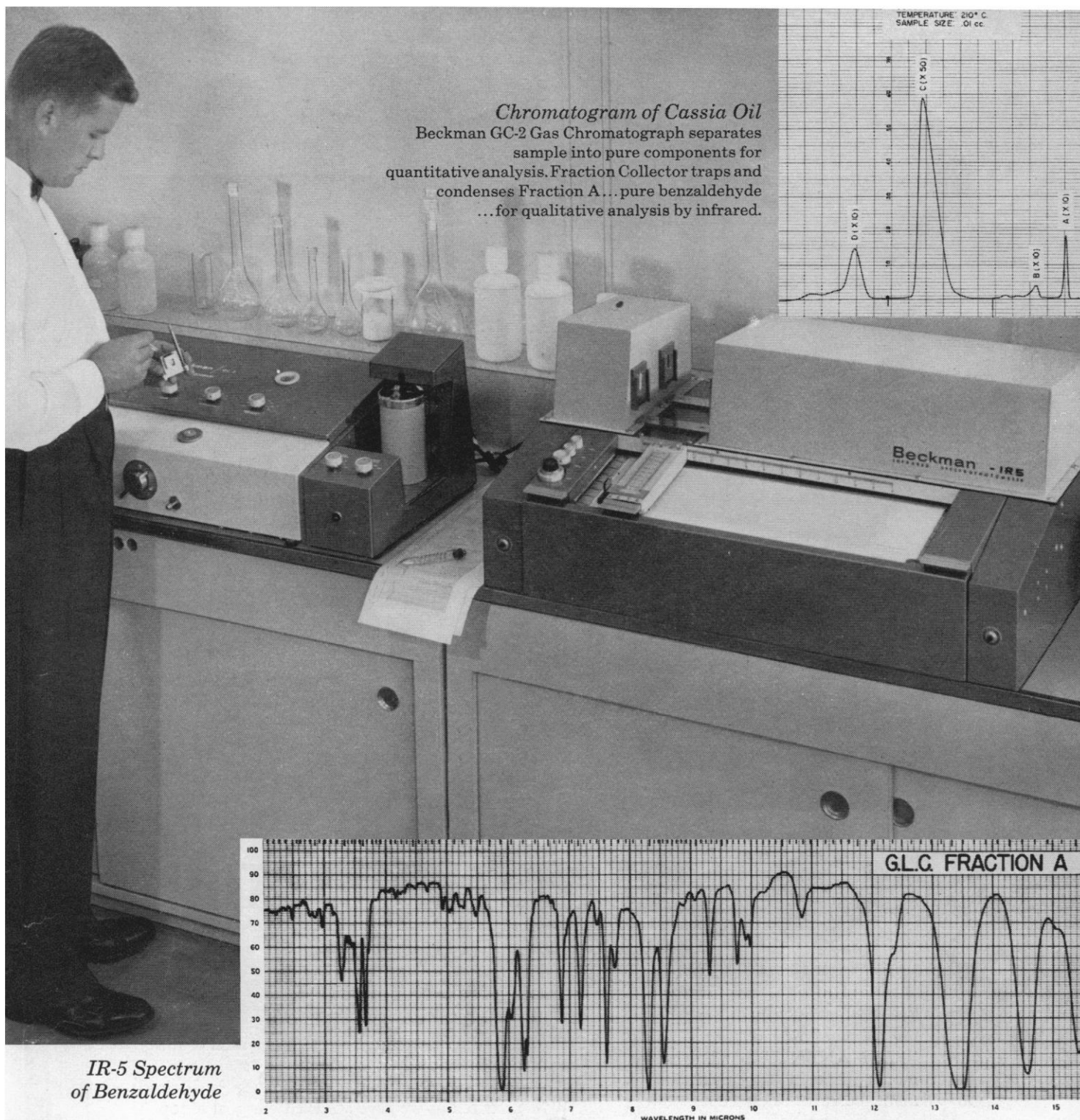
Young Ph.D.-level chemist, with 2 to 3 years' industrial experience in tablet research and development, to supervise tablet section in our Pharmaceutical Development Department.

In confidence send complete résumé and salary requirements to Personnel Director

SCHERING CORP.

60 Orange St. — Bloomfield, N. J.

Three Physical Science Positions. One Ph.D. with research and teaching experience to head Department of Physics, starting salary \$10,000-\$11,000 for 11 months. One teacher each in chemistry and physics, M.S. to Ph.D., salary dependent on qualifications. Start September 1959. H. W. Gould, Northern Illinois University, DeKalb, Illinois. X



Chromatogram of Cassia Oil
Beckman GC-2 Gas Chromatograph separates sample into pure components for quantitative analysis. Fraction Collector traps and condenses Fraction A... pure benzaldehyde ...for qualitative analysis by infrared.

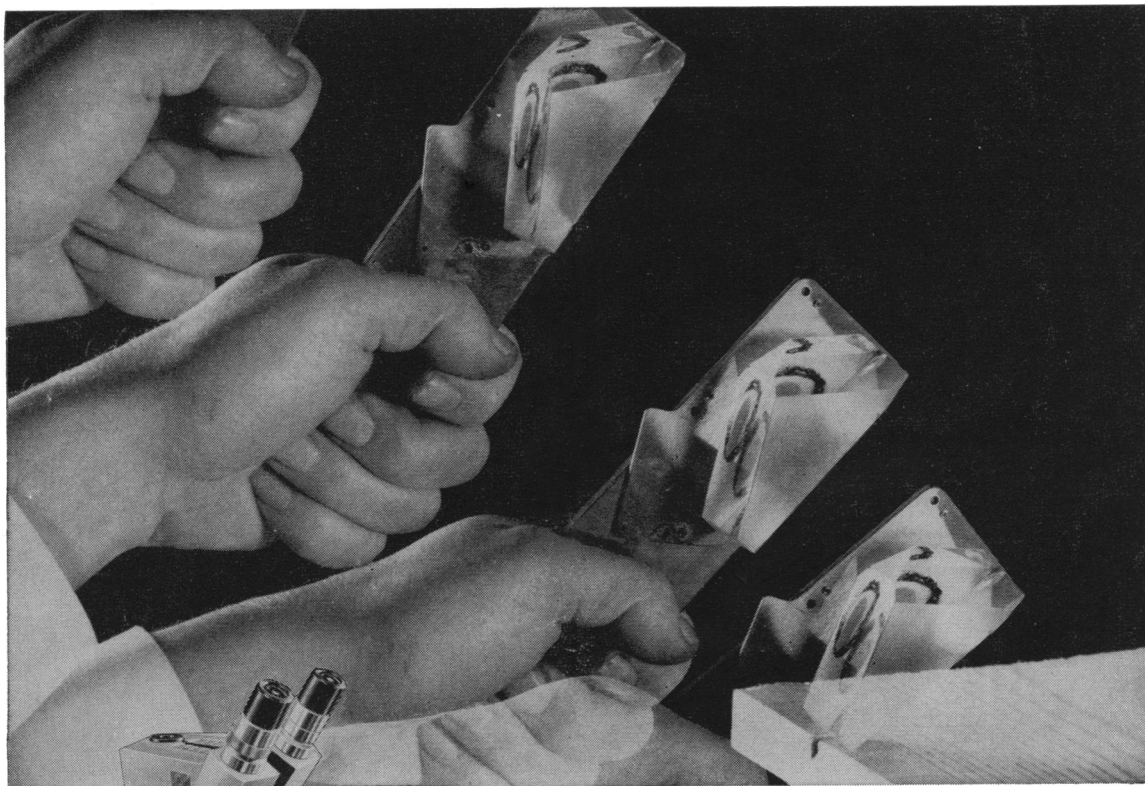
IR-5 Spectrum of Benzaldehyde

What's missing in this Infrared Spectrum of Benzaldehyde? Benzoic acid impurities, of course!

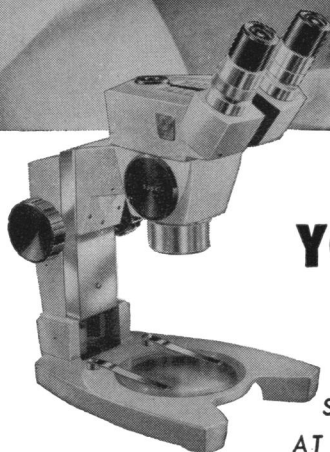
Pure benzaldehyde has always been difficult to prepare and even more difficult to analyze before it decomposes. But now, this problem can be solved by combining a GC-2 Gas Chromatograph and an IR-5 Infrared Spectrophotometer into one analytical system. The GC-2, with Fraction Collector, isolates the pure fraction which is then transferred to an IR-5 microcell for analysis. In just sixteen minutes the IR-5 produces this complete 2-16 micron spectrum of benzaldehyde. ☒ These Beckman instruments allow complete separation and positive identification of samples as small as 0.0002 cc...both quantitative and qualitative analyses of organic mixtures...with speed and accuracy. To learn more about the high-temperature GC-2 and double-beam IR-5, write for Data File 2L-52-38.

Beckman
Scientific and Process Instruments Division
Beckman Instruments, Inc.
2500 Fullerton Road, Fullerton, California

It's a Fact: Beckman portable oxygen analyzers used with hospital incubators help prevent Retrolental Fibroplasia, a disease of premature infants which is caused by excess oxygen and can lead to partial or complete blindness.



Multi-exposure shot showing "PERMANENT" mounted prism being crashed into a piece of wood. Bond was not affected in any way. Your AO Sales Representative will perform this demonstration right before your eyes.



YOU CAN PAY MORE BUT YOU CAN'T BUY BETTER

AMERICAN-MADE AO SPENCER CYCLOPTIC
STEREOSCOPIC MICROSCOPES START
AT A LOW \$202.50* . . .

This stroboscopic photograph shows the amazing holding power of the specially developed "PERMANENT" bonding agent used to mount prisms in the new AO Spencer Cycloptic Stereoscopic Microscopes.

This method of prism mounting means you can put your Cycloptic to extreme use...attachment to a vibrating production machine, rough and tumble field trips, even years of student handling...and still be assured of positive, per-

manent prism alignment.

This careful attention to detail is typical of the thoroughness that marked every step of the development of this instrument. Enthusiastic users tell us we have achieved our goal of top quality at a low, low cost.

The entire AO Spencer Stereoscopic story is yours for the asking. Mail coupon below for handsome 36 page brochure which gives complete specifications.

*Model 56F-1, in quantities of 5 or more



American Optical
Company

INSTRUMENT DIVISION, BUFFALO 15, NEW YORK

Dept. O-2

Gentlemen:

Please send me AO Spencer Cycloptic Brochure SB56-856.

Name

Address

City Zone State