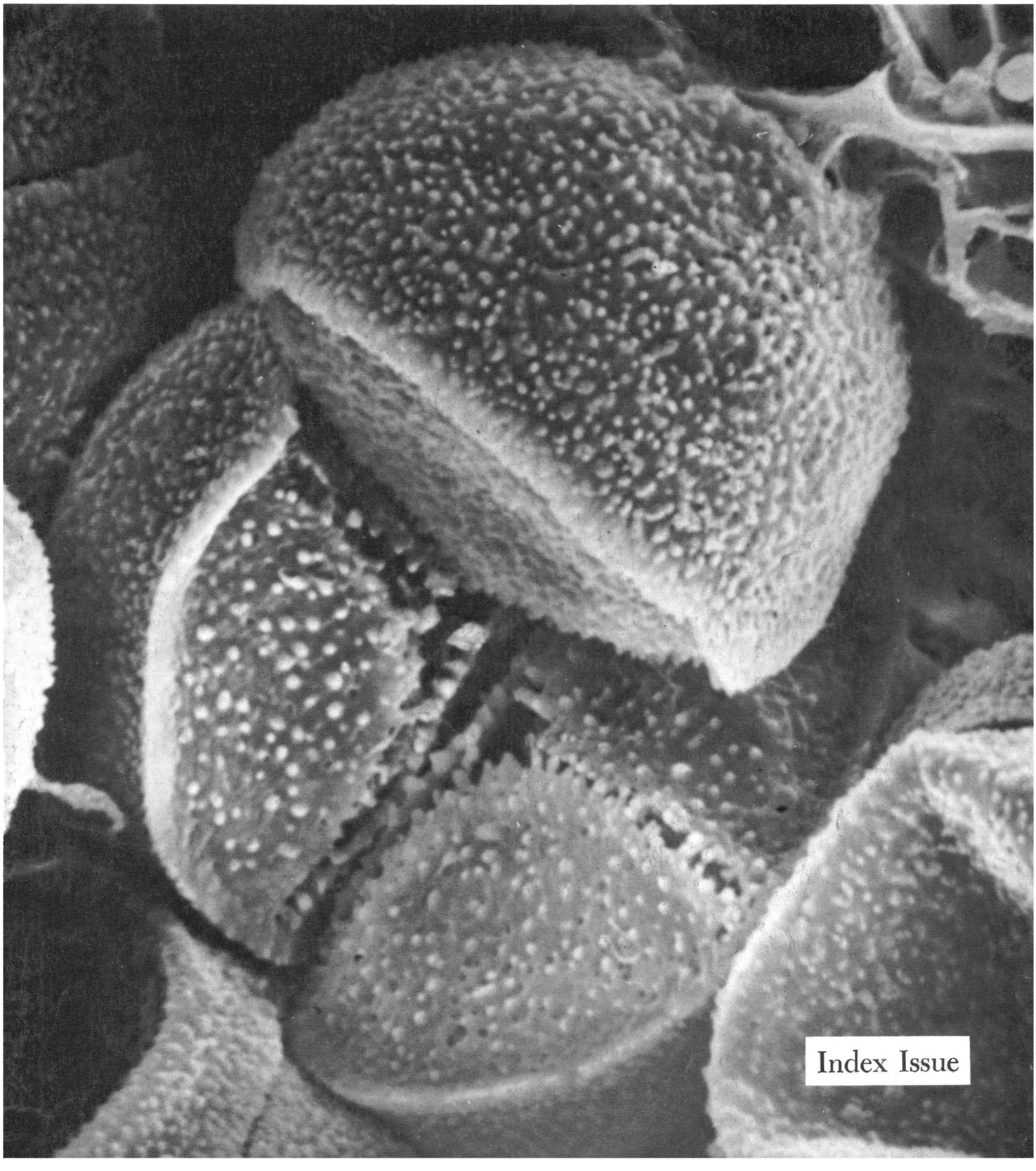
SCIENCE

28 June 1974

Vol. 184, No. 4144

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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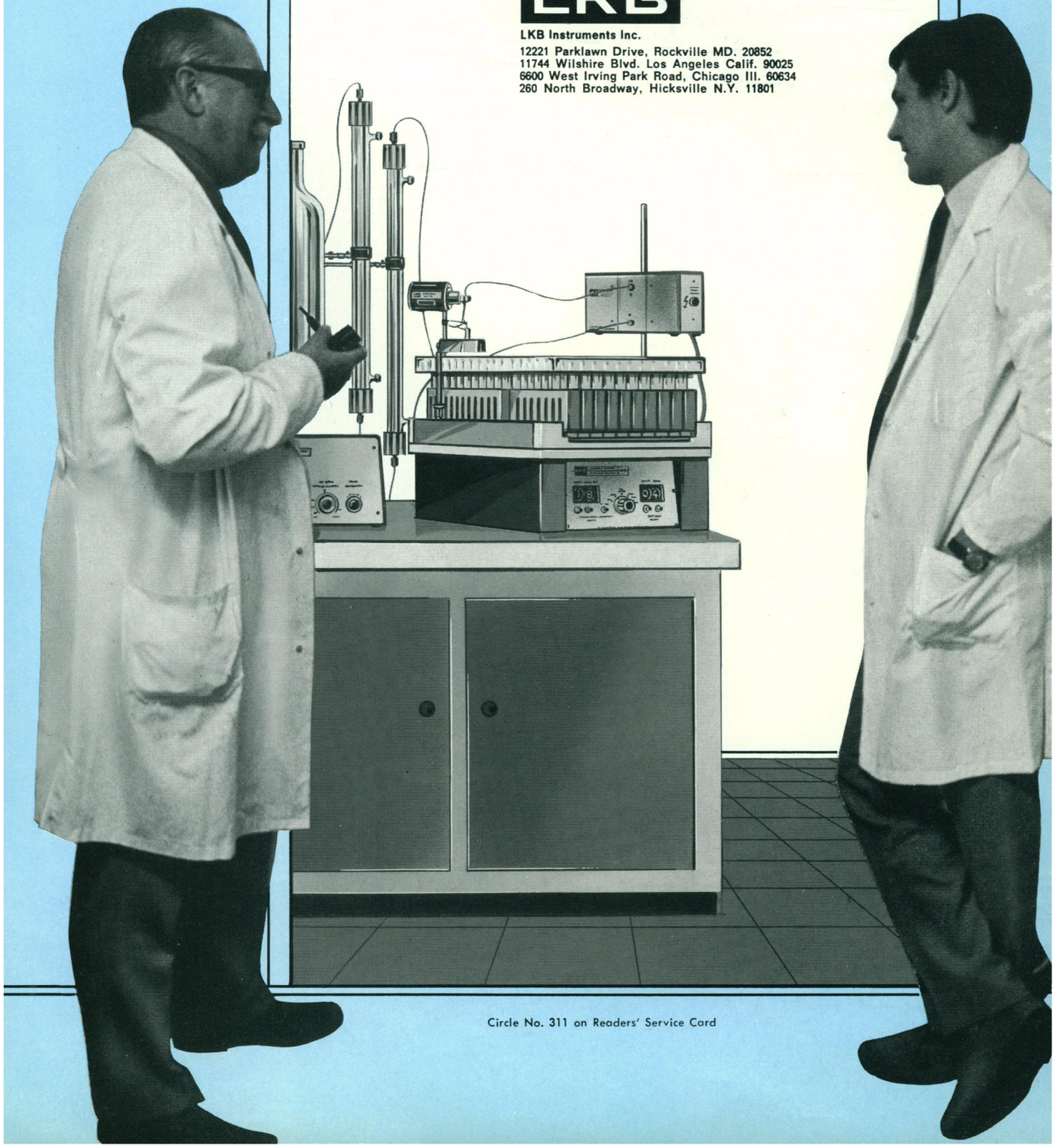

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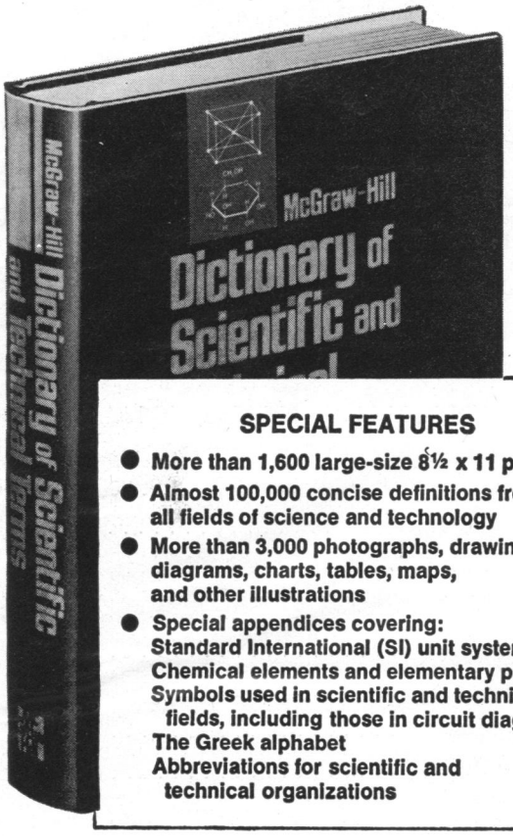

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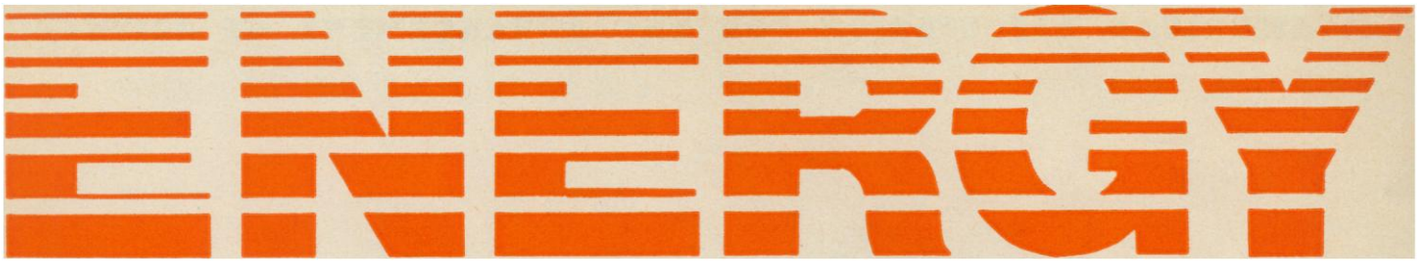
COVER

Equatorial and proximal views of three members of a spore tetrad of *Lycospora* from *Lepidostrobus* cone taken from the Lower Block Coal Member of Indiana, about 310 million years old (about × 5900). See page 1367. [Joan M. Courvoisier, Florida State Museum, Gainesville]



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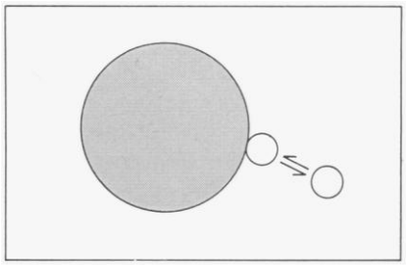

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amplify and reinforce Waddington's account. While Waddington was head of the Operational Research Section, Coastal Command, Royal Air Force (RAF), I was a member of Britain's Army Operational Research Group (AORG). I was able to see a diversified range of OR activity, because all the British Army's OR sections were centered in a single establishment (unlike the RAF, where they were dispersed by Commands). I worked in the section devoted to antiaircraft fire control but had frequent contacts with several other sections.

The reduction in status of OR today has been paralleled by a drastic change in content, so that the phrase "operations (or operational in English usage) research" hardly means the same thing as it did. A World War II OR worker recognizes little in contemporary OR literature. The proliferation of models derived from game theory is one new element, but on the whole the change that has occurred is best described as a great reduction in scope.

Waddington emphasizes that World War II OR had a strongly empirical approach, the first step being the acquisition of valid facts and data. This step was sometimes difficult, but it often happened that valid observations, once obtained, immediately provided a direct and obvious solution. On occasion, sophisticated mathematical analysis of model-making were indeed used, but in a great many important cases such techniques were not called for. If mathematical models were constructed, they had a close relation to observations. The adjective "valid" is applied to data to convey the meaning that they are to the point and unbiased, rather than necessarily precise numerically. It is presumably for this reason that many biologists were successful in OR: they were familiar with small-sample statistics and precautions against bias in collecting data. They certainly had no superior skill in constructing mathematical models. I remember being interviewed by Brigadier General B. J. F. Schonland (later Sir Basil Schonland), the head of AORG, before I joined the establishment. He said, "As a scientist you have been trained to observe. This is what we want you for, and it is in this that you differ from an engineer." Acquisition of data and nonnumerical information remained a dominant activity until the war ended. Quite often this involved design and construction of sophisticated instrumentation, and probably more ingenuity was used in this than in making abstract models.

A most important element in the success of World War II OR was the choice of problems. While they were obviously suggested by military needs, problems were not merely imposed from above, but were subjects of constant discussion between military and scientific personnel at all levels. In this way, problems that could reasonably be solved were selected, and hopeless undertakings were avoided. This resulted in a high proportion of success, but had the effect that the amount of research done was by no means proportional to military importance. Thus the sections dealing with radar and antiaircraft fire control remained the largest until the end of the war, while the section devoted to infantry was fairly small. Past success and personalities may have played a part, but the chief reason is that the areas of radar and antiaircraft fire control had many problems that scientists could successfully attack; it was much more difficult to find such problems in infantry.

J. A. Stockfisch has called attention to the need for much more empirical operational testing of military equipment in the style of World War II OR (*1*).

A. C. FABERGÉ

Department of Zoology,
University of Texas, Austin 78712

References

1. J. A. Stockfisch, in hearings before the U.S. Congress, Joint Economic Committee, Subcommittee on Economy in Government, *Changing National Priorities* (Government Printing Office, Washington, D.C., 1970), part 2, appendix, pp. 721–729.

Support for Williams & Wilkins

In his report "Journals: Photocopying is not the only problem" (News and Comment, 29 Mar., p. 1274), John Walsh notes that Williams & Wilkins is asking for financial help in appealing to the Supreme Court its suit against the U.S. government for copyright infringement. He then adds that it "remains to be seen how many publishers will ante up."

As chairman of the ad hoc Committee for Copyright Protection, which is being organized to help Williams & Wilkins, I can report that publishers, and professional societies as well, are responding immediately and liberally.

In advance of any formal solicitation, nine publishers have volunteered contributions ranging from $500 to $5000. Many others have said they will make substantial contributions now that the Williams & Wilkins appeal has been accepted. I confidently predict that 50 to 100 publishers will contribute to this cause.

Further, six professional societies have already pledged contributions ranging from $100 to $5000. They are the American Chemical Society, American Society of Microbiology, American Society for Testing Materials, Society for Applied Spectroscopy, American Society of Civil Engineers, and the Institute of Electrical and Electronics Engineers. We are told that several other societies will contribute when a formal appeal for contributions is made.

This evidence of professional society concern exposes an odd conflict of interest that needs to be pondered thoughtfully by all scientists. While many individual scientists, along with many librarians and other information specialists, are pushing hard for exempted privileges of photocopying for scientific and educational uses, the officers of their professional organizations (and especially their publications officers) are drawing back from the sure prospect of resulting losses of subscription and advertising income to their already straitened journals. And, strangely enough, many members of the societies that are supporting the Williams & Wilkins appeal are also supporting the National Education Association's Ad Hoc Committee of Educational Organizations and Institutions on Copyright Law Revision, a group that has made the loudest and most persistent demands for the broad special exemptions.

Scientists should not confuse the rhetoric of "free flow of information" with the economics of "flow of free information." There is no such thing as free information; somebody has to pay the cost of any system for the organization and dissemination of science information. The privilege of "free" photocopying simply is not compatible with the economics of book and journal publishing. Why, then, do so many scientists seem to think they can have their cake and eat it too?

CURTIS G. BENJAMIN
Committee for Copyright Protection, McGraw-Hill, Inc., 1221 Avenue of the Americas, New York 10020

Science Management Training

In his editorial "Managers of science" (15 Feb., p. 599) Dael Wolfle comments on the mid-career "training" of managers in mission-oriented and industrial sciences. While I believe that mid-career management training is an important way to correct deficiencies in science management, a more fundamental problem is the lack of management training of scientists during their doctoral programs.

As one who has twice been in middle management positions (as manager of operations and data systems for a small corporation and as chairman of a biology department in a university), I have found that when this topic was raised with upper management, in either industry or academe, only rarely was there any concern about either the correction of lower or middle management deficiencies or about the development of training programs.

After years of frustrated self-education in management technology, with a correlated lack of career productivity, I have decided that the only solution for me is to return to teaching and research activities.

Deficiencies in science management in both academe and industry (and I suspect the problem exists in government as well) can only be corrected by a basic change in attitudes early in the educational process. We are now seeing the conversion of certain traditional Ph.D. requirements (such as foreign languages) to more contemporary options (such as statistics, computer technologies, teaching and evaluation skills, and communication skills). Managerial skills should also be included as an optional Ph.D. requirement, since a smaller and smaller proportion of current and future Ph.D.'s will probably be retained in purely nonmanagerial positions, such as teaching.

There are two excellent reasons why the solution must come during the Ph.D. program and not at mid-career: (i) mid-career training is inefficient, as stresses of family, shifting career objectives, and peer pressure inhibit concentrated efforts; and (ii) middle management training (as we now know it) is too "expensive" in terms of bad management decisions made during on-the-job training.

E. C. KELLER, JR.
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Water Pollution Abatement: Goals and Costs

In 1972, the Federal Water Pollution Control Act was amended in part as follows: "It is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985." The record of the hearings preceding enactment of the legislation makes it clear that the phraseology implies an emphasis on pollution arising from point sources and hence controllable.

It now begins to appear that because of the pollution from nonpoint sources, the quality of our navigable waters will be only moderately improved even after capital expenditures of perhaps more than $100 billion. Moreover, a recent report* issued by the Environmental Protection Agency (EPA) points out that capital investment is only the beginning. Once installed, facilities incur annual costs that, over a 20-year period, may amount to five times the cost of the initial facilities. These are costs that will be met by taxpayers and consumers.

The EPA report estimates that to comply with 1977 requirements of "best practicable" water pollution control technology, industry will have to invest an additional $8 billion to improve effluents at existing plants. The sum is modest in comparison with the $60 billion now believed necessary to bring public sewerage facilities up to standards. But cost estimates for the latter have been steadily climbing even faster than inflation, and the report mentions a possible doubling of the cost. The present estimate essentially provides for secondary treatment, that is, a reduction of biological oxygen demand (BOD) by 85 to 90 percent. A long path lies between that and no discharge of pollutants. To remove the last 10 percent usually entails considerably more cost than to abate the first 90 percent.

With these figures as a background, a recent report† by Enviro Control, Inc., to the Council on Environmental Quality comes as a shocker. The report shows that partially treated sewage is only one of the sources of urban water pollution. Urban nonpoint sources constitute a factor of at least comparable magnitude.

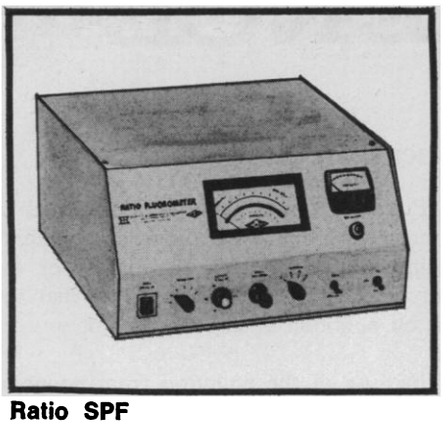
The major problem arises in drainage following a storm. When storm and sanitary sewers are combined, the flow far exceeds capacity of storage at treatment plants, and part of the flow must be bypassed. At present, efforts are being made to separate storm and sanitary sewers. The new report shows that this procedure will not be very effective.

The report points out that "between 40% and 80% of the total annual BOD and COD [chemical oxygen demand] entering receiving waters from a city is caused by sources other than the treatment plant." Dog feces, ground-up tires, papers, and plant materials are obvious factors. The report further states, "The runoff of toxic pollutants, particularly heavy elements, is . . . . [substantial]; a typical moderate-sized city will discharge 100,000 to 250,000 pounds of lead and 6,000 to 30,000 pounds of mercury per year."

Urban pollution is supplemented by rural nonpoint sources. Manure from farm animals, most of which is not treated, contains about ten times as much organic matter as do human wastes. Following storms, considerable amounts together with other agricultural wastes are introduced into streams. In addition, natural processes of weathering contribute annually about 200 million tons of inorganic materials, including heavy elements.

Thus it appears that we are approaching a situation in which removal of the last few percent of contaminants from point sources could constitute a costly and almost meaningless enterprise. The time has come for looking at the total picture of water pollution—what is practical, the costs, and the benefits.—PHILIP H. ABELSON

* Environmental Protection Agency, *The Economics of Clean Water–1973* (Government Printing Office, Washington, D.C., 1973), $1.40. † A. M. Vitale and P. M. Sprey, *Total Urban Water Pollution Loads: The Impact of Storm Water* (Publ. PB231-730, National Technical Information Service, Department of Commerce, Springfield, Va. 22151, 1974), $5.50.



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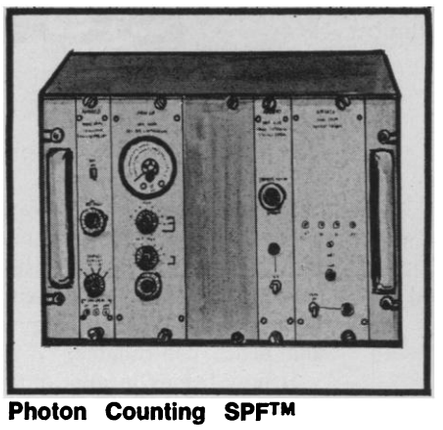

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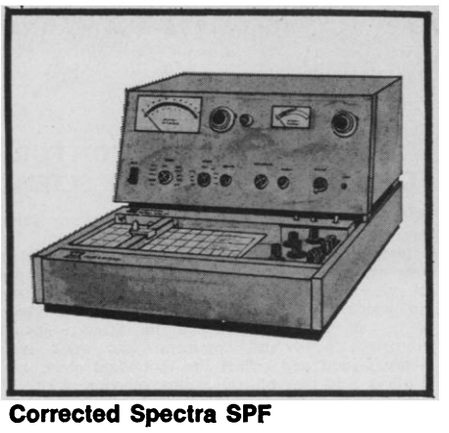

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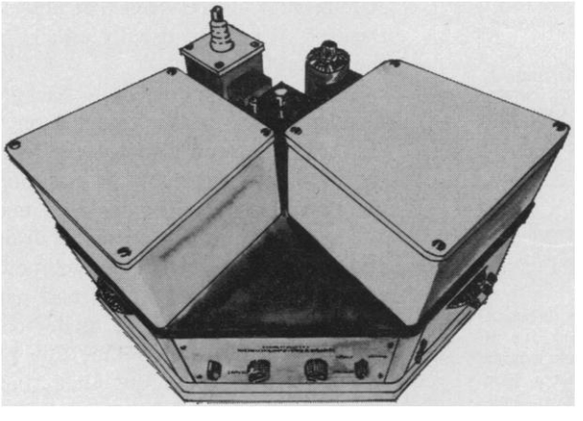

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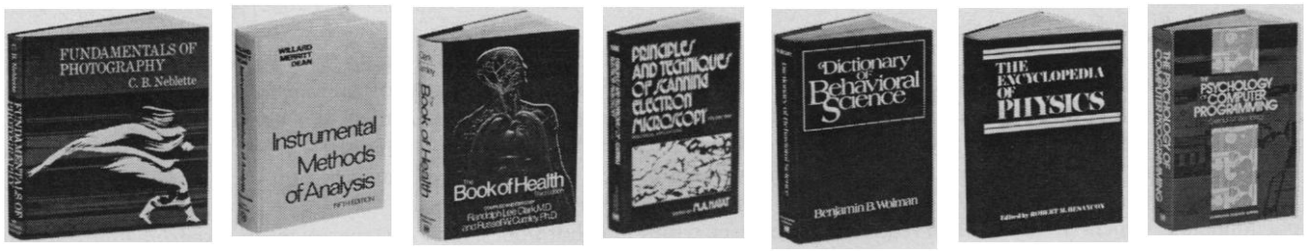

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Edited by M. A. Hayat. Volume 1 (204 pp., illus., 6 x 9, $16.95) covers areas such as specimen preparation, phosphatases, glutamate oxalacetate transaminase, myrosinase in cruciferous plants, and enzyme immunocytochemistry. *Volume 2 (190 pp., illus., 6 x 9, $16.50)* presents procedures for localizing hemoproteins, acyltransferases, polyphenoloxidases (plants), tyrosinase, sulfatases, adenylate cyclase, and lipase.

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PRINCIPLES AND TECHNIQUES OF SCANNING ELECTRON MICROSCOPY
Biological Applications

Edited by M. A. Hayat. Volume 1 (300 pp., 272 illus., 6 x 9, $22.50) includes operating principles; critical point drying; cryotechniques; frozen resin cracking method and cytological applications; preparing and projecting stereo slides from electron micrograph stereopairs. *Volume 2 (200 pp., illus., 6 x 9, $19.95)* shows methods and applications in cathodoluminescence; silver staining procedures; examination of specimens incubated in histochemical media; use of a single specimen for both scanning and transmission electron microscopy.

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BASIC ELECTRON MICROSCOPY TECHNIQUES

By M. A. Hayat. Describes newest, simplest and best methods in fixation, embedding, sectioning, staining, tissue storage and the preparation of buffers. Includes procedures for isolation of certain cell components; perfusion fixation of lung, liver and muscle; staining with iodine, silver, thorium, iron, vanadium, indium, lanthanum, alcian blue and ruthenium red. *118 pp., illus., 5 1/2 x 8 1/2, $9.95*

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Quo Vadis Industrial Science?

There was a proposal last year to abolish the Industrial Science Section (P) of the AAAS. However, after consideration at its recent meeting, the Committee on Council Affairs did not recommend dissolution. Hence, while we are not well, at least we are alive! We are heartened by this decision, since we believe that in today's and tomorrow's world the potentials of Section P are great, both in terms of relevance and in terms of utility.

Most of those who favored the abolishment did so without comment. In general, those who did comment took the attitude that if the Section cannot do any better than it has done in the past, then perhaps it is best to do away with it. But those who defended its purposes, objectives, and potentials did so convincingly and eloquently, while at the same time calling for a renaissance.

Bringing this renaissance about at this time takes on added significance for the following two reasons:

1) *Interest within AAAS.* In addition to the 560 members of AAAS who primarily identify with Section P, there are no less than 4000 additional members who are on record as having more than passing interest in its affairs.

2) *There is much interaction between societal problems and industrial science.* Here Section P can create opportunities for dialogue and contribute to solutions.

In our world, beset by crises, our aspirations are outrunning our means of attaining them. The difference seems to be increasing—a situation not exactly conducive to world tranquillity. Conflicts abound. Resource extraction, conversion processes, and the production of end-use items seem to interfere with the improvement and even with the maintenance of the quality of our social and physical environment. We have already experienced such phenomena as the "environmental crisis" and the "energy crisis" with related "oil politics," reflecting highly complex international conflicts. We may be on the eve of an even more serious "world food crisis" with "food politics."

In times past, science and technology have proved to be most effective "tools" in helping reduce the gap between what we want and what we can have. Industry has been and is a major contributor to the development of these tools, as well as an effective user. It is also industry that is at the interface between supply and demand and between the markets of society and the goods and services that it can produce. These vital interfaces, we feel, are worthy of much study and reflection. It should be evident then that an active and effective Section on Industrial Science or better yet an *Industrial Science and Technology Section* within the AAAS would be in the best interest of all concerned. It could then concentrate on the *utility* and *application* of not just science, but also technology, within an industrial context and the large social context.

We have already embarked on the renaissance alluded to before. A realignment proposal has been mailed to the 560 members of Section P. Members who are not among these but who would like to get involved in our efforts, please send a note to either of us in care of the AAAS.

GABOR STRASSER
Chairman, Section P
ROBERT L. STERN
Secretary, Section P

PRODUCTS and MATERIALS

Automated Dialyzer

This instrument facilitates dialysis for the CEA-Roche carcinoembryonic antigen assay. Dialysis in this in vitro process consists of five cycles of at least 3 hours each. Water is changed after each cycle and an ammonium acetate buffer must be added for the final cycle. The device consists of a large-volume immersion tank, sample shelves, compressed air agitator, and automatic controls for tank filling, high-liquid level detection, cycle timing, tank draining, low-level detection, refilling, cycle counting, and addition of the buffer. The units are available with a 30- or 60-gallon tank which accommodates 188 or 432 dialysis bags, respectively. Damon/IEC Division. Circle No. 843 on Readers' Service Card.

Blood Tube Shaker

The Labquake shaker will accommodate 46 standard 10-milliliter Vacutainer blood-collecting tubes in two trays. The upper tray is removable even during shaking. The motion is a gentle back-and-forth rocking to facilitate mixing and prevent coagulation. The device is equipped with variable speed controls. Labindustries, Incorporated. Circle No. 844 on Readers' Service Card.

Tissue Fixative

Perfix is a more rapid fixative than the standard 10 percent neutral-buffered formalin usually used for this purpose. It also hardens cytoplasmic structures better for paraffin embedding. The material contains no mercury. It does not interfere with special stains nor does it form precipitates in sections. Applied Bioscience. Circle No. 851 on Readers' Service Card.

Pipette Tips

Pink Budget Tips fit Finnpipettes of 5- to 50-microliter capacity and of 50- to 250-microliter capacity and many other pipettes within those ranges of volume. Blue Budget Tips fit Finnpipettes of 200- to 1000-microliter capacity and other pipettes of that volume range. Budget Tips are made of polypropylene. Volumetrics, Incorporated. Circle No. 832 on Readers' Service Card.

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The UNIVAR (Fig. 1) features optics for a number of techniques in a single system. All transmitted-light techniques plus incident fluorescence microscopy require one set of objectives. Four built-in light sources are electronically coordinated with the objectives. Up to three camera systems may be accommodated simultaneously. There is a directionally adjustable 250-millimeter projection screen. American Optical Corporation. Scientific Instrument Division. Circle No. 845 on Readers' Service Card.

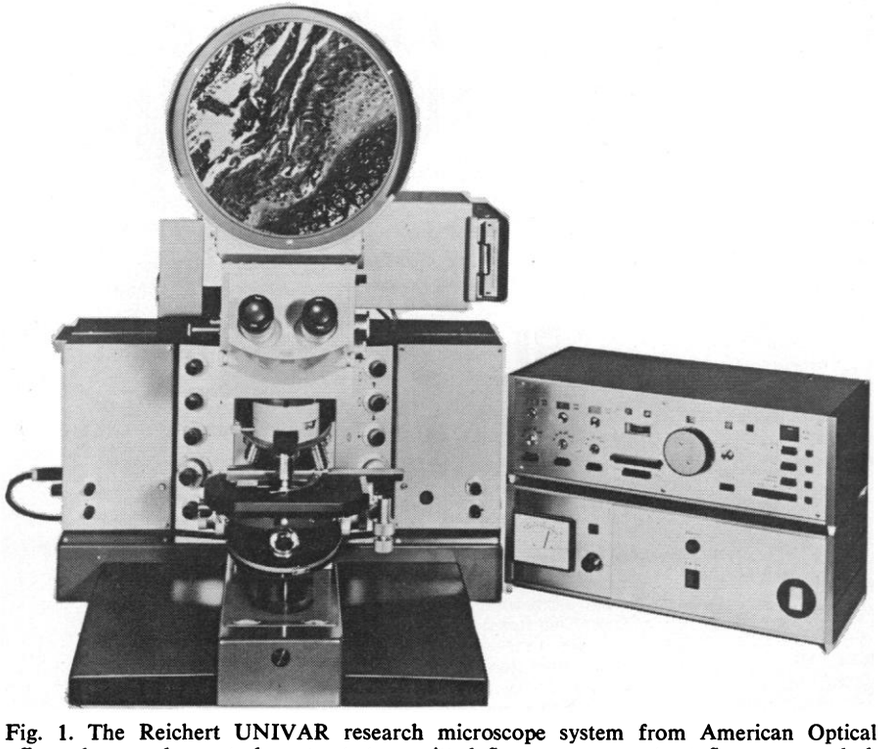

Fig. 1. The Reichert UNIVAR research microscope system from American Optical offers phase and anoptral contrast, transmitted fluorescence, contrast fluorescence dark field, incident light fluorescence, bright field, dark field, polarized contrast microscopy with the push of a button, turn of a knob or movement of a slide—all from the same set of objectives and light sources.

Circuit Tester

The Safetone tracer is a current-limited (1 milliampere) audible circuit tester. Tone pitch increases with resistance. The circuits tested are safe from destructive effects of higher currents. The device is powered by two standard D batteries. Applications include testing of microcircuits, integrated circuitry, semiconductor circuits, and others. Western Technical Products. Circle No. 846 on Readers' Service Card.

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Readers' Service Card (see pages 1334A and 1382C) and placing it in the mailbox. Postage is free.—RICHARD G. SOMMER

Oven-Incubator

This device is designed for general laboratory applications. The heating element attains 56°C in 9 minutes with a uniformity of ± 2.5°C at 37°C. The heating method is gravity-convection and a bimetallic thermostat provides temperature control from ambient to 100°C (± 1°C). The chamber measures approximately 1 cubic foot (31 by 29 by 30 centimeters) and has a plexiglass window in the door and an expanded metal shelf. Thermolyne. Circle No. 849 on Readers' Service Card.

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Gas-Sensing Electrode

The model 95-46 electrode measures dissolved nitrogen dioxide, nitrite concentration after *p*H adjustment, and nitrate concentration, without interference, after reduction. Sensitivity is 0.02 part per million and samples as small as 0.1 milliliter may be measured with special cap. The electrode may be used in the field with a portable specific ion meter or in the laboratory in combination with an expanded-scale *p*H/millivolt meter. It has an outer body of fluorocarbon and an inner body of epoxy. The electrode is packaged in a vinyl-coated steel storage case and comes with internal filling solution, a box of replacement membranes, membrane tweezers, and an instruction manual. Orion Research Incorporated. Circle No. 847 on Readers' Service Card.

Tissue Processor for Electron Microscopy

Benjamin II is an apparatus for automatic dehydration and infiltration by epoxy resins of small specimens. It moves up to 24 specimen baskets simultaneously in a trough. The contents of the trough may be exchanged up to 29 times from ten different containers according to a program. Time periods and fluid volumes may be selected. The fluids come in contact with silicone, polypropylene, stainless steel, and glass. Ernest F. Fullam, Incorporated. Circle No. 848 on Readers' Service Card.

Automated Clinical Analyzer

The HMA 1600 automatically performs 16 tests including total protein, cholesterol, bilirubin, calcium, glucose, and hemoglobin. A sample of serum is added to the reagent in a color-coded cuvette which is placed in a color-coded well. When the 16 cuvettes are in place, the entire analysis requires only 7 minutes. Panel lights indicate tests completed and tests running. Results are printed on a card coded for patient name and identification number. Hycel, Incorporated. Circle No. 850 on Readers' Service Card.

Literature

A Complete Guide for Hotpack Incubators is a 36-page catalog of research appliances for controlled temperature environments. Hotpack Corporation. Circle No. 852 on Readers' Service Card.

Lang-Levy Micropipets describes technique and specifications of these transfer devices. Bio-Rad Laboratories. Circle No. 853 on Readers' Service Card.

Fourier-Transform Nuclear Magnetic Resonance Spin-Lattice Relaxation Time Measurement is treated in a 68-page brochure. Nicolet Instrument Corporation. Circle No. 854 on Readers' Service Card.

At Last Microscope Eyepieces are Obsolete is a pamphlet devoted to a microscope viewing system that combines advantages of eyepieces, closed circuit television, and projection screens. Vision Systems, Incorporated. Circle No. 855 on Readers' Service Card.

Pumping Systems for solution transfer are described in a pamphlet from Spectroderm International. Circle No. 856 on Readers' Service Card.

The Math Specialist's Calculator is a specification sheet that describes the model FX-10 pocket calculator. Casio Computer Company, Limited. Circle No. 857 on Readers' Service Card.

Isomet details the design features and applications of a low-speed saw for preparing specimens for microstructural analysis. Buehler, Limited. Circle No. 858 on Readers' Service Card.

Development of an Instrumental Monitoring Method for Measurement of Asbestos in or near Sources is a 51-page treatise on a system that uses a scanning electron microscope with a microprobe and image analysis. Paper copies are $3.50 and microfiche copies are $1.45 (PB-226-471/TA). National Technical Information Service, U.S. Department of Commerce. Circle No. 859 on Readers' Service Card.

Model 810-D Digital Logic Recorder is the subject of an applications note. The device can be used for synchronous or asynchronous signals. Biomation Corporation. Circle No. 860 on Readers' Service Card.

Nothing Conquers Like the Golden Head is a 6-page catalog on a line of air compressors and vacuum pumps. Pneumotive ITT. Circle No. 861 on Readers' Service Card.

Computers in Information Sciences: Computer Components is a bibliography covering January 1968 to February 1973 (AD-761-970/R). National Technical Information Service, U.S. Department of Commerce. Circle No. 862 on Readers' Service Card.

Leasametric/Metric Resources Corporation 1974/75 Catalog offers rental and lease of electronic instruments, sales of new and used (recycled) electronic instruments, and comparison of more than 5000 electronic instruments' specifications. Leasametric/Metric Resources Corporation. Circle No. 863 on Readers' Service Card.

Series 3380A Reporting Integrators are chromatograph-compatible. Hewlett-Packard Avondale Division. Circle No. 864 on Readers' Service Card.

BOOKS RECEIVED

(Continued from page 1366)

Grenville Goodwin among the Western Apache. Letters from the Field. Morris E. Opler, Ed. University of Arizona Press, Tucson, 1974. 104 pp., illus. $4.50.

An Introduction to Electrical Instrumentation. A Guide to the Use, Selection, and Limitations of Electrical Instruments and Measuring Systems. B. A. Gregory. Macmillan, London, 1974 (U.S. distributor, Crane, Russak, New York). x, 342 pp., illus. Paper, $12.75. Electrical and Electronic Engineering.

Introduction to Mathematics for Life Scientists. Edward Batschelet. Springer-Verlag, New York, 1973. xiv, 496 pp., illus. Paper, $9.80. Springer Study Editions. Reprinted from *Biomathematics*, vol. 2 (1971).

Low-Noise Electronic Design. C. D. Motchenbacher and F. C. Fitchen. Wiley-Interscience, New York, 1973. xx, 358 pp., illus. $19.95.

Lymphocytic Choriomeningitis Virus and Other Arenaviruses. Proceedings of a symposium, Hamburg, Germany, Oct. 1972. F. Lehmann-Grube, Ed. Springer-Verlag, 1973. xiv, 340 pp., illus. Paper, $18.10.

Medical Genetics. Principles and Practice. James J. Nora and F. Clarke Fraser. Lea and Febiger, Philadelphia, 1974. xii, 400 pp., illus. $20.

The Medium, the Mystic, and the Physicist. Toward a General Theory of the Paranormal. Lawrence LeShan. Viking, New York, 1974. xx, 300 pp. $8.95.

Metal Ions in Biological Systems. Vol. 3, High Molecular Complexes. Helmut Sigel, Ed. Dekker, New York, 1974. xiv, 290 pp., illus. $22.75.

Notes on the Herpetofauna of Surinam IV. The Lizards and Amphisbaenians of Surinam. M. S. Hoogmoed. Junk, The Hague, 1973. vi, 420 pp., illus. + charts. Dfl. 100. Biogeographica, vol. 4.

Orientations in Geochemistry. Panel on Orientations for Geochemistry. National Academy of Sciences, Washington, D.C., 1973. xviii, 122 pp. Paper, $5.75.

Personalized System of Instruction. 41 Germinal Papers. J. Gilmour Sherman, Ed. Benjamin, Menlo Park, Calif., 1974. xiv, 226 pp., illus. Paper, $5.95. The Benjamin Personalized System of Instruction Series.

Psychological Bases of War. Heinrich Z. Winnik, Rafael Moses, and Mortimer Ostow, Eds. Quadrangle, New York, and Jerusalem Academic Press, Jerusalem, 1973. 262 pp. $9.95.

Psychrometry in Water Relations Research. Proceedings of a symposium, Logan, Utah, Mar. 1971. Ray W. Brown and Bruce P. Van Haveren, Eds. Utah Agricultural Experiment Station, Utah State University, Logan, 1972. xii, 342 pp., illus. Paper, $10.

Quasiconformal Mappings in the Plane. O. Lehto and K. I. Virtanen. Translated from the German edition (Berlin, 1965) by K. W. Lucas. Springer-Verlag, New York, ed. 2, 1973. viii, 258 pp., illus. $27.50. Die Grundlehren der mathematischen Wissenschaften, Band 126.

Radiation Chemistry of Monomers,