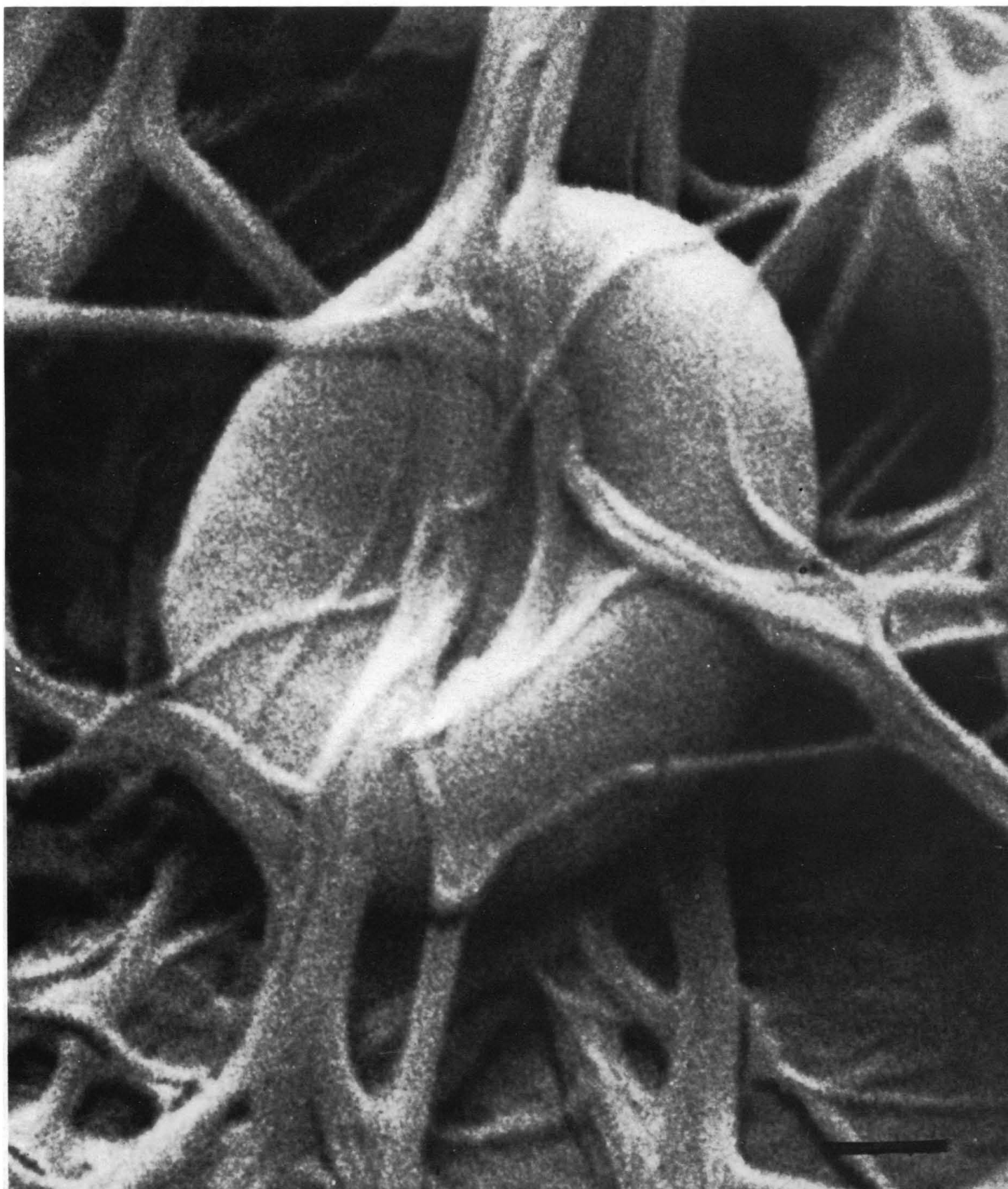


# SCIENCE

27 August 1971

Vol. 173, No. 3999

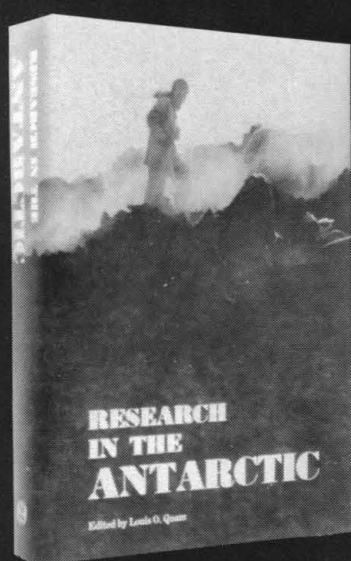
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



# RESEARCH IN THE ANTARCTIC



BIOLOGICAL STUDIES  
GLACIOLOGY  
SNOW MEASUREMENTS  
CLIMATE AND ATMOSPHERE  
OCEANOGRAPHY  
CONJUGATE PHENOMENA  
AURORAL STUDIES  
GONDWANALAND AND CONTINENTAL DRIFT



The first single-volume report of the extensive research conducted in the Antarctic since the International Geophysical Year

Edited by Louis O. Quam  
Director of the Office of Polar Programs of the  
National Science Foundation

700 pages, hundreds of illustrations and tables, a comprehensive index,  
52" x 48" full color wall map of Antarctica

Member's price (with check accompanying order): \$19.95  
Regular price: \$24.95



Orders to the Publication Sales Office,  
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE  
1515 Massachusetts Avenue, N.W., Washington, D.C. 20005



For what it costs you  
to mail this coupon our new  
**Barnstead DI-matic automatic**  
demineralizers can demineralize  
forty gallons of your water.

225 Rivermoor St./Boston, Mass. 02132  
(617) 327-1600

Please send me all the facts on how your new  
DI-matics can demineralize my water cheaper  
and easier than I'm doing it now no matter how  
I'm doing it.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_



**BARNSTEAD**  
SYBRON CORPORATION

That's five gallons to the penny.  
Or \$.002 to the gallon. Based on 10 grain water.

It's amazing.

Whichever one you buy (single mixed bed, alternating mixed bed,  
organic and mixed bed, or two bed) it's fully automatic.

You'll get it for just about the price of most of the manual  
machines on the market.

And you'll get it fast because we're set up to ship right off the shelf.

When you get it all you do is a little light plumbing, plug it in, and  
you've got your water.

Pure, cheap, and simple.

27 August 1971

Vol. 173, No. 3999

# SCIENCE

<b>LETTERS</b>	Health Care Crisis: <i>D. J. Fink; J. D. MacCarthy</i> ; Seeking Employment: <i>J. M. Veigel</i> ; Pesticide Labeling: <i>C. H. Fox</i> ; Definition of "Good Teaching": <i>D. B. Rinsley</i> ; Women in Physics: <i>V. Kistiakowsky</i> . . . . .	766
<b>EDITORIAL</b>	AAAS Council Resolutions: <i>F. B. Wood</i> . . . . .	769
<b>ARTICLES</b>	Pleistocene Changes in the Fauna and Flora of South America: <i>B. S. Vuilleumier</i> . . . . .	771
	Radiation Exposure in Air Travel: <i>H. J. Schaefer</i> . . . . .	780
	The Future Market for Ph.D.'s: <i>D. Wolffe</i> and <i>C. V. Kidd</i> . . . . .	784
<b>NEWS AND COMMENT</b>	Nixon's New Economic Policy: Hints of a Resurgence for R&D . . . . .	794
	Geophysicists in Moscow: Signs of Easier Relations . . . . .	797
	Court Decision Jolts AEC . . . . .	799
	DNA Double Helix: Photo Sends Controversy Spiraling . . . . .	800
<b>RESEARCH TOPICS</b>	Fusion Power: Progress and Problems: <i>M. Seif</i> . . . . .	802
<b>BOOK REVIEWS</b>	<i>The Anatomy of a Scientific Institution</i> , reviewed by <i>R. E. Schofield</i> ; other reviews by <i>C. Osgood, H. A. Schroeder, G. M. Dack, T. Thompson</i> and <i>R. A. Meisch, E. L. Cockrum, J. T. Bartlett</i> ; Books Received . . . . .	804
<b>REPORTS</b>	Lunar Appennine-Hadley Region: Geological Implications of Earth-Based Radar and Infrared Measurements: <i>S. H. Zisk et al.</i> . . . . .	808
	Jupiter: Its Captured Satellites: <i>J. M. Bailey</i> . . . . .	812
	Antarctic Bottom Water: Major Change in Velocity during the Late Cenozoic between Australia and Antarctica: <i>N. D. Watkins</i> and <i>J. P. Kennett</i> . . . . .	813
	Time, Energy, and Territoriality of the Anna Hummingbird ( <i>Calypte anna</i> ): <i>F. G. Stiles</i> . . . . .	818

<b>BOARD OF DIRECTORS</b>	ATHELSTAN SPILHAUS Retiring President, Chairman	MINA REES President	GLENN T. SEABORG President-Elect	DAVID BLACKWELL RICHARD H. BOLT	LEWIS M. BRANSCOMB BARRY COMMONER
<b>VICE PRESIDENTS AND SECTION SECRETARIES</b>	MATHEMATICS (A) Henry O. Pollak F. A. Ficken	PHYSICS (B) Gaylord P. Harnwell Albert M. Stone	CHEMISTRY (C) Charles C. Price Leo Schubert	ASTRONOMY (D) Laurence W. Fredrick Arlo U. Landolt	
	PSYCHOLOGY (I) James E. Deese William D. Garvey	SOCIAL AND ECONOMIC SCIENCES (K) Daniel P. Moynihan Harvey Sapolsky		HISTORY AND PHILOSOPHY OF SCIENCE (L) Cyril Smith Raymond J. Seeger	
	PHARMACEUTICAL SCIENCES (N) Wallace L. Guess John Autian	AGRICULTURE (O) Matthias Stelly Michael A. Farrell	INDUSTRIAL SCIENCE (P) Burton V. Dean Jordan D. Lewis	EDUCATION (Q) J. David Lockard Phillip R. Fordyce	
<b>DIVISIONS</b>	<b>ALASKA DIVISION</b> Laurence Iving President Irma Duncan Executive Secretary	<b>PACIFIC DIVISION</b> George E. Lindsay President Robert C. Miller Secretary	<b>SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION</b> John R. Lacher President Marlowe G. Anderson Executive Secretary		

SCIENCE is published weekly, except the last week in December, but with an extra issue on the third 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 © 1971 by the American Association for the Advancement of Science. Annual subscription \$20; foreign postage: Americas \$3; overseas \$5; air freight to Europe, North America, Near East \$16; single copies \$1 (back issues, \$2) except *Guide to Scientific Instruments* which is \$4. School year subscription: 9 months, \$15; 10 months, \$16.75. Provide 4 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

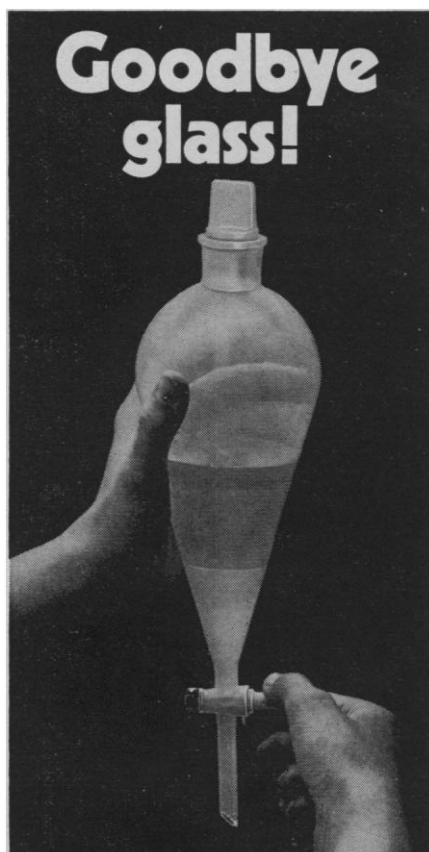
Identification of Each Human Chromosome with a Modified Giemsa Stain: <i>S. R. Patil, S. Merrick, H. A. Lubs</i> .....	821
Insect Photoreceptor: An Internal Ocellus Is Present in Sphinx Moths: <i>J. L. Eaton</i> .....	822
Marihuana: Identification of Cannabinoids by Centrifugal Chromatography: <i>D. G. Petcoff et al.</i> .....	824
Ascorbate Sulfate: A Urinary Metabolite of Ascorbic Acid in Man: <i>E. M. Baker, III, et al.</i> .....	826
Leucylglycinamide Released from Oxytocin by Human Uterine Enzyme: <i>R. Walter et al.</i>	827
Human Fetal Cerebellar Cortex: Organization and Maturation of Cells in vitro: <i>L. W. Lapham and W. R. Markesbery</i> .....	829
L-Dopa: Disaggregation of Brain Polysome and Elevation of Brain Tryptophan: <i>B. F. Weiss, H. N. Munro, R. J. Wurtman</i> .....	833
Identification of the Germination Self-Inhibitor from Wheat Stem Rust Uredospores: <i>Y. Macko et al.</i> .....	835
<i>Pseudomonas aeruginosa</i> : Growth in Distilled Water from Hospitals: <i>M. S. Favero et al.</i> ..	836
Pineal N-Acetyltransferase Activity: Effect of Sympathetic Stimulation: <i>P. H. Volkman and A. Heller</i> .....	839
Subacute Sclerosing Panencephalitis: Isolation of Suppressed Measles Virus from Lymph Node Biopsies: <i>L. Horta-Barbosa et al.</i> .....	840
Host-Seeking Stimulant for Parasite of Corn Earworm: Isolation, Identification, and Synthesis: <i>R. L. Jones et al.</i> .....	842
Latent Herpes Simplex Virus in Spinal Ganglia of Mice: <i>J. G. Stevens and M. L. Cook</i>	843
Serum Parathyroid Hormone in X-Linked Hypophosphatemia: <i>C. Arnaud, F. Glorieux,</i> <i>C. Scriver</i> .....	845
Effects of Long-Term Reserpine Treatment on Brain Tyrosine Hydroxylase and Behavioral Activity: <i>D. S. Segal et al.</i> .....	847
Technical Comments: Microdroplets and Water Drop Freezing: <i>P. V. Hobbs;</i> <i>R. J. Cheng</i> ; Cloud Seeding Experiments: Possible Bias: <i>S. M. Stigler</i> .....	849
<b>MEETINGS</b> The Precambrian: <i>P. Cloud</i> .....	851

CARYL P. HASKINS PHYLLIS V. PARKINS	LEONARD M. RIESER KENNETH V. THIMANN	WILLIAM T. GOLDEN Treasurer	WILLIAM BEVAN Executive Officer
GEOLOGY AND GEOGRAPHY (E) Ellis L. Yochelson William E. Benson	BIOLOGICAL SCIENCES (FG) George Sprugel, Jr. Richard J. Goss	ANTHROPOLOGY (H) Ward Goodenough Anthony Leeds	
ENGINEERING (M) Newman A. Hall Raynor L. Duncombe	MEDICAL SCIENCES (N) George B. Koelle F. Douglas Lawrason	DENTISTRY (Nd) Henry W. Scherp Sholom Pearlman	
INFORMATION AND COMMUNICATION (T) Edward L. Brady Scott Adams	STATISTICS (U) Elizabeth Scott Ezra Glaser	ATMOSPHERIC AND HYDROSPHERIC SCIENCES (W) Thomas F. Malone Louis J. Battan	

## COVER

Scanning electron micrograph of an erythrocyte enmeshed in fibrin. Part of a thrombus found on the inner surface of an intravenous catheter implanted proximal to the heart (about  $\times 20,500$ ). [Emil Bernstein and Eila Kairinen, Gillette Company Research Institute, Rockville, Maryland]

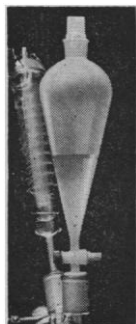
The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding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



## Hello Nalgene sep funnels.

Nalgene Separatory Funnel of Teflon\* FEP are so transparent that even the ether/water phase interface can be clearly seen right down to the stopcock. Resists any chemical used in a sep funnel so it can be used with HF. Ideal for trace analysis. Non-wetting for complete draining. The non-stick, easy-to-clean surface makes washing easy. Leakproof stopcock is Teflon TFE, non-seize stopper is new fluoropolymer, Tefzel\*.

And they're unbreakable—yet competitively priced with glass. Think about that the next time you handle a glass funnel. Available in 125, 250 and 500 ml sizes (Cat. No. 4301).



Also available in same sizes with 24/40 Teflon TFE male joint as Teflon Addition Funnel (Cat. No. 4320) for safer use on columns and flasks.

Order from your Lab Supply Dealer. Ask for our Catalog or write Dept. 4208B, Nalgene Laboratory Division, Rochester, New York 14602.

\*DuPont Registered Trademark



Nalgene® Labware...the permanent replacements.

### LETTERS

#### Health Care Crisis

The fashion this season is to talk about the health care crisis (1); four years ago, style dictated discussion of the health manpower crisis (2). The attempt to solve both of these crises has led to the definition of job roles for new types of health professionals and the development of programs to train them (3) as well as the creation of new medical schools and the expansion of enrollments at existing schools [Table 6 in (4)]. Recently the development of a new program to train Ph.D.'s in the life sciences as physicians was reported in *Science* (5).

This response seems quite similar to the outpouring of interest, energy, and funds with which this nation met the technology gap and the scientific-engineering manpower crisis of the Sputnik era (6). Once again, hearings are held in the nation's capital, programs are proposed, legislation is enacted, projects are funded. A backward glance at the fruits of the response to the earlier crises may prove instructive.

Because science was stressed in the elementary school, improved via new curricula (BSCS biology, PSSC physics, Chem-Study chemistry) in the high school, encouraged by summer stipends at the college level, and supported extensively by grants and fellowships at the graduate and post-doctoral levels, many students who might have entered other fields chose to become scientists (7). Colleges and universities, supported by grants from the federal government via the National Science Foundation and the Department of Defense, expanded their science staffs and enrollments, developed teaching and research programs in such fields as high-energy particle physics and molecular genetics, and moved laboratories from the basements of old buildings to the top floors of new science centers. Of course, building faculties and facilities took time.

Now there is an overabundance of Ph.D.'s in all fields, especially the sciences (8). While the job outlook for scientists and engineers is the worst in twenty years (9), the production of new Ph.D.'s in these very fields is just reaching its peak. It appears that there has been a tremendous waste of both money and manpower because of an overresponse to what was perceived as a crisis.

Let us turn to the health field. It currently takes 10 years for a first-year medical student to enter the health manpower pool; it takes 5 to 10 years to plan and staff a new medical school before it can accept its first class. The training of other kinds of health professionals is less extensive but may still require 3 to 4 years beyond high school or college. It may be true that more doctors are needed; it is apparent that doctors are useful to people in a very real and personal sense, unlike other highly trained professionals; it is clear that we could always export doctors to countries with health personnel shortages. The time, effort, and expense involved in training doctors and other health professionals, however, compel me, like Cassandra on the threshold, to sound a warning against proceeding too far too fast. The rapid increase in enrollments in the health professions has been documented (10); it would be almost criminal to again encourage our youth to enter a lengthy program of specialized training if, when they completed the course, they were to find that the prize they had sought had vanished.

DANIEL J. FINK

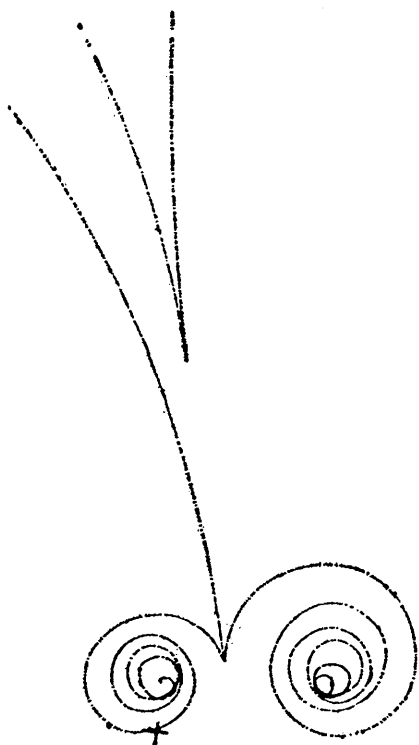
Department of Preventive Medicine  
and Community Health, School of  
Medicine and Dentistry,  
University of Rochester,  
Rochester, New York 14620

#### References

1. E. M. Kennedy, Health security for America, speech to the U.S. Senate, *Congr. Rec.*, 25 January 1971, p. S16; R. M. Nixon, message to Congress, *ibid.*, 18 February 1971, p. S1496.
2. F. B. Amos, *Amer. J. Public Health Nat. Health* 55, 1437 (1965); M. Shaefer and H. E. Hilleboe, *ibid.* 57, 6 (1967); Task Force on Health Manpower, National Commission on Community Health Services, *Health Manpower* (Public Affairs Press, Washington, D.C., 1967); D. L. Wilbur, *J. Amer. Med. Ass.* 201, 167 (1967).
3. Ad Hoc Committee on Allied Health Personnel, *Allied Health Personnel* (National Academy of Sciences, Washington, D.C., 1969); Ad Hoc Panel on New Members of the Physician's Health Team, *Physician's Assistants* (National Academy of Sciences, Washington, D.C., 1970); H. K. Silver, L. C. Ford, L. R. Day, *J. Amer. Med. Ass.* 204, 88 (1968); R. A. Smith, *ibid.* 211, 1843 (1970).
4. F. T. Stritter, J. G. Hutton, W. F. Dube, *J. Med. Educ.* 46, 25 (1971).
5. W. J. Harrington, W. J. Whelan, B. J. Fogel, E. M. Papper, *Science* 172, 1109 (1971).
6. D. J. Fink, unpublished paper.
7. J. Walsh, *Science* 172, 1218 (1971).
8. A. M. Cartter, *ibid.* 171, 132 (1971).
9. D. Shapley, *ibid.*, p. 823.
10. M. Y. Pennell and D. B. Hoover, *Health Manpower Source Book*, 21, *Allied Health Manpower Supply and Requirements 1950-80* (Government Printing Office, Washington, D.C., 1970).

As a member of the AAAS and a physician in active practice in a relatively rural environment, I feel that it





*For budding astrophysicists  
and backyard astronomers*

## Atoms, Stars, and Nebulae

(revised)

**Lawrence Aller**

If it's up there, it's probably in here, in this scholarly but comprehensible addition to the Harvard Books on Astronomy series. If you're a backyard astronomer, or a beginning student of astrophysics, the completely revised edition of this highly-praised book tells the story, in simple and direct terms, of how physics and astronomy work together. Illustrated. **\$11.95**

**The Harvard Books  
on Astronomy.**

**HARVARD**

Harvard University Press, Cambridge, Mass. 02138

Circle No. 77 on Readers' Service Card

27 AUGUST 1971

is time to look at the other side of the "health crisis" coin.

Those of us who are serving the public in actual practice are virtually unanimous in criticizing existing government health care programs for their failure to improve our ability to provide better medical care to the recipients.

These government programs are characterized by bureaucratic inefficiency from top to bottom. Although the amount of paper work involved has not increased, there has not been much improvement. The abundance of paper work contributes appreciably to the cost per patient of health care and is disillusioning to even the most altruistically motivated idealists, who would rather spend their efforts ministering to the needs of the sick than rendering reports to Caesar.

At the same time, inadequate funding combined with inflation are reducing the material rewards by which the providers of health care are persuaded to render services to recipients of government aid. Often this results in retroactive refusal by government agencies to pay for services that were apparently authorized.

In addition, more and more people are coming to believe that "medical care is a right." This portion of our population makes increasingly irresponsible demands on our overtaxed system in the form of minor complaints that formerly would not have resulted in a visit to the hospital or to the doctor's office.

Whereas all of us in practice are well aware of deficiencies in the health care that is available to a small segment of our population, certain political leaders have made extravagant claims and promises, which can only be interpreted as having been made for political gain. The inflated expectations brought about by these politicians, together with the defective administration of existing programs and inadequate funding, may actually be reducing the quality of medical care available to some people in the United States.

**JOHN D. MACCARTHY**

635 Cedar Street, Elko, Nevada 89801

### Seeking Employment

In view of the current crisis in employment opportunities for Ph.D. scientists it is interesting to note both the number and profile of those interested

# Praise the Lourdes.



## Beta-Fuge™

Vernitron enters the research lab with Lourdes Beta-Fuge...the only centrifuge that combines 4 litre rotor capacity with the highest possible speed. Features include patented continuous flow system with 1.8 litre sediment capacity, "Fail-Safe" brush life control, sliding top door for easy loading and unloading, solid state speed control, and temperature control range for -20°C to plus 40°C.

For size and speed, there's no better centrifuge for your laboratory than the Lourdes Beta-Fuge.

For more information, write Vernitron or contact your local dealer...today. And you, too, will praise the Lourdes.

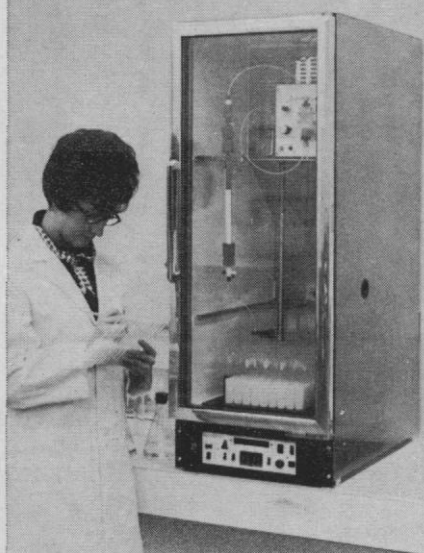


Vernitron Medical Products, Inc.  
Empire Blvd. & Terminal Lane, Carlstadt, N.J. 07072

Circle No. 78 on Readers' Service Card

767

## cold room chromatography without a cold room



This tabletop refrigerated fraction collector will fit practically anywhere in your lab. 210 test tubes from 10 to 18 mm diameter are held in removable racks which move in timed, counted drop, or volumetric increments. Cleaning is easy with the lift out, submergible mechanism and smooth molded interior. The cabinet has a brushed stainless steel exterior and double pane full size glass door. Columns with a maximum length of 1 meter can be clamped to removable sliding wire racks, which also hold buffer reservoirs, pumps, and general cold storage items.

At \$1600 an ISCO refrigerated fraction collector is hardly more expensive than popular unrefrigerated units. It is described in our general catalog, with other ISCO equipment for chromatography, density gradient fractionation, electrophoresis, and other biochemical laboratory techniques. Your copy is waiting for you.



**INSTRUMENTATION  
SPECIALTIES COMPANY**  
4700 SUPERIOR LINCOLN, NEBRASKA 68504  
PHONE (402) 434-0231 TELEX 48-6453

in teaching at liberal arts colleges.

This year our department had a faculty opening for an experimental physical chemist. We placed an advertisement for 2 weeks in a professional magazine. We received a total of 281 applications. On the basis of current or most recent full-time employment, these can be categorized as follows: (i) graduate students (23 percent); (ii) first postdoctoral appointees (28 percent); (iii) second or later postdoctoral appointees (11 percent); (iv) faculty members (22 percent); (v) industrial employees (13 percent); and (vi) government employees (2 percent).

The percentages of currently unemployed, female, and noncitizen applicants were 12, 3, and 27, respectively.

JON M. VEIGEL

*Joint Science Department,  
Claremont Colleges,  
Claremont, California 91711*

### Pesticide Labeling

I am collecting case histories of poisonings by combination preparations of pesticides, particularly those composed of various mixtures of phosphate esters, carbamates, or chlorinated hydrocarbons. Those cases in which information about instructions for use printed on labels have been inadequate, confusing, contradictory, or absent are especially pertinent to this study.

While there are many reported instances of poisonings by individual compounds, case reports in which several pesticides in combination were involved are not commonly reported in the literature. Many poisonings from these combinations may go unreported owing to the difficulties in establishing which of the agents is responsible for the patient's symptoms.

I urge scientists and physicians who know of such cases to write to me.

CECIL H. FOX

*Box 19367,  
Washington, D.C. 20036*

### Definition of "Good Teaching"

In his letter of 11 June, Dow pleads for a definition of "good teaching."

A good teacher is a person who provides far more than textbooks or lectures; he offers himself as a model

for his students' identification; through him they not only know more than they knew before, but also they are more than they were before. A good teacher, regardless of his subject, catalyzes the student's self-discovery, and the joy of the *ding an sich*—the thing-in-itself, the excitement of knowing for itself. The great teacher goes farther; in his unique way, he legitimizes for his gifted students the myriad awe-inspiring experiences from which new creative possibilities and combinations spring forth.

John Ciardi correctly notes that American mass education aims for the development of a universal standard of subliteracy. As the educational edifice weakens, its standards fall farther, its incredible bureaucracy proliferates, and it is no wonder that educators must indulge in pseudoscientific, numerological mumbledepeg to "discover" what it is they think they are supposed to be doing with students. As Dow states, "many of the teaching-versus-research studies . . . simply result in quantifying the obvious." How right he is!

DONALD B. RINSLEY

*3212 Eveningside Drive,  
Topeka, Kansas 66614*

### Women in Physics

The American Physical Society has appointed a Committee on Women in Physics which requests the following information for its study.

First, we are compiling a roster of women physicists and would very much like to know the names and present addresses of all women physicists, especially those who are not members of the American Physical Society. The term physicist is meant to include women with B.A.'s, B.Sc.'s, or higher degrees who are actively engaged in work related to physics and also women with advanced degrees in physics working in areas not related to physics or not presently working.

Second, we are soliciting comments and recommendations to the committee from all women physicists, both members of the American Physical Society and nonmembers.

VERA KISTIAKOWSKY

*Committee on Women in Physics,  
575 Technology Square, Room 408,  
Massachusetts Institute of Technology,  
Cambridge 02139*



## 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

1971

THOMAS EISNER	NEAL MILLER
AMITAI ETZIONI	BRUCE MURRAY
EMIL HAURY	JOHN R. PIERCE
DANIEL KOSHLAND, JR.	MAXINE SINGER

1972

ALFRED BROWN	FRANK PRESS
JAMES F. CROW	FRANK W. PUTNAM
THOMAS KUHN	WALTER O. ROBERTS
ELLIOTT W. MONTROLL	

### 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, ROBERT J. BAZELL, DEBORAH SHAPLEY, ROBERT GILLETTE, D. PARK TETER, NICHOLAS WADE, EDWARD P. JONES, JOE PICHIRALLO, CONSTANCE HOLDEN, SCHERRAINE MACK

*Research Topics:* ALLEN L. HAMMOND

*Book Reviews:* SYLVIA EBERHART, KATHERINE LIVINGSTON, MARLENE GLASER

*Cover Editor:* GRAYCE FINGER

*Editorial Assistants:* MARGARET ALLEN, ISABELLA BOULDIN, BLAIR BURNS, ELEANORE BUTZ, RONNA CLINE, CORRINE HARRIS, OLIVER HEATWOLE, ANNE HOLDSWORTH, ELEANOR JOHNSON, CHRISTINE KARLIK, MARSHALL KATHAN, MARGARET LLOYD, DANIEL RABOVSKY, PATRICIA ROWE, LEAH RYAN, LOIS SCHMITT, BARBARA SHEFFER, RICHARD SOMMER, YA LI SWIGART, ALICE THEILE, MARIE WEBNER

*Membership Recruitment:* LEONARD WRAY; *Subscriptions:* BETT SEEMUND; *Addressing:* THOMAS BAZAN

### Advertising Staff

#### Director

EARL J. SCHERAGO

#### Production Manager

BONNIE SEMEL

*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); MEDFIELD, MASS. 02052: Richard M. Ezequelle, 4 Rolling Lane (617-444-1439); CHICAGO, ILL. 60611: John P. Cahill, 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 Topics: 467-4455; Reviewing: 467-4440. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv, *Science*, 25 June 1971. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

## AAAS Council Resolutions

The American Association for the Advancement of Science has had a liberal policy with regard to the introduction of resolutions for endorsement by Council. This has stimulated new thinking and has provided a means for assuring relevance and responsiveness during this period of transition for science and technology. It is important to assure that this responsiveness is accompanied by appropriate responsibility.

The Committee on Council Affairs, of which I am a member, has the responsibility of studying the resolutions and recommending Council action. Many types of resolutions have been sent to this committee. When resolutions are clearly inappropriate, time is lost by the committee in discussing them and time has obviously been spent by the sponsor in preparing them. It seems in order to indicate the nature of resolutions that are appropriate and the nature of those that are not.

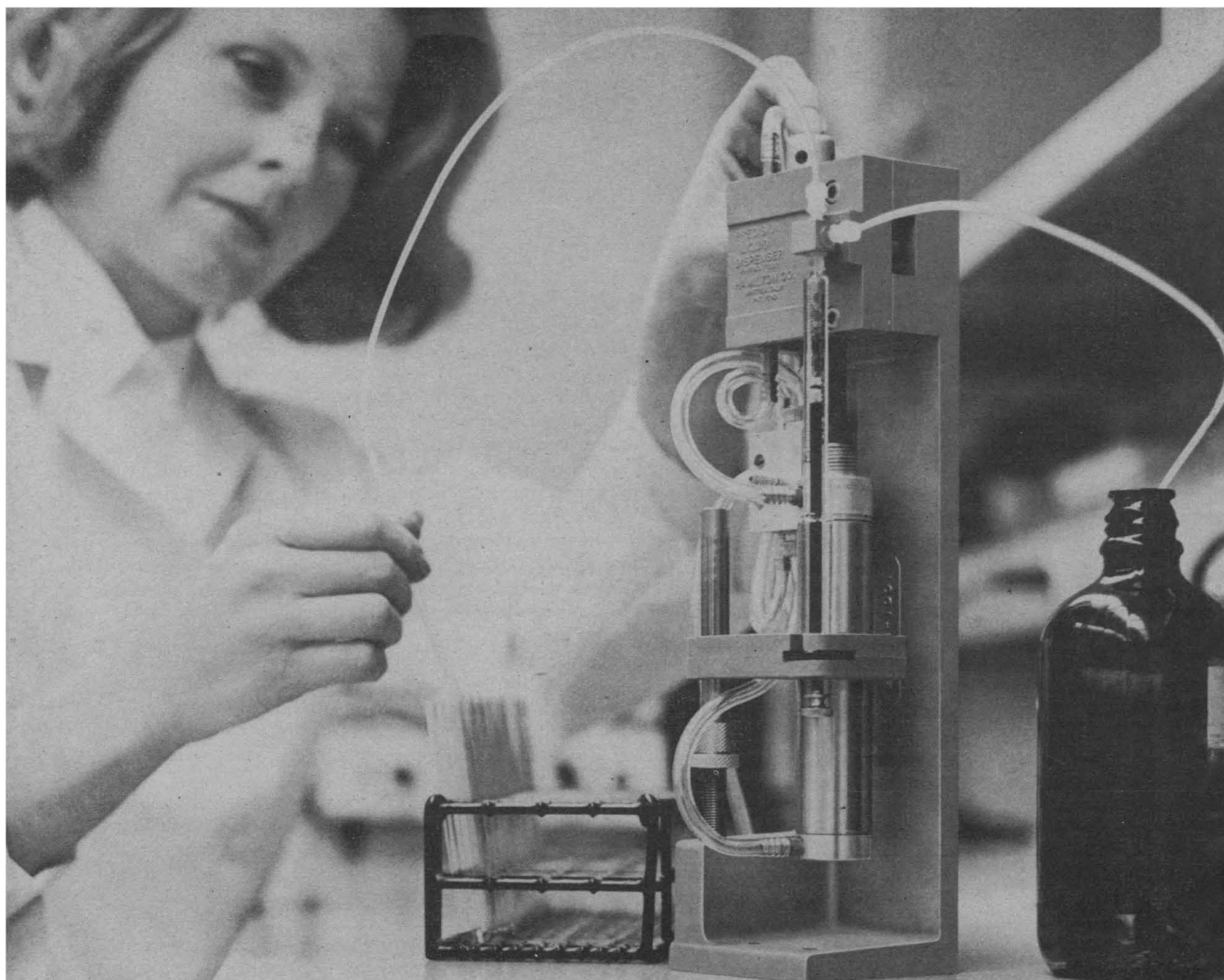
One of the objects of the Association stated in its constitution is "to improve the effectiveness of science in the promotion of human welfare." All too often the words "human welfare" have been taken as the sole basis for a resolution; the "effectiveness of science" or, indeed, any relationship to science has either been ignored or been introduced under very weak rationalization.

Frequently, these resolutions have strongly suggested an attempt to use the name of the Association to support political convictions held by the sponsor. The Committee on Council Affairs does not consider that the Association's purposes include publicizing the political views of its members.

On many occasions, the forms of the resolutions have also been inappropriate for support by a body of scientists supposedly acting on scientific evidence. This has been particularly noticeable in the "whereases" preceding the resolution, which have sometimes been inaccurate in content and ridiculous in length. For example, one resolution submitted in 1970 stated: "Whereas this opinion is shared by leading scientists throughout the world. . . ." Under questioning, the author was unable to name any "leading scientists" who shared the opinion and finally said he "thought" that "some" foreign scientists would agree. This sort of loose and careless language does not impress the committee and raises doubts as to the intellectual honesty of the sponsor of the resolution.

The use of words such as "conclusive proof," without any evidence as to the nature of the proof or where it is to be found, does not help the committee to gauge the soundness of a resolution. Whenever resolutions require specialized knowledge for their consideration, their movers should make it their responsibility to provide such knowledge, so that the committee and the Council can act appropriately. Motions for action requiring financial backing by the Association should include realistic budget estimates. Explicit instructions for submission of resolutions will be published annually in the September issue of the *AAAS Bulletin*.

The time may well come when scientists will need to speak out together on matters of concern to us all. The authority of our Association will have been greatly weakened if we have passed resolutions on matters unrelated to science or have forced through Council resolutions on which scientists hold widely divergent views.—FRANK BRADSHAW WOOD, *Department of Physics and Astronomy, University of Florida, Gainesville 32601*



## Dispense precise volumes automatically

If you need to dispense precise volumes of liquid . . . in automated, semi-automatic, or on-demand applications . . . our Precision Liquid Dispenser will solve some of the problems encountered in other dispensers. It offers high precision over a range of 1  $\mu$ l to 10 ml. Any of eight syringes with Teflon\* tipped plungers may be used interchangeably. Cycling rates for collecting and dispensing are adjustable. With our Teflon dispensing tips your system may be completely inert. Delivery volume is adjustable continually from 2% to 100% of the syringe scale. □ If you need to deliver microliter volumes, precisely . . . investigate our Precision Liquid Dispenser. It's described in our catalog . . . let us send you a copy. Write to Hamilton Company, P.O. Box 307, Whittier, California 90608.

**HAMILTON** *Fl.*

\*DuPont registered trademark

## Labeled Compounds for Cell Wall Research

### Sialic Acid

#### N-Acetyl-neuraminic-4-C<sup>14</sup> Acid

NEC-615 45-55mc/mM \$105/10 $\mu$ c \$360/50 $\mu$ c

Other compounds of related interest:

#### D-Mannosamine-C<sup>14</sup> (U) Hydrochloride

NEC-613 175-225mc/mM \$100/50 $\mu$ c \$450/250 $\mu$ c

#### D-Glucosamine-C<sup>14</sup> (U) Hydrochloride

NEC-500X >200mc/mM \$65/50 $\mu$ c \$300/250 $\mu$ c

#### L-Fucose-H<sup>3</sup> (G)

NET-296 1-5c/mM \$33/250 $\mu$ c \$75/1mc  
\$225/5mc

#### L-Fucose-1-C<sup>14</sup>

NEC-602 40-55mc/mM \$90/50 $\mu$ c \$400/250 $\mu$ c

PLACE YOUR ORDER COLLECT.

**NEN** New England Nuclear

575 Albany Street, Boston, Mass. 02118

Customer Service: (617) 482-9595

Canada: NEN Canada Ltd., Dorval, Quebec

Europe: NEN Chemicals GmbH

Dreieichenhain bei Frankfurt, Germany

Circle No. 91 on Readers' Service Card

## Free bulletin describing important new research equipment for

### Neurophysiologists

### Experimental psychologists

### Eye, brain, heart researchers

### Other life scientists

- Low-cost histogram analyzer for on-line data reduction and analysis.
- Experiment control (precision timing, sequencing of events).
- Stimulators (both modular and integrated).
- Amplifiers and preamplifiers (general and microelectrode).
- Discriminators, counters, timers, ratemeters, hard-copy interfaces.

Write for Bulletin LS-201. Ortec Incorporated, 133 Midland Road, Oak Ridge, Tenn. 37830. Phone (615) 482-4411.

In Europe: Ortec GmbH, 8 München 13, Frankfurter Ring 81, W. Germany.  
In the U.K.: Ortec Ltd., Dallow Road, Luton, Bedfordshire, England.

**ORTEC**  
AN EG&G COMPANY

Circle No. 92 on Readers' Service Card



5131

## CYCLIC AMP

by G. ALAN ROBISON and EARL W. SUTHERLAND, both at the Department of Pharmacology, School of Medicine, Vanderbilt Univ., Nashville, Tennessee, and R. W. BUTCHER, Department of Biochemistry, Univ. of Massachusetts Medical School, Worcester, Mass.

This long awaited volume presents a comprehensive and critical review of our present knowledge of the many roles of cyclic AMP in biological processes, as well as a description of the methods used to gain this knowledge. The specific functions of AMP and implications for future research are included. The book contains over 1500 references, and 53% of them are to papers published in 1968 or later.

CONTENTS: Appendix on the Assay of Cyclic AMP. Cyclic AMP and Hormone Action. Chemistry of Cyclic Nucleoside Phosphates and Synthesis of Analogs. Formation and Metabolism of Cyclic AMP. Some Actions of Cyclic AMP. The Catecholamines. Glucagon and Insulin. Lipolysis in Adipose Tissue. Cyclic AMP and Steroidogenesis. Other Hormones. Other Cyclic Nucleotides.

August 1971, about 500 pp., \$17.50

## ADVANCES IN CELL AND MOLECULAR BIOLOGY

### Volume 1

edited by ERNEST J. DuPRAW, Stanford Univ. School of Medicine, Stanford, California

This new serial publication provides succinct reviews of the several areas of cell and molecular biology receiving the most attention as the various volumes go to press. In addition to updating material in the text Cell and Molecular Biology, the series provides excellent summaries of new research trends for students and research workers alike. Topics covered in this first volume include: the biology and chemistry of chromosomal proteins, molecular mechanisms of chromosome breakage and rejoining, the molecular architecture of synaptonemal complexes, and chromosome alterations in human carcinogenesis.

1971, 328 pp., \$15.00

## ENZYME PURIFICATION AND RELATED TECHNIQUES

### Volume 22 of Methods in Enzymology

Series Editors: SIDNEY P. COLOWICK and NATHAN O. CAPLAN

edited by WILLIAM B. JAKOBY, Section on Enzymes and Cellular Biochemistry, National Inst. of Arthritis and Metabolic Diseases, National Inst. of Health, Bethesda, Md.

This volume is a comprehensive sourcebook of available methods for enzyme purification. It presents fractionation techniques based on molecular size, shape, solubility, and charge, and includes a section on the assessment of purification. It also covers the processes of microbial growth for both small- and large-scale preparation, the isolation of certain organelles, and various methods of extraction. A discussion of large-scale enzyme preparation outlines many possibilities for working with more laboratory quantities of protein.

1971, 660 pp., \$29.50

## A STATISTICAL MANUAL FOR CHEMISTS

### SECOND EDITION

by EDWARD L. BAUER, Winthrop Laboratories, Rensselaer, N.Y.

CONTENTS: Fundamentals. The Average. Experimental Design and the Analysis of Variance. The Comparison of Two Averages. Analysis of Variance by Range. Control Charts. Correlated Variables. Sampling. Control of Routine Analysis.

August 1971, about 190 pp., in preparation

## ACADEMIC PRESS

NEW YORK AND LONDON  
111 FIFTH AVENUE, NEW YORK, N. Y. 10003

Circle No. 50 on Readers' Service Card

853



## NEW Polynucleotides and PNPase preps from P-L Biochemicals

4510 POLY A•POLY U, DOUBLE STRAND,  
PHYSIOLOGICAL SALT\*, LYOPHILIZED  
\*Also available as Sodium Salt  
10 mg. \$18.00 25 mg. \$35.00  
100 mg. \$90.00

4532 POLY A•POLY U•POLY U, TRIPLE  
STRAND, PHYSIOLOGICAL SALT\*, LYOPHILIZED  
\*Also available as Sodium Salt  
10 mg. \$20.00 25 mg. \$40.00  
100 mg. \$100.00

4715 POLY I•POLY C, DOUBLE STRAND,  
STERILE REFERENCE SOLUTION, 1 mg./  
ml. IN PHYSIOLOGICAL SALINE  
1 ml. \$6.00 5 ml. \$12.50

4257 POLYGUANYLIC ACID (POLY G) POTASSIUM SALT, LYOPHILIZED  $S_{20,w} = 6.12$   
10 mg. \$16.00 25 mg. \$32.00  
100 mg. \$110.00

4550 POLYXANTHYLIC ACID (POLY X), POTASSIUM SALT, LYOPHILIZED  $S_{20,w} = 4.5$   
10 mg. \$50.00 25 mg. \$110.00  
100 mg. \$330.00

4160 POLYADENYLIC, URIDYLIC, GUANYLIC ACID; (POLY A,U,G) POTASSIUM SALT, LYOPHILIZED  $S_{20,w} = 8.2$   
5 mg. \$50.00 10 mg. \$90.00  
25 mg. \$200.00

4341 POLYINOSINIC, GUANYLIC ACID; POLY(I,G), POTASSIUM SALT, LYOPHILIZED. Approximately equal incorporation I and G  $S_{20,w} = 11.0$   
5 mg. \$50.00 10 mg. \$90.00  
25 mg. \$200.00

4451 POLYURIDYLIC, GUANYLIC ACID; POLY(U,G), POTASSIUM SALT, LYOPHILIZED. Approximately equal incorporation of U and G  $S_{20,w} = 6.0$   
5 mg. \$50.00 10 mg. \$90.00  
25 mg. \$200.00

0672 POLYNUCLEOTIDE PHOSPHORYLASE, (*E. coli* B), TYPE 25. Minimum activity 25 poly units per mg. protein (1 unit = 1  $\mu$ mole ADP/15 min.)  
10 units \$50.00 50 units \$200.00

0688 POLYNUCLEOTIDE PHOSPHORYLASE, (*E. coli* B), TYPE 2. Activity 0.5 to 3.0 poly units per mg. protein (1 unit = 1  $\mu$ mole ADP/15 min.)  
50 units \$25.00 500 units \$220.00

0431 POLYNUCLEOTIDE PHOSPHORYLASE, PRIMER DEPENDENT\*, (*M. lysodeikticus*). Synthesis of trinucleoside diphosphates or larger oligonucleotides of known sequence.  
10 units \$80.00 25 units \$165.00  
\*Primer Independent preparations also available.

0616 RIBONUCLEASE T<sub>1</sub> (*A. oryzae*). Use with 0431 PNPase for trinucleoside diphosphate synthesis.  
100,000 units \$15.00  
500,000 units \$55.00

excellence in  biochemistry

**P-L biochemicals, inc.,**

1037 W. McKinley Ave., Milwaukee, Wisconsin 53205  
Tel. 414-271-0667, Cable: PL Biochem

Circle No. 76 on Readers' Service Card

were at that time gathered in a single circumpolar sialic blob, one might visualize such a late pre-Paleozoic glacial episode as being truly "worldwide" as far as records are concerned. Since there is enough evidence to suggest both that this might be so and that it could provide a well-defined operational boundary between Paleozoic and pre-Paleozoic, the possibility deserves intensive, open-minded study. An interesting possibility to be considered here involves the idea that associated lowering of groundwater levels might be reflected by the deep leaching and oxidation of much older BIF protos commonly observed where glacial deposits of younger pre-Paleozoic age are missing.

If Cloud's model of early biospheric-atmospheric-lithospheric evolution is valid, then the onset of red-bed sedimentation should be expected to overlap only slightly in time with the last major episode of banded iron formation, denoting another phase of crustal evolution that seems to have time significance and generally to separate older from younger Proterozoic. Stromatolite zonation, if it can be shown to have consistent interregional applications, would apply on a scale of units hundreds of millions of years long, and primarily to the younger (middle and upper) Proterozoic. Soviet stromatolite students generally have supported this view, recently with the limited concurrence of Martin Glaessner and associates and of Cloud. But at this conference both Hans Hofmann and Paul Hoffman strongly questioned the utility of interbasinal stromatolite correlation on grounds of their experience with the Proterozoic rocks of Canada.

All this interplay made evident both a broad agreement about the main modalities of crustal evolution during pre-Paleozoic time in North America, and much disagreement about details, about the philosophy on which a stratigraphic nomenclature or symbolism should be based, and on how many major divisions should be recognized and what names or symbols should be applied to them. In general this is so the world over at the present time. In broad terms, informed geologists generally recognize (i) a basal granite-greenstone-graywacke-bedded chert-amphibolite facies older than about 2.4 to 2.7 aeons; (ii) an intermediate facies of mainly ensialic clastic prisms or wedges that includes the oldest clean quartzites and generally the youngest

banded iron formation above the greenstone-granite facies and older than about 1.8 to 2.1 aeons; and (iii) a younger, more diversified set of rocks which characteristically include the oldest red beds, an abundance of commonly stromatolitic carbonate rocks, and, at many places tillite-containing sediments somewhat older than about 0.6 aeon. The words Archean, Eparchean, Katarchean, lower Proterozoic, and middle and upper Proterozoic are commonly applied to these divisions or parts of them; but, even though the same broad groupings of rocks are recognized, usage of terms is not consistent from one continent and country to another, and there seems to be little prospect of agreement on a uniform global nomenclature at this time.

The consensus at the Medicine Bow conference, insofar as there was one, was that it would be premature to seek nomenclatural agreement. In retrospect it seems not terribly important that we could not agree on names or precise boundaries in view of the fact that we did see the same broad trends and were able to discuss them without much terminological difficulty. This is attributable, above all, to the magnificent labors of the last two generations of geochronologists. But that does not mean that radiometric numbers should define rather than calibrate crustal evolution. The issue will be rejoined—there is no doubt of that. And if it is successfully resolved, the groundwork laid at this conference may take some of the credit.

PRESTON CLOUD

Department of Geological Sciences,  
University of California,  
Santa Barbara 93106

### Notes

1. The terms Archean and Proterozoic here refer to major divisions of the pre-Paleozoic, older and younger, respectively, than about 2.5 to 2.6 aeons, following current practice in Canada where the great bulk of North American pre-Paleozoic rocks are found. Two of the respondents to a draft of this report objected to that usage as not properly reflecting the lack of agreement on nomenclature at the conference. Another felt "that almost everyone agreed that the Precambrian . . . should be divided by arbitrary absolute time boundaries." I did not detect such a consensus, and it is convenient for present purposes, and consistent with much accepted practice, to utilize the terms Archean and Proterozoic in their Canadian sense. The reader should realize, however, both that opinion and practice are unsettled and that there was no agreement among the conferees in favor of this or any other terminology.
2. My research on the primitive earth, my contribution to this conference, and the expenses of attendance and participation by H. L. Allsopp, R. L. McConnell, and myself were supported by NSF grant GB-7851 and NASA Exobiology grant NGR-05-010-035.

13 January 1971

SCIENCE, VOL. 173

## BOOKS RECEIVED

(Continued from page 807)

formation Service, Springfield, Va.). viii, 190 pp., illus. Paper, \$3. AEC Critical Review Series.

**Anatomy of the Normal Human Thalamus.** Topometry and Standardized Nomenclature. A. Dewulf. Elsevier, New York, 1971. xiv, 196 pp., illus. \$26.

**Applied Coastal Geomorphology.** J. A. Steers, Ed. M.I.T. Press, Cambridge, Mass., 1971. 228 pp. + plates. \$10.

**Arithmetic.** An Introduction to Mathematics. Bevan K. Youse. Canfield, San Francisco, 1971. x, 294 pp., illus. \$8.95.

**Aspects of the Biology of Symbiosis.** Proceedings of a symposium, Boston, December 1969. Thomas C. Cheng, Ed. Butterworths, London, and University Park Press, Baltimore, Md., 1971. x, 328 pp., illus. \$14.50.

**Atlas of Energy Budgets of Plant Leaves.** David M. Gates and LaVerne E. Papian. Academic Press, New York, 1971. viii, 278 pp., illus. \$14.50.

**Atlas of United States Trees.** Vol. 1, Conifers and Important Hardwoods. Elbert L. Little, Jr. U.S. Forest Service, Washington, D.C., 1971 (available from the Government Printing Office, Washington, D.C.). Various pages, with overlays. \$16.75.

**Atoms, Stars, and Nebulae.** Lawrence H. Aller. Harvard University Press, Cambridge, Mass., ed. 2, 1971. xii, 352 pp., illus. \$11.95.

**Biological Principles and Processes.** Claude A. Vilée and Vincent G. Dethier. Saunders, Philadelphia, 1971. xxii, 1010 pp., illus. \$11.25.

**The Biology of Flowering.** Frank B. Salisbury. Published for the American Museum of Natural History by the Natural History Press, Garden City, N.Y., 1971. xiv, 176 pp., illus. \$5.95.

**Biophysik.** Eine Einführung in die Physikalische Analyse biologischer Systeme. Walter Beier. Thieme, Leipzig, ed. 3, 1968. x, 420 pp., illus. 39.50 M.

**Les Bombycoïdes (Lepidoptera-Bombycoidea) de l'Europe et du Bassin Méditerranéen.** Vol. 1, Lemoniidae, Bombycidae, Brahmaeidae, Attacidae, Endromiidae. P.-C. Rougeot. Masson, Paris, 1971. viii, 164 pp. + plates. 80 F. Faune de l'Europe et du Bassin Méditerranéen, vol. 5.

**The Born-Einstein Letters.** Correspondence between Albert Einstein and Max and Hedwig Born, from 1916 to 1955, with commentaries by Max Born. Translated by Irene Born. Walker, New York, 1971. xii, 240 pp. + plates. \$8.50.

**Centurie de Lépidoptères de l'île de Cuba.** Ph. Poey. Classey, Paris, 1970 (U.S. distributor, Entomological Reprint Specialists, Los Angeles). Unpaged, illus. \$30. Reprint of the 1832 edition.

**The Challenge of Genetics.** Problems Designed to Enlighten and Stimulate Students of Genetics. Edward H. Simon and Joseph Grossfield. Addison-Wesley, Reading, Mass., 1971. vi, 218 pp., illus. Paper, \$3.50.

**Chemistry.** Elementary Principles. Paul F. Weller and Jerome H. Supple. Addison-Wesley, Reading, Mass., 1971. xii, 644 pp., illus. \$10.75.

**Class Context and Family Relations.** A Cross-National Study. Leonard I. Pearlin. Little, Brown, Boston, 1971. xvi, 224 pp. \$7.95.

**Combustion-Driven Oscillations in Industry.** Abbott A. Putnam. Elsevier, New York, 1971. xiv, 208 pp., illus. \$18.50. Fuel and Energy Series.

**Computer Methods for Ships Surface Design.** Chengi Kuo. Elsevier, New York, 1971. x, 224 pp., illus. \$15.90.

**Conference on Beneficial Uses of Thermal Discharges.** Albany, N.Y., September 1970. Satyendra P. Mathur and Ronald Stewart, Eds. New York State Department of Environmental Conservation, Albany, 1971. 228 pp., illus. Paper, \$10.

**A Course in Statistical Thermodynamics.** Joseph Kestin and J. R. Dorfman. Academic Press, New York, 1971. xviii, 578 pp., illus. \$17.50.

**Crystal Chemistry and Semiconduction in Transition Metal Binary Compounds.** J. P. Suchet. Academic Press, New York, 1971. xx, 380 pp., illus. \$22.

**Developments in Applied Spectroscopy.** Vol. 9. Papers from a symposium, Chicago, June, 1970. E. L. Grove and A. J. Perkins, Eds. Plenum, New York, 1971. x, 454 pp., illus. \$19.50.

**Dialysis and Renal Transplantation.** Vol. 7. Proceedings of conference, Barcelona, June 1970. J. Stewart Cameron, Daniel Fries, and Chisholm S. Ogg, Eds. Pitman, London, 1971 (U.S. distributor, Williams and Wilkins, Baltimore, Md.). xvi, 528 pp., illus. \$22.

**The Distributional History of the Biota of the Southern Appalachians.** Part 1, Invertebrates. A symposium, Blacksburg, Va., June 1968. Perry C. Holt, Richard L. Hoffman, and C. Willard Hart, Jr., Eds. Virginia Polytechnic Institute, Blacksburg, 1969. viii, 298 pp., illus. Paper, \$4.95. VPI Research Division Monograph 1.

**Electroacoustics.** Microphones, Earphones, and Loudspeakers. M. L. Gayford. Elsevier, New York, 1971. xii, 290 pp., illus. \$15. Standard Telephones and Cables Monograph.

**Electronic Properties of Materials.** A Guide to the Literature. Vol. 3. D. L. Grigsby, Ed. IFI/Plenum, New York, 1971. Part 1, xiv, 1162 pp. Part 2, x, 756 pp. \$150.

**The End of a Tradition.** Culture Change and Development in the Município of Cunha, São Paulo, Brazil. Robert W. Shirley. Columbia University Press, New York, 1971. xvi, 304 pp. \$10.

**Experiments Using Marine Animals.** Fred A. Diehl, James B. Feeley, and Daniel G. Gibson, III. John M. King, Ed. Aquarium Systems, Eastlake, Ohio, 1971. iv, 92 pp., illus. Paper, \$4.50.

**Forecasters' Guide to Tropical Meteorology.** Gary D. Atkinson. Air Weather Service (MAC), Scott Air Force Base, Ill., 1971 (available from the National Technical Information Service, Springfield, Va.). Various pages, illus. Paper, \$6. Technical Report 240.

**Forest Resources in Canada.** Current Status, Adequacy, Desirable and Future Development. Background Study for the Science Council of Canada. J. Harry G. Smith and Gilles Lessard. Information Canada, Ottawa, 1970. 204 pp. Paper,

# NOW! 35% off CRC's Automated Labwashers

SAVE! Buy direct from  
the manufacturer.  
(offer ends Sept. 30, 1971)



**The new CRC Labwasher®**  
offers improved glassware  
washing plus plasticware cycle.

Sets up in seconds. No costly installation charges. And no inconvenience. Quick-disconnect coupling includes universal adapter for attachment to any water tap. Smooth-working ball-type casters lock for stable operation. And a three-wire cord—over eight feet long—makes direct connection to distant outlets possible. Operates on 115 Volts — 60 cycles.

They cut glass labware breakage in half, and soon pay for themselves in man-hours saved.

- Choice of tap or distilled water rinses (up to 3)
- Dual-Temp Forced-Air Drying
- Booster heater for elevating and maintaining water temperatures
- Convenient front loading with roll-out racks
- 16 stainless steel accessory racks handle glass labware or plasticware

For more information,  
request Bulletin No. A-18



THE  
**CHEMICAL  
RUBBER  
CO.**

18901 Cranwood Parkway  
Cleveland, Ohio 44128

Circle No. 74 on Readers' Service Card  
855

**plenum**  
PUBLISHING CORPORATION

## EXCITED STATES OF PROTEINS AND NUCLEIC ACIDS

Edited by **Robert E. Steiner**, *University of Maryland*, and **Ira Weinryb**, *Squibb Institute for Medical Research, N.J.*

This work offers a solid foundation for research workers to keep abreast of the rapidly developing field concerning the emission properties of proteins and nucleic acids. It critically assesses existing results and interpretations, and stresses recent developments. Accounts of earlier work are also presented. It includes such topics as: a generalized theoretical treatment of luminescence, and an account of experimental techniques.

**CONTRIBUTORS:** W. B. Dandliker • J. Eisinger • Robin M. Hochstrasser • Edward P. Kirby • Eloise Kuntz • A. A. Lamola • J. W. Longworth • Everett T. Meserve • A. J. Portmann • R. F. Steiner • I. Weinryb.

APPROX. 478 PAGES AUGUST 1971 \$28.00  
SBN 306-30509-7

## BIOMEMBRANES\* VOLUME 1

Edited by **Lionel A. Manson**, *Wistar Institute*

**BIOMEMBRANES** systematically reviews the latest information on the composition, function, biosynthesis, and structure of membranes of animal, plant, and bacterial cells. Studies with artificial membrane models are included, as they relate to biological membranes. Some of the topics covered include: control and regulatory functions of biomembranes, and active transport mechanisms.

**CONTRIBUTORS:** M. C. Glick • Paul Kraemer • Anthony Martonosi • Milton Salton • Leonard Warren.

293 PAGES AUGUST 1971 \$19.50  
SBN 306-39801-X

\*Place your continuation order today for books in this series. It will ensure delivery of new volumes immediately upon publication; you will be billed later.

**plenum press / consultants bureau**

Divisions of Plenum Publishing Corporation  
227 W. 17th ST., NEW YORK, NEW YORK 10011  
Circle No. 70 on Readers' Service Card

\$3.50 Canadian. Special Study No. 14.  
**Fossils and Flies.** The life of a Compleat Scientist, Samuel Wendell Williston (1851-1918). Elizabeth Noble Shor. University of Oklahoma Press, Norman, 1971. xiv, 286 pp., illus. \$8.95.

**400 Ideas for Design.** Vol. 2, Best Ideas for Design from *Electronic Design*, 1965 through 1970. Frank Egan, Ed. Hayden, New York, 1971. xvi, 280 pp., illus. \$11.95.

**Gateway to Science.** The Weizmann Institute at Twenty-Five. Lillie Shultz, Ed. Photographed by Peter Fink. Weidenfeld and Nicolson, Jerusalem, 1970. 192 pp., illus. Boxed.

**A Geography of Landforms.** John H. Vann. Brown, Dubuque, Iowa, 1971. x, 138 pp., illus. Paper, \$1.95.

**A Guide to Fluidics.** Arthur Conway, Ed. Macdonald, London, and Elsevier, New York, 1971. vi, 146 pp., illus. \$8.

**Handbook of Drug Interactions.** Gerald Swidler. Wiley-Interscience, New York, 1971. x, 384 pp. \$15.

**A Handbook on Evolution.** Gavin de Beer. British Museum (Natural History), London, ed. 4, 1970. xii, 132 pp., illus. Paper, 7S.

**Industrial Organization and Management.** Lawrence L. Bethel, Franklin S. Atwater, George H. E. Smith, and Harvey A. Stackman, Jr. Revised by James L. Riggs. McGraw-Hill, New York, ed. 5, 1971. xiv, 682 pp., illus. \$12.50.

**Introduction to Coastline Development.** J. A. Steers, Ed. M.I.T. Press, Cambridge, Mass., 1971. 230 pp., illus. \$10.

**The Jerusalem Symposia on Quantum Chemistry and Biochemistry.** Vol. 3, Aromaticity, Pseudo-Aromaticity, Anti-Aromaticity. Proceedings, Jerusalem, March 1970. Ernst D. Bergmann and Bernard Pullman, Eds. Israel Academy of Sciences and Humanities, Jerusalem, 1971 (U.S. distributor, Academic Press, New York). 398 pp., illus. \$21.50.

**Lazare Carnot Savant.** Charles Coulston Gillispie. Princeton University Press, Princeton, N.J., 1971. xii, 360 pp., illus. \$17.50.

**Let There Be Light.** George M. Greenfield. Vantage, New York, 1971. 58 pp. \$3.50.

**Life and Death in a Coral Sea.** Jacques-Yves Cousteau, with Philippe Diolé. Translated from the French by J. F. Bernard. Doubleday, Garden City, N.Y., 1971. 302 pp., illus. \$8.95.

**Linear Models.** S. R. Searle. Wiley, New York, 1971. xxiv, 532 pp., illus. \$19.95.

**The Mathematical Papers of Isaac Newton.** Vol. 4, 1674-1684. D. T. Whiteside, Ed., with the assistance in publication of M. A. Hoskin and A. Prag. Cambridge University Press, New York, 1971. xxxiv, 678 pp., illus. \$55.

**Mechanical Engineering and Economics and Ethics for Professional Engineering Examinations.** Eugene Stamper and Stanley Dublin. Hayden, New York, 1971. xxii, 392 pp., illus. \$14.95.

**The Micropalaeontology of Oceans.** Proceedings of a symposium, Cambridge, England, September 1967. B. M. Funnell and W. R. Riedel, Eds. Cambridge University Press, New York, 1971. x, 828 pp., illus. \$55.

**Middle Albian Stratigraphy in the Anglo-Paris Basin.** Hugh Gwyn Owen. British Museum (Natural History), London, 1971. 164 pp. + plates + foldout maps. Paper, £6. Geological (Palaeontological) Series, Supplement No. 8.

**Models of Manpower Systems.** Proceedings of a conference, Oporto, Portugal, September 1969. A. R. Smith, Ed. Elsevier, New York, 1971. xii, 432 pp., illus. \$20.

**Molecular Aspects of Sick Cell Hemoglobin.** Clinical Applications. Robert M. Nalbandian, Ed. Thomas, Springfield, Ill., 1971. xviii, 200 pp., illus. \$15.75.

**The Monroe Doctrine.** An American Frame of Mind. Charles Morrow Wilson. Auerback, Princeton, N.J., 1971. 156 pp. \$5.95.

**Narcotic Drugs.** Biochemical Pharmacology. Doris H. Clouet, Ed. Plenum, New York, 1971. xxii, 506 pp., illus. \$28.

**Olmec.** An Early Art Style of Pre-Columbian Mexico. Charles R. Wicke. University of Arizona Press, Tucson, 1971. xx, 188 pp., illus. \$12.

**Optical Holography.** Robert J. Collier, Christoph B. Burckhardt, and Lawrence H. Lin. Academic Press, New York, 1971. xviii, 606 pp., illus. \$22.

**Organometallic Reactions.** Vol. 2. Ernest I. Becker and Minoru Tsutsui, Eds. Wiley-Interscience, New York, 1971. xii, 450 pp., illus. \$22.

**Paleoecological Aspects of a Modern Coastal Lagoon.** John E. Warne. University of California Press, Berkeley, 1971. viii, 132 pp., illus. + loose charts. Paper, \$4.50.

**Patterns in Cancer Mortality in the United States: 1950-1967.** Fred Burbank. National Cancer Institute. National Institutes of Health, Bethesda, Md., 1971 (available from the Superintendent of Documents, Washington, D.C.). xvi, 594 pp., illus. \$6.25.

**The Physiology of Excitable Cells.** D. J. Aidley. Cambridge University Press, New York, 1971. x, 468 pp., illus. \$15.

**Polyacetals.** S. J. Barker and M. B. Price. Published for the Plastics Institute by Elsevier, New York, 1971. 176 pp., illus. \$8.50.

**Polarization Phenomena in Nuclear Reactions.** Proceedings of a symposium, Madison, Wis., August 1970. H. H. Barschall and W. Haeberli, Eds. University of Wisconsin Press, Madison, 1971. xxx, 930 pp., illus. \$15.

**Post-Partum Family Planning.** A Report on the International Program. Gerald I. Zatuchni, Ed. McGraw-Hill, New York, 1971. xxxii, 478 pp. \$15.

**Proceedings of the 1970 CERN Computing and Data Processing School.** Varenna, Italy, August 1970. European Organization for Nuclear Research (CERN), Geneva, 1971. x, 470 pp., illus. Paper. CERN 71-6.

**Pulsating Stars 2.** A Nature Reprint. Plenum, New York, 1971. xii, 116 pp., illus. \$12.

**Rapport d'Activité, 1968.** Centre National de la Recherche Scientifique, Paris, 1969. 304 pp. Paper.

**Rapport d'Activité, 1969.** Centre National de la Recherche Scientifique, Paris, 1970. 336 pp., illus. Paper.



**THE AAAS  
SCIENCE BOOK LIST**  
(Third edition, 1970)

Citations and annotations on 2441 trade books, textbooks, and references in the pure and applied sciences for secondary school students, college undergraduates, teachers, and nonspecialist adult readers.

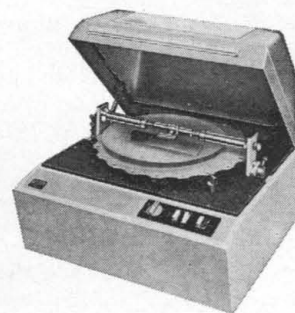
Supersedes the popular 1964 edition which has been widely used as a library acquisition and collateral reading guide.

Bound in sturdy green cloth, 452 pages, with author, title, and subject indexes and a directory of book publishers. Complete citation of each book includes author, title, name of publisher, level of difficulty, descriptive annotation and price of book.

List price \$10  
AAAS members' cash price, \$9.00

Send orders to  
**AAAS Publications Department BL**  
1515 Massachusetts Avenue, NW  
Washington, D.C. 20005

## Next to your knives, this is the sharpest instrument you can buy

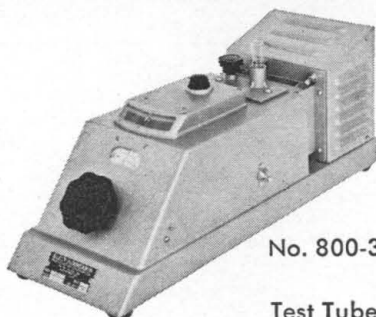


Only Shandon-Elliott Microtome Sharpeners provide these exclusive features: producing and reproducing the **correct bevel angle** via a fine adjustment lever precisely controlling glass plate level . . . **automatic changeover device** to sharpen both knife bevels equally . . . **blade pressure control**—infinitely variable—permitting craftsmanlike pressure near end of cycle . . . **automatic timer** sets up to 30 minutes to avoid oversharpening . . . holders to **fit all blades** . . . easy to operate . . . **transparent cover** for safety . . . lapping bars for **automatic reconditioning of the plate**. For more details, contact Shandon Scientific Company, Inc., 515 Broad Street, Sewickley, Pa. 15143.



PITTSBURGH • LONDON • FRANKFURT

## Klett Summerson Photoelectric Colorimeter

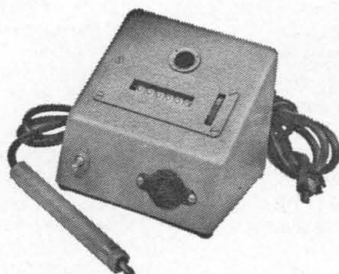


No. 800-3

Test Tube  
Model

### KLETT COLONY MARKER and TALLY

This instrument takes the drudgery and error out of the counting of bacterial colonies.



**Klett** MANUFACTURING CO., INC.,  
179 East 87th Street, New York, 28, N.Y.

## REVCO IS THE ULTIMATE IN ULTRA-LOW TEMPERATURE EQUIPMENT

REVCO pioneered ultra-low temperature equipment, and REVCO engineering has made the name synonymous with reliability and dependability around the world.

REVCO provides quality ULT refrigeration units from 1-1/2 to 25 cubic feet.

REVCO's custom accessories can tailor any unit to your specifications for storage, research or testing in any discipline.

For more information write for our fact file and our list of customers served.



**REVCO, INC.**

117 Memorial Drive, West Columbia, S.C. 29169

"The world's leader in ultra-low temperature equipment."

Circle No. 90 on Readers' Service Card

TO  
-140°F  
(-96°C)