

# SCIENCE

10 September 1976

Volume 193, No. 4257

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*Announcing the second of five biennial Mitchell Prizes to be awarded at the international conference on "Alternatives to Growth '77" to be held at The Woodlands, Texas, October 2-4, 1977. The Mitchell Prize Contest is to encourage international research and debate on new and alternative approaches to the purposes and processes of growth.*

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It is becoming increasingly apparent that growth in itself does not proffer solutions to the manifold social and economic problems confronting humanity at large. Moreover, because of such factors as ecological imperatives, shifts in social preferences, stagnating employment opportunities and rising resource prices, current growth patterns need to be earnestly examined. Humanity is at a turning point. Alternative social and economic systems must be explored.

A sustainable society in equilibrium with the finite nature of our Planet and aware of environmental constraints, could offer viable alternatives to present continuous growth-oriented systems. To change society and industrial systems harbours profound implications and ramifications. The Mitchell Prize has been established in collaboration with the

Club of Rome to encourage international analysis and solution of problems resulting from such social and economic change.

The Contest entries need not necessarily be in the form of papers. They could also be presented in the form of, for example, a film, an engineering drawing, a town design, or operative models of a proposed sustainable state—or innovative recycling systems. Such entries must be relevant to a sustainable society. All entries must be verbalized in a maximum 10-page summary. Five broad substantive areas have been identified to which contestants are invited to address themselves: 1) management of natural and human resources; 2) institutional innovation for a changing world; 3) how to meet rising expectations when certain limits are being reached; 4) how should the world's physical, finan-

cial and human resources be used to meet 'basic human needs' in sustainable ways; and 5) what economic mechanisms and technologies are needed to move toward a sustainable society? Concentrating on one of five categories each paper\* must take into account the element of policy making and must proffer recommendations to alleviate the effects of current growth patterns; and bring about desirable change.

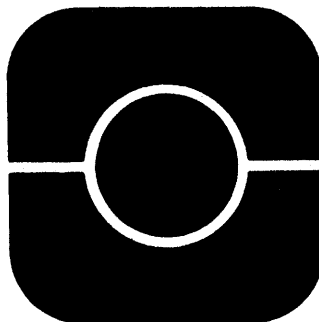
The awards will be made at the international conference, "Alternatives to Growth '77," to be held at The Woodlands, Texas, October 2-4, 1977. The Conference is being sponsored by The Club of Rome, the University of Houston, and Mitchell Energy and Development Corp.; and organized by the Society for International Development. The awards are being sponsored by George and Cynthia Mitchell of Houston, Texas.

---

\* All interested persons must request application materials no later than November 12, 1976. For further information write to:

Alternatives to Growth '77  
c/o Society for International  
Development  
1346 Connecticut Avenue, N.W.  
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Washington, D.C. 20036 USA

## Alternatives to Growth '77



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Close-up of exterior view of corner window, Pueblo Bonito, Chaco Canyon, New Mexico. See page 957. [Jonathan Reyman, Illinois State University, Normal, Illinois]

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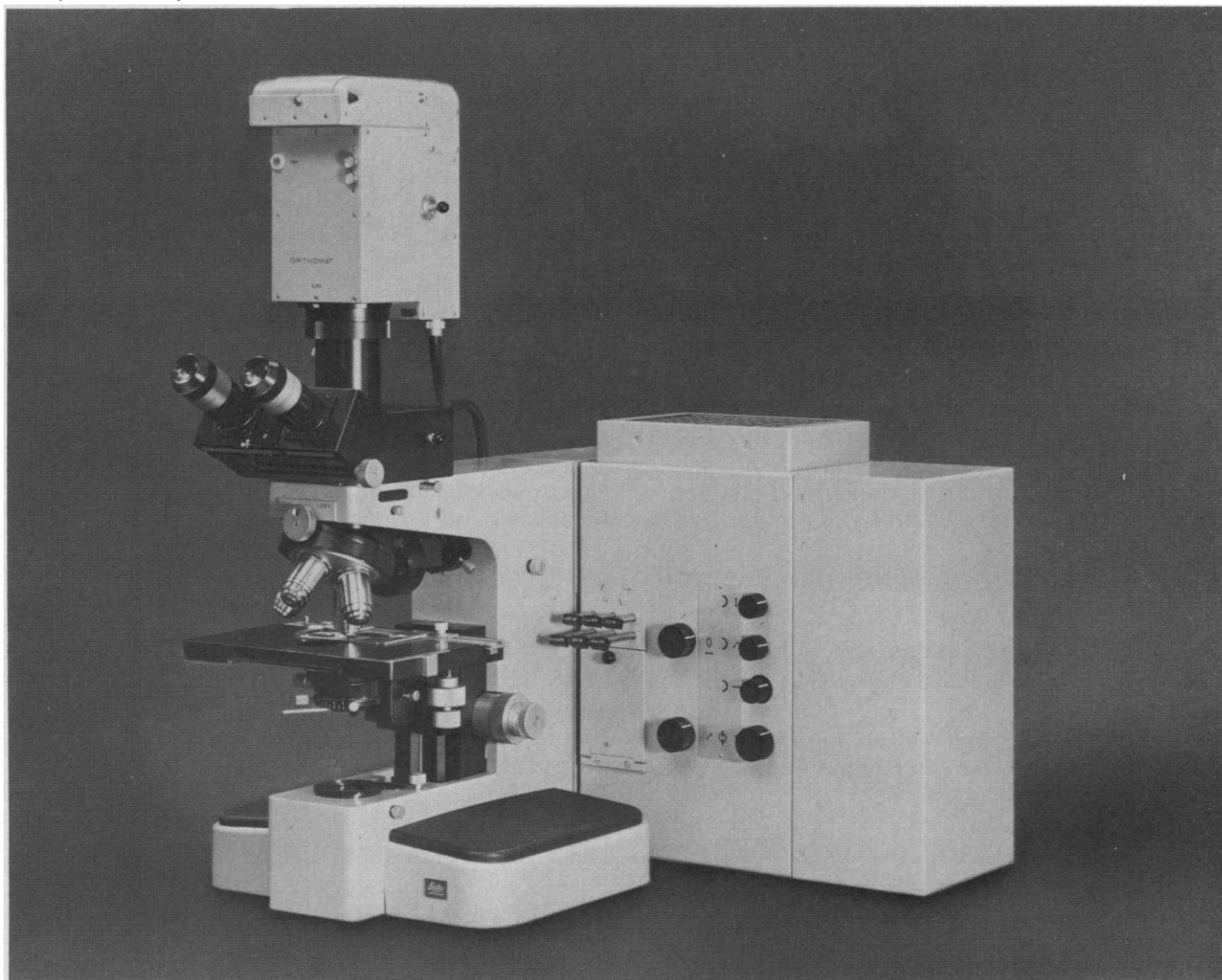
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1976. xiv + 402 pages. US \$49.95/Dfl. 130.00. ISBN 0-444-41448-9

The major current controversies relating to identification of functional cell types and the morphological and developmental associations which have particular relevance to pathology form the basis for discussion in this volume.

## **Membrane Molecular Biology of Neoplastic Cells**

by D.F.H. WALLACH

with contributions by R. SCHMIDT-ULLRICH

1976. xxii + 526 pages. US \$55.95/Dfl. 145.00. ISBN 0-444-41359-6

This volume reviews information on membrane alterations in neoplastic cells, and applies membrane molecular biology to a comparison of normal and malignant cells.

## **Molecular Biology of Nucleocytoplasmic Relationships**

edited by S. PUISEUX-DAO

1975. xiv + 328 pages. US \$37.75/Dfl. 98.00. ISBN 0-444-41343-X

To discover precisely how the genomes function is the major purpose of this volume which presents research results on the most detailed mechanisms known of viral and bacterial transcription and translation.

## **Dynamics of Connective Tissue Macromolecules**

Proceedings of the International Symposium held at the Strangeways Research Laboratory, Cambridge, England, 1-3 July, 1974

edited by P.M.C. BURLEIGH and A.R. POOLE

1975. xxvi + 434 pages. US \$42.50/Dfl. 110.00. ISBN 0-7204-4515-9

The most recent discoveries about the synthesis, structure and degradation of connective tissue macromolecules and the control of these processes are emphasized in this volume.

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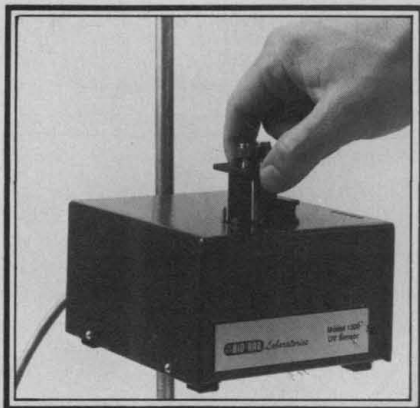
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1 to 999 seconds

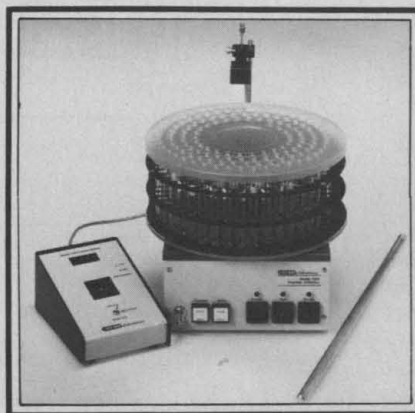
1 to 999 minutes

Volume (optional)

1 to 999 drops

- 2. Turntables.** With the standard and optional turntables you can run one, two or three columns simultaneously, run a preparative column or collect directly into scintillation vials.

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Single 136 x 10 ml test tubes



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Double 136 x 10 ml  
Preparative — 50 x 75 ml test tubes  
Spot Collection  
Single 160 x 1 ml  
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Scintillation Vial Turntable  
50 x 20 ml vials

- 3. Dual event marker.**

Switch closure

5-volt pulse

- 4. Three powered outlets.** For use with accessories such as pumps, recorders, etc.

Power — activated whenever master switch is on.

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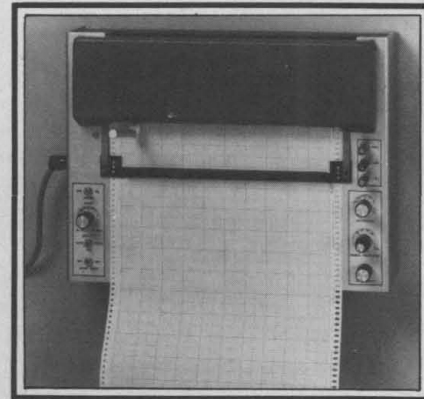
- 6. Manual advance button.**

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- 5. Accessory power outlet.** Lets you run other apparatus in conjunction with the recorder.

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# Western Electric Reports:

## Rumpelstiltskin lives!

**R**umpelstiltskin found his niche in fairy tales by spinning straw into gold. That once seemed only a little more challenging than the host of engineering problems the Bell System faced in developing a practical lightwave communications system. Problems like spinning "wires" of glass.

In lightwave communications, pulses of laser light are used to transmit millions of bits of information through hair-thin glass fibers. A bundle of such fibers not much thicker than a lamp cord can carry as many telephone conversations as a copper cable the thickness of your arm.

Bell Labs researchers came up with a recipe for glass fibers so transparent a light beam passing through 500 feet of the material would lose less intensity than in passing through a window pane. So repeaters could be economically spaced—about four miles apart.

But a way also had to be found to make the fiber at mass production speeds without deviating more than 1% in diameter.

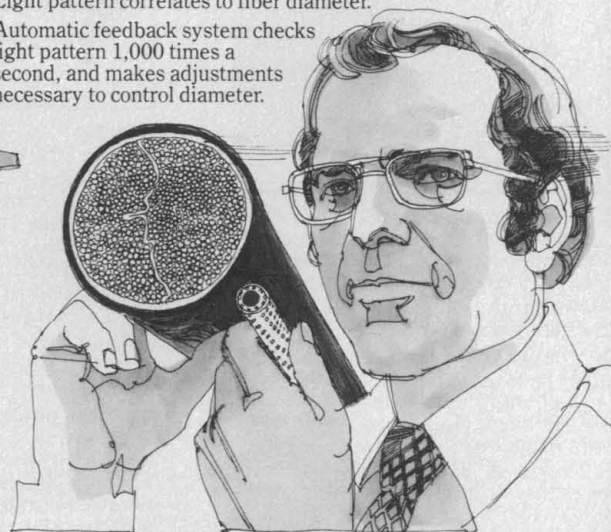
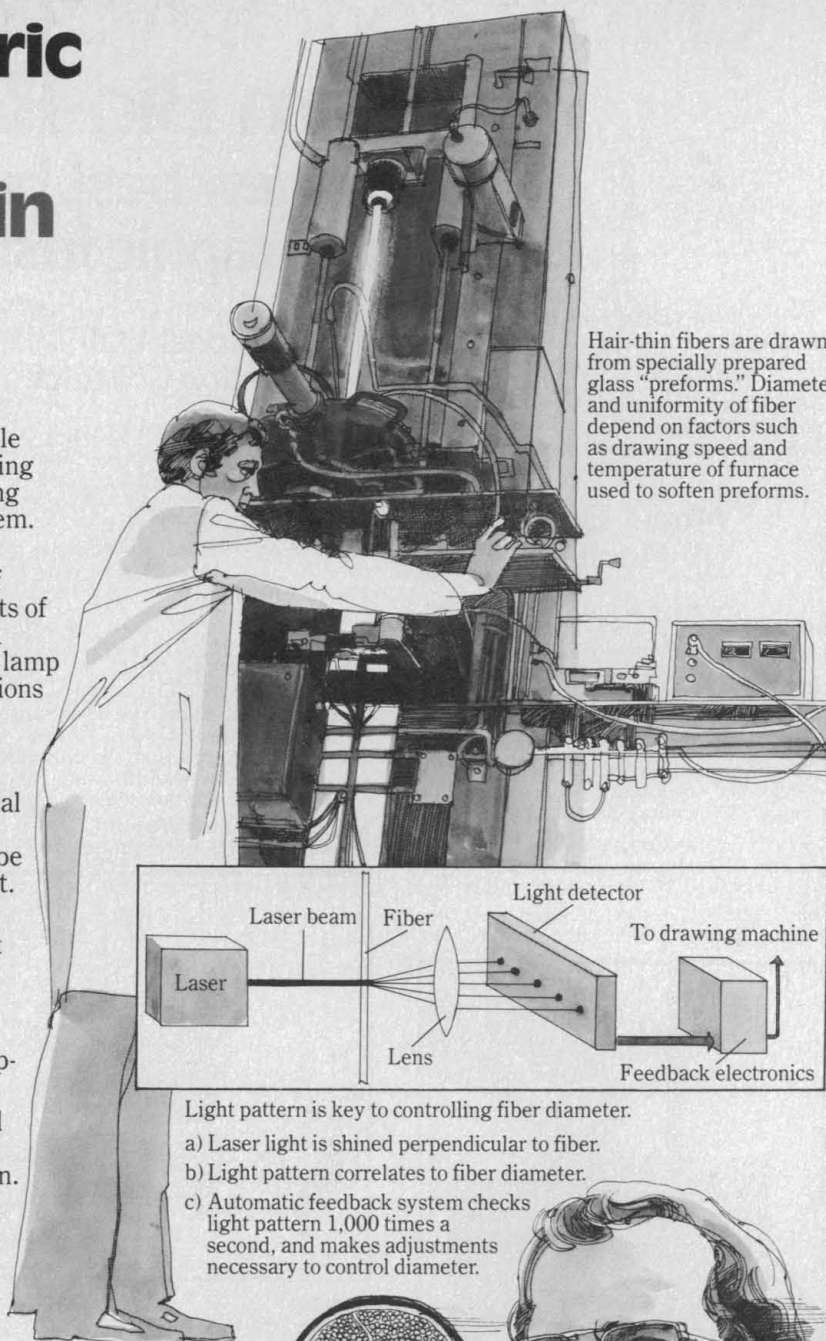
The people at Western Electric's Engineering Research Center in Princeton, N.J., tackled the problem while lightwave development continued at Bell Labs.

They discovered that laser light, shined on an optical fiber at an angle perpendicular to its axis, casts a characteristic light pattern. They were able to correlate this pattern to changes in the fiber's diameter. And to build an automatic feedback system into existing fiber drawing machines to control it.

The result is ultrasmooth glass fiber with a diameter varying no more than thirty-millionths of an inch.

Bell System engineers have found practical ways to fashion the fibers into cables that can be pulled through underground ducts, and to splice them with negligible light loss in the real world of manholes and city streets.

**Benefit:** Today, an experimental lightwave system is being tested at a Bell Labs-Western Electric facility in Atlanta. In the early 1980's, lightwave communications will probably be used to relieve cable congestion between major telephone switching centers. And as it proves competitive with other technology, it will spread throughout the telephone network.



Lightguide cable can carry nearly 50,000 calls—many more than larger copper cable. Imagine the space that saves underground.



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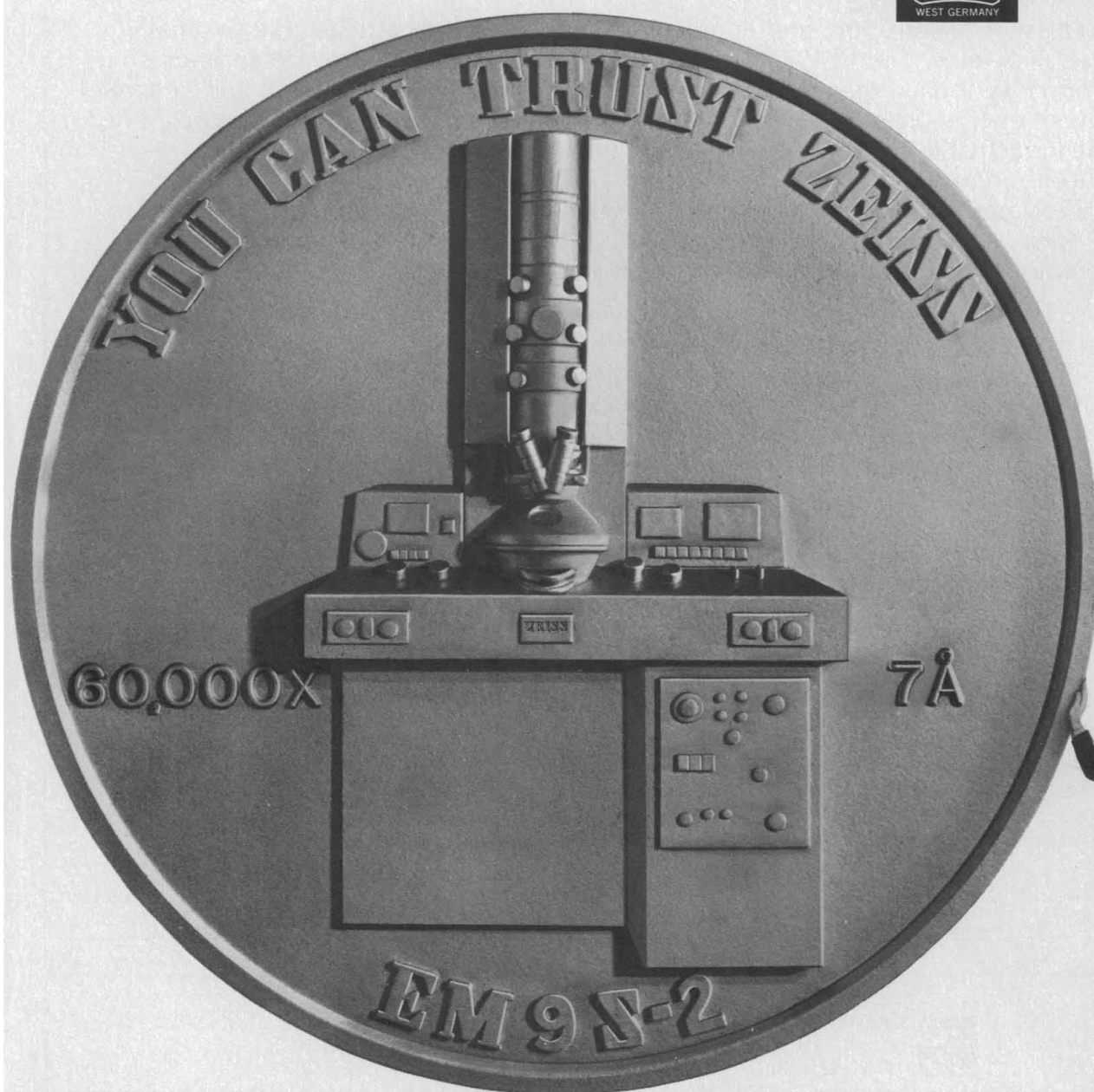
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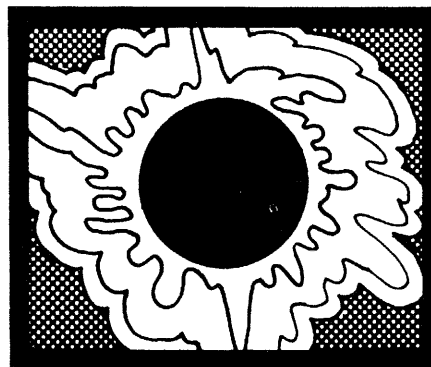
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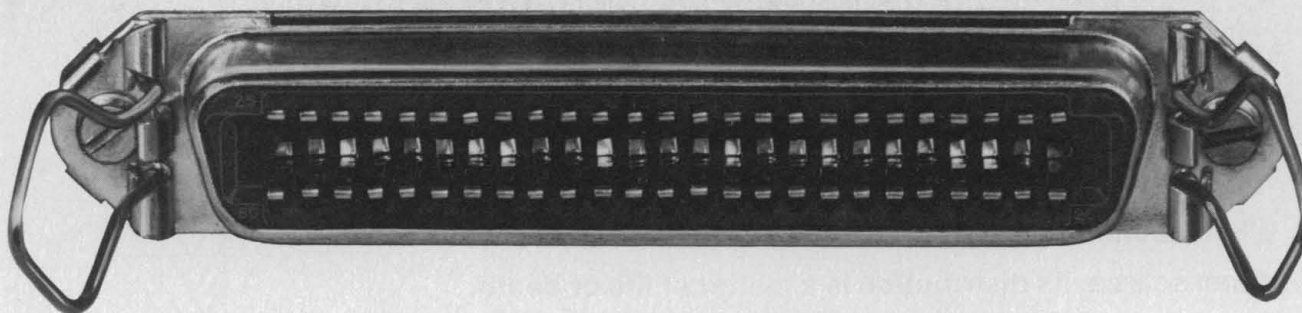
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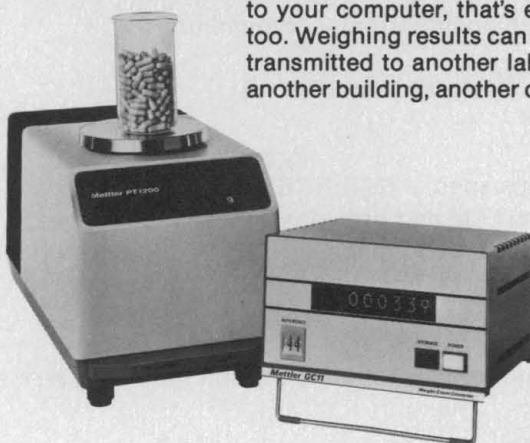


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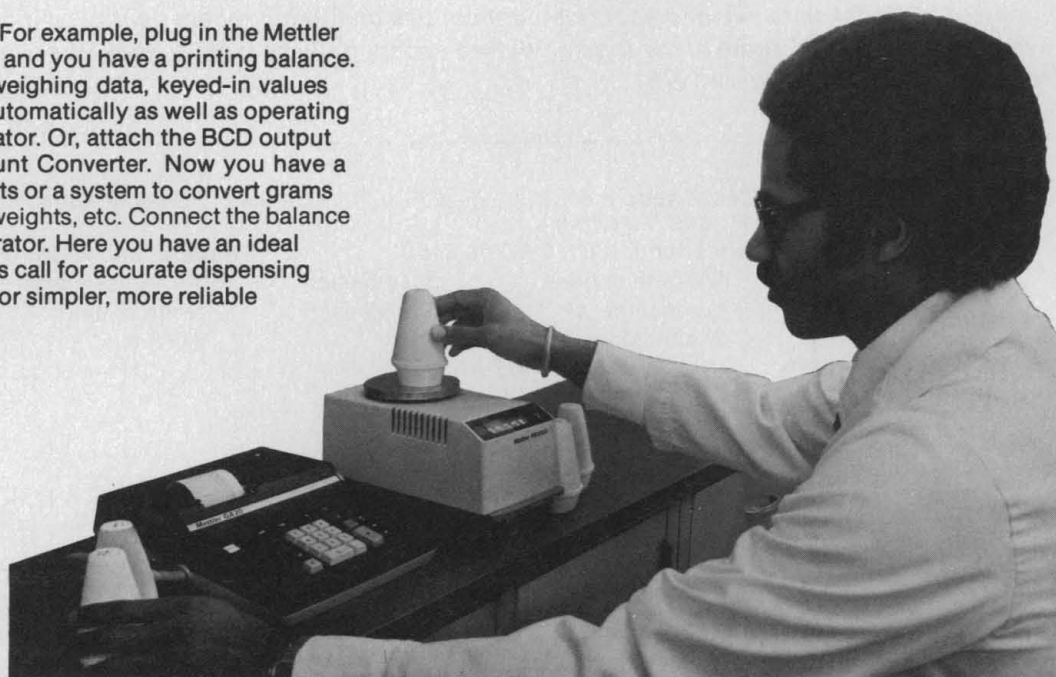
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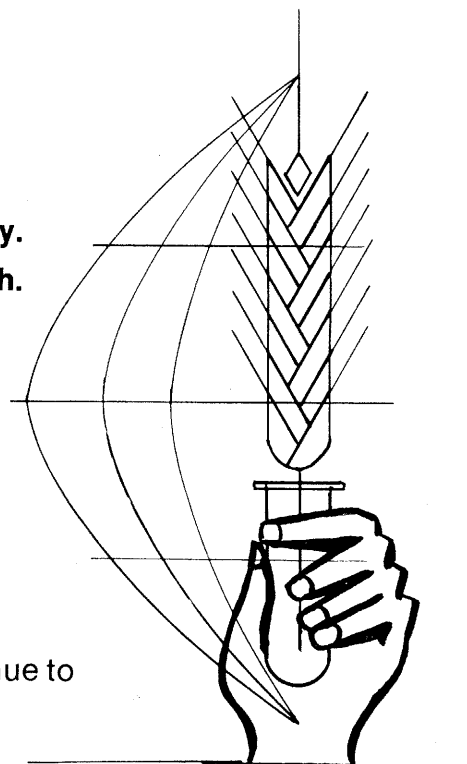
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The potential application of the model for forecasting, generation of synthetic data, and verification of certain causal hypotheses about environmental processes is discussed at some length. In particular, stochastic models are demonstrated to be superior to deterministic models even though the latter are popular.

1976, 352 pp., \$34.50/£21.05 ISBN: 0-12-400550-0

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in mice and HLA in man, and the role of these complexes in the rejection of organ grafts, in immune phenomena and in autoimmune diseases.

1976, 416 pp., \$29.50/£18.00 ISBN: 0-12-653750-X

# PROCEEDINGS OF THE SAN DIEGO BIOMEDICAL SYMPOSIUM 1976, Volume 15

edited by JAMES INGRAM MARTIN

From the Foreword:

As in past years, this year's symposium continues the underlying theme of "innovations in biomedicine." The papers are all of high quality and generally represent the forefronts of research in their respective disciplines. An additional feature of this year's meeting, however is the added emphasis on non-invasive innovations in biomedicine. . . . It is one thing to measure blood flow by cutting open the chest and implanting a flow transducer and another thing to leave

the chest intact and measure the flow by ultrasound or radiographically. Both techniques may give the same results to the investigator, but there is a huge difference to the patient. Many of the papers in the sessions on biofeedback and cardiology do present some of the most recent non-invasive techniques in their respective fields.

1976, 446 pp., \$35.00/£21.35 ISBN: 0-12-474650-0

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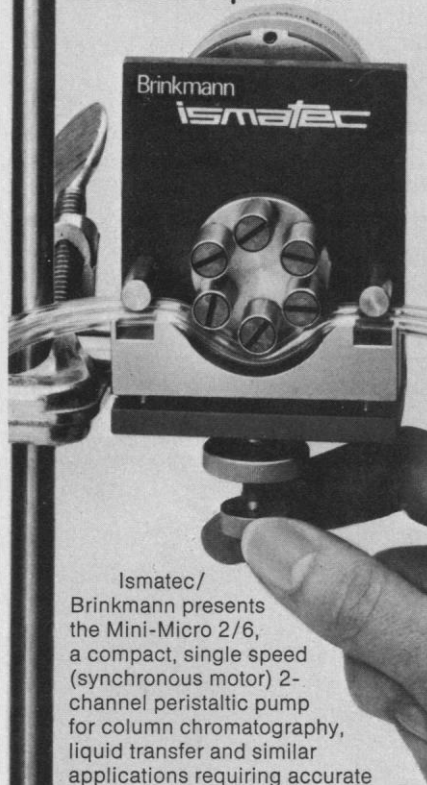


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## LETTERS

### Carter's Engineering Background

While it is a heady thought that we may have a scientist-engineer as our next U.S. president, namely Jimmy Carter, it seems rather unfair to an earlier chief executive to say that Carter "will become the first American president, at least in recent times, who can lay claim to any significant degree of scientific and technical knowledge" (News and Comment, 6 Aug., p. 462).

Although Herbert Hoover's administration of 1928-32 may not qualify as "recent" in the eyes of author Nicholas Wade, it doesn't seem so very long ago to many of us. In an earlier issue of *Science* (8 Jan. 1965, p. 125), Hoover's scientific and engineering talents were discussed at some length.

Hoover was the only U.S. president ever to hold membership in the National Academy of Sciences. Educated as a mining engineer at Stanford University, he was a fellow of the AAAS, as well as of the Royal Geographical Society of London.

Hoover's early application of scientific mining principles and techniques throughout the world were spectacularly successful and made his fortune, enabling him to retire at 34 and later to devote himself to public service. As Secretary of Commerce he made over the Bureau of Standards into a first-class research institution and brought infusions of scientific methods to the Bureau of Fisheries, the Bureau of Mines, and the Census Bureau with similar benefits to each. And at Stanford University he established the Food Research Institute to bring scientific principles to the study of mass food problems.

Although science and technology may have seemed less vital to the nation during Hoover's presidency, he unquestionably had great faith in their efficacy for improving the condition of humanity.

ROBERT E. LAMAR

*News and Publications Service,  
Stanford University,  
Stanford, California 94305*

Nicholas Wade makes the statement that "A professional engineer is often understood to be someone who has undergone a 4-year course in a particular engineering specialty, such as electrical, mechanical, or civil." To call oneself a "professional engineer" in any of the 50 states or the District of Columbia, a person must complete an 8-year training program, the first 4 years of which include earning a baccalaureate in an engi-

neering specialty, followed by a 4-year internship and a professional-level examination lasting 2 days. The use of the term "professional engineer" is restricted in most of these states to the person who has completed this program and has passed the examination so that he has been registered as a Professional Engineer by the state in which he intends to practice.

Whereas the scientist is in the pursuit of truth, he can and should deliver his hypotheses only after he has ascertained that he is in possession of all the available facts. He should not be under any time or financial pressures, and he certainly should be under no political pressures. The professional engineer, on the other hand, is most frequently working against a time, dollar, and political deadline. He must make value judgments weighing cost against performance, performance against political expediency, political expediency against his inbred ethics. He is on the firing line of technology; he must develop methods to make technology useful. He must also very frequently justify his every move to those who are not adequately prepared to understand them.

It is unfortunate that in this country the credentials of those who call themselves engineers are not very carefully examined. Since the mid-1950's there has been a proliferation of people calling themselves engineers, yet today it is doubtful that 10 percent of them are legally, mentally, or ethically qualified to do so. All too frequently we find the applied mathematician calling himself an engineer because he knows a certain amount of engineering theory, or the graduate of a technical school calling himself an engineer because he can get a better job that way, or the electronics technician recently discharged from the armed forces calling himself an engineer because he can get away with it.

In the long run, this downgrading of the engineering profession can serve only to hurt science. Although the engineer must perform in a different manner than the scientist, they both serve science.

WILLIAM B. JARZEMBSKI

*Department of Biomedical Engineering  
and Computer Medicine, School of  
Medicine, Texas Tech University  
Health Sciences Centers, Lubbock 79409*

Nicholas Wade's article is somewhat misleading in describing my connection with the early phases of the U.S. Navy Nuclear Power Training Program and thus, by implication, my possible views on the scientific or engineering credentials of Jimmy Carter.

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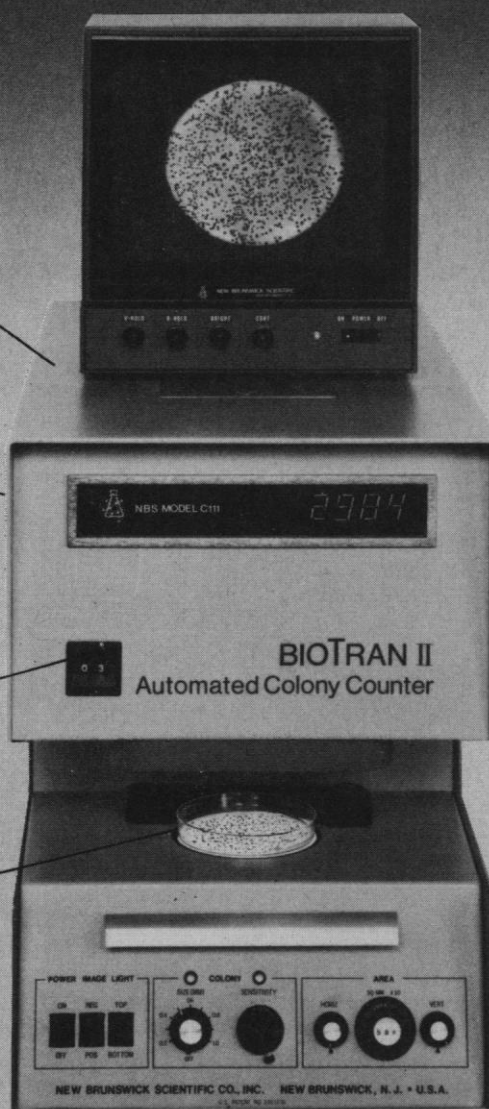
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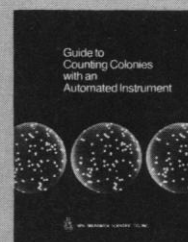
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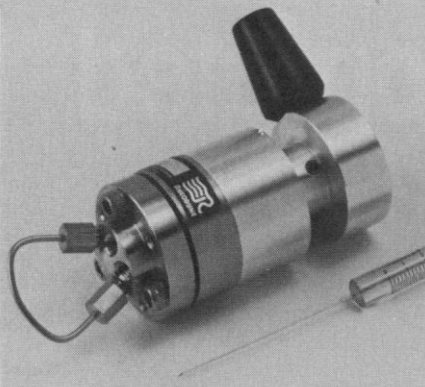
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My experience with this program began in 1958 and terminated in 1961, as Wade states. The program was initiated in 1956, under the direction of Commander William Behrens, at New London, Connecticut. The nuclear physics curriculum, which I taught primarily, was developed at New London by Austin Frye, who had been chairman of the physics department at the U.S. Navy Postgraduate School, and was extended by others, including myself. While the New London program was based upon previous experience in training in nuclear technology at the Bureau of Ships and at the prototype sites near Pittsburgh and Schenectady, it was not, specifically, the program that Carter attended. The mode of operation in the early days of the nuclear program is, however, well documented (1). My remarks should at most be construed as generic comments on the nature of that program and reflect no direct evaluation of Carter's credentials.

Further, Wade follows a statement describing enthusiasm for Carter in the scientific and technical community with a correctly stated quote from me that "it would be unusual to see a president who knows a Bessel function from a Fourier series." My statement was intended to be factual only. It would be quite inappropriate for a public servant such as myself to voice preferences in the presidential contest; such preferences were neither expressed nor implied in my conversation with Wade.

JOEL A. SNOW

*Division of Policy Research and Analysis,  
 National Science Foundation,  
 Washington, D.C. 20550*

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1. R. G. Hewlett and F. Duncan, *Nuclear Navy, 1946-1962* (Univ. of Chicago Press, Chicago, 1974).

#### The Science Court

Philip Boffey's excellent article on the science court (News and Comment, 9 July, p. 129) reports that the "only outright opposition to emerge from the scientific community thus far has been voiced by leaders of the Scientists Institute for Public Information."

At the American Physical Society (APS) Washington meeting last April, the Forum on Physics and Society organized a public session on the science court. Among the panelists was Arthur Kantrowitz, principal advocate of the court. I think it is fair to say that most of the audience came to the session inter-

ested in the idea, or at least neutral, and ended up leary of it. It struck me, at least, as an attempt to institute a Plato's Republic of scientists. Not since the time of the trial of Galileo have we had a canon court issuing pronouncements of scientific Truth. At the conclusion of the APS forum session the audience (and the panelists) by a show of hands resolved overwhelmingly that "before an experiment on the Science Court be conducted, much further discussion is needed, not merely among scientists, but in the American community at large, which will be powerfully affected by the conclusions reached in any Science Court." The Forum on Physics and Society is now endeavoring to stimulate its 2000 members to think about the issue and hopes to encourage the broad public discussion which has so far been lacking.

There are important differences between the plan now being considered by the Consumer Product Safety Commission and the general proposals of Kantrowitz and the White House advisory group on science and technology. Commissioner Lawrence Kushner, who spoke at the forum session, views the court as a kind of Robert's Rules for scientific controversy, a way of forcing opposing sides to confront each other's facts and arguments. The court would have no life of its own. From time to time a court would be impaneled by the Commission and dissolved upon the issuance of a report to the Commission.

The more ambitious plans of Kantrowitz and the White House group seem to me both simplistic and dangerous. Implicit in the argument for a science court is the assumption that value-free questions of fact can be separated from political questions of policy. The science court, it is argued, will resolve controversies as to the facts. But which facts? The answers you get depend upon the questions you ask. In those recent matters of public controversy with a heavy technological component—the ABM, the SST, the B1 bomber, reactor safety—the two sides have been stressing different questions. What the important questions are is a political judgment.

Furthermore, since the answers to whatever questions one considers important are not known, but can only be estimated, the two sides quite properly assign different weights. Judgments on the complex questions of public policy rest not upon one fact, or one lemma, but on a rich foliage of argument, each branch of which is reached only after logical branching at previous stages in the argument. Assigning different probabilistic estimates of "the truth" at each

step can lead to qualitatively different conclusions (1). In social policy questions it is impossible to separate facts from values. A democratic consensus can be achieved only by a democratic process, even with respect to scientific "facts," when those facts have heavy political import. No elite group—the National Academy of Sciences, Nobel laureates, or anyone else—can decide for the U.S. public what are the right questions and the right answers.

The science court will stifle public debate. It will encourage the public to believe that objective answers have been measured incontrovertibly in the laboratory. This select court will select the issues, select the judges, select the questions, select the protagonists, and give its imprimatur to its answers. Perhaps the science court will establish once and for all that the sun revolves around the earth.

EARL CALLEN

*Department of Physics, American University, Washington, D.C. 20016*

#### Notes

1. As a simple linear illustration, suppose there are six steps in an argument and at each step the spread in estimates is from 0.75 to 0.95, which is maybe as close to agreement as one is likely to come in a real controversy. Whereas  $(0.95)^6 \approx 0.66$ ,  $(0.75)^6 \approx 0.1$ , a two-thirds probability in one case and a mere 10 percent chance in the other.

#### Clean Air Litigation

In his article on the social impact of pollution control (14 May, p. 631), Wallace Johnson makes a critical factual error. In the current round of litigation of the Environmental Protection Agency's (EPA's) regulations on the preservation of air quality in clean air regions, New Mexico (and a number of other clean air states which have joined in its brief) is not siding against the Sierra Club, but with it—against EPA and major polluters. New Mexico and the Sierra Club share a common perspective that strong and effective national regulation on the preservation of air quality is the only way to protect clean air states against threats by industry that they will go elsewhere if tough air quality standards are enforced. Also, the notion represented in Wallace's subhead that we are talking about "Cleaner than clean air" is misleading; the national ambient air quality standards do not represent "clean air"; they represent air quality just clean enough that damaging health and property consequences have not yet been demonstrated. Even the toughest of the proposed significant deterioration classifications,



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for example, represents a loss of over 100 miles of visibility in the Southwest; the national ambient standards are so lax that they would permit a loss of visibility sufficient that visitors to the Grand Canyon could not see the other side.

CARL POPE

*Sierra Club, 530 Bush Street,  
San Francisco, California 94108*

Johnson's statement that nondegradation regulations promulgated by the Environmental Protection Agency (EPA) are "presently being challenged in the court by the Sierra Club and other environmental groups on the one hand and by the American Petroleum Institute, various oil companies, and the state of New Mexico on the other hand" is misleading at best.

While it is true that New Mexico, specifically the New Mexico Environmental Improvement Agency, is involved in the litigation dealing with the nondegradation regulations, we are not on the side of the American Petroleum Institute or of the various oil companies.

The position of the oil companies is that EPA's regulations are too restrictive. Both the Sierra Club and New Mexico feel the regulations are not restrictive enough and do not in fact prevent significant deterioration (1).

Nor do I agree with Johnson's assertion that the imposition of nondegradation principles could operate so as to prevent industrial development in the western states. The best way to ensure full and environmentally compatible development is through the imposition of a uniform Class II ceiling (2) under a nondegradation designation (3).

New Mexico and other states in the Rocky Mountain West are at the focus of much of the projected energy development occurring in this country. As such, we see daily examples of industries' wanting to develop coal, uranium, and other resources, not by using the best available control technology, but by acting in the same heedless manner that developers have most often employed elsewhere.

Additionally, New Mexico is a state with chronic unemployment and underemployment problems. Given a situation where there are natural resources available for development and strong socioeconomic pressures to promote that development, the historical tendency has been to welcome industry on a first-come, first-served basis without requiring much in the way of pollution controls. In areas of little development, there is correspondingly little pollution, and environmental quality is thus too

often viewed as the tool with which to bargain.

The difficulty, apart from environmental degradation, is that this approach fails to consider the reality of air quality as a natural resource which is as depletable as any other. Whether one agrees philosophically with national air quality standards, they do exist, and their existence means the end of the age-old concept of an unlimited air resource. Hence using that resource as an inducement to promote development is as short-sighted as would be the reckless use of any other resource.

The imposition of a uniform, nationally designated Class II ceiling rather than limiting development actually ensures more development than would otherwise occur. This is because (i) those states that desire to use air quality as an inducement to development will not be allowed to develop at the expense of neighbors who are interested in maintaining as much of a quality environment as possible, and (ii) a tighter ceiling than that imposed by national standards will help impress on everyone that air is a depletable resource and that new industry must be required to utilize the best control technology in developing new energy supplies.

The question of available technology is the crux of the problem. Existing industry faced with the problems of the retrofit of control devices is finding the job difficult and expensive. In many cases, the result has been an unwillingness to accept the fact that the job of control is even possible. But a difficult job is not synonymous with an impossible one, particularly in the case of new industry where controls can be made an integral part of plant design.

The end result is that, rather than having an air shed used up by three or four inadequately controlled industries, more industry can be accommodated. If done properly, this would ensure that the limitation to development in an area such as New Mexico would be the lack of water—the naturally limiting factor, and not an artificial air pollution limitation.

CUBIA L. CLAYTON

*New Mexico Environmental Improvement  
Agency, Post Office Box 2348,  
Santa Fe 87503*

#### References

1. State of New Mexico *ex rel.* New Mexico Environmental Improvement Agency v. EPA civil No. 75-1370 (District of Columbia Court of Appeals, 1975).
2. *Fed. Reg.* 39, 42515 (1974).
3. C. L. Clayton, in testimony before the U.S. Senate, Committee on Public Works, Subcommittee on Environmental Pollution, *Implementation of the Clean Air Act—1975*, Part 1 (Government Printing Office, Washington, D.C., 1975), pp. 857–862.



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## Universities and National Research Policy

The postwar ebullience and national prosperity has given way to austerity and national insecurity. This new environment poses special dangers for the research university. Our political system naturally produces pressures to satisfy the majority and spread resources evenly over a large number of claimants. If there is too little money to satisfy all claims, the needs of institutions of special quality are readily dismissed as elitist and unnecessary. A period of national insecurity also reinforces the tendency to concentrate on immediate problems and ignore or defer long-term needs. Finally, a period of austerity impels public officials to insist that every expenditure be justified as objectively as possible. Such accountability is not kind to the intangible values that characterize so much of the work of universities.

These pressures have already left their mark on the nation's research effort. Federal support for R & D and basic research has steadily declined in real dollars, and other nations are beginning to surpass us in the share of the gross national product that they devote to these purposes. Applied research is targeted heavily at urgent domestic problems, such as cancer and energy, to the neglect of longer-range international needs in such fields as basic biological research devoted to agriculture and tropical disease. Funds for equipment and facilities have fallen off to such a point that experimental science is threatened in many private universities. Investigators are hampered by instability in federal funding and by increasing red tape in the administration of contracts. Financial stringency has limited the career opportunities of younger university scientists and threatens to drive promising investigators into other, less productive environments.

These developments call for greater efforts from universities to press the case for research support. This task has been largely left to individual scientists, who have worked effectively with their counterparts in the National Science Foundation and Health, Education, and Welfare. But scientists cannot fully appreciate the needs of the university as a whole. They have little contact with members of Congress or with the Office of Management and Budget or with other key officials in the Executive Branch. And they lack the capacity to attract support from representatives of business and other sectors with a stake in a vigorous science program.

What can be done to improve the situation? To begin with, university organizations—especially the Association of American Universities—must make a sustained effort to develop an effective policy for the support of research and to create an effective forum in Congress and the Executive Branch where they can discuss this policy not only at budget time but on a more informal, long-term basis.

University presidents must also do more to help formulate an adequate research policy. Presidents cannot impose their opinions in matters beyond their competence. But they must see to it that all the interests of the institution are identified, that conflicting needs are reconciled, and that these needs are presented in convincing form to those who make the ultimate decisions in Washington. And they must make efforts to enlist the aid of allies outside the universities who share an interest in the progress of science.

Above all, a much more forceful case must be made for the importance of research universities to the nation's welfare. It has become fashionable today to belittle the value of education and to question the contributions of knowledge. We are doing very little to counter these arguments. Perhaps we have lost our nerve, or perhaps we have grown too accustomed to having our importance taken for granted. Whatever the reason, we run the risk of having our needs quietly ignored in favor of all the other urgent claims being made on the government. We will do a disservice to ourselves and to the public interest if we allow this situation to continue.—DEREK C. BOK, *President, Harvard University, Cambridge, Massachusetts 02138*

This editorial is adapted from an address delivered at the annual meeting of the American Association for the Advancement of Science in Boston, Massachusetts, 18 February 1976.

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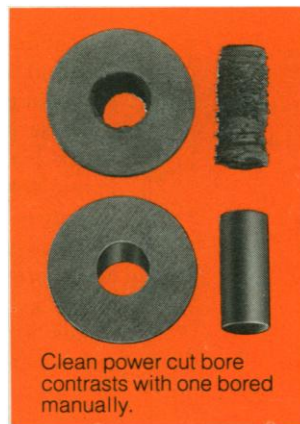
Spiral cutter groove feeds lubricant to aid cutting and minimize friction.

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We have literature on the Sargent-Welch Power Borer. For your copy, phone, write or circle the reader service number.

Anyone who has bored a rubber stopper by hand knows that it is a case of trading hard work for poor results. At best, the hole is ragged, non-uniform and frequently crooked.

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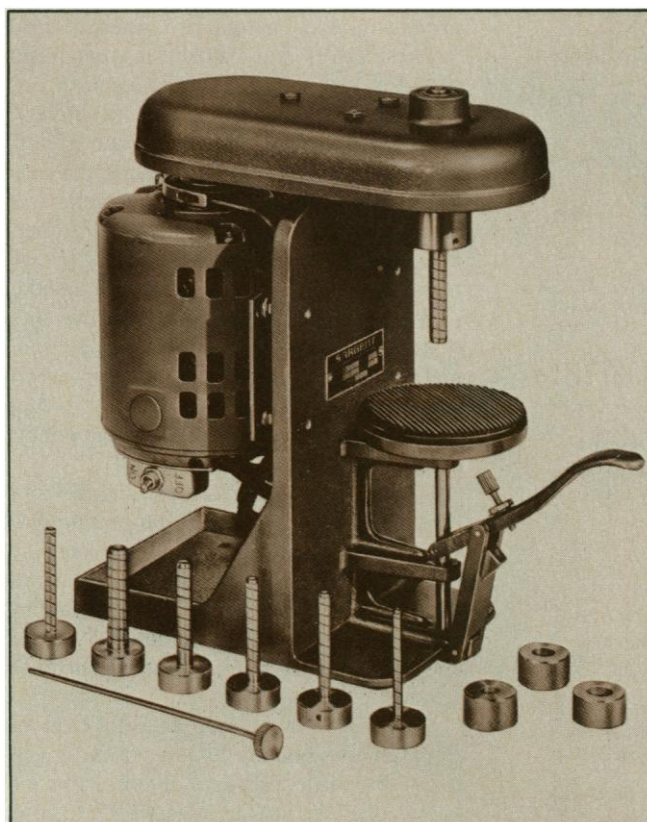
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## Annual Meeting Denver

20-25 February 1977

## Call for Contributed Papers

For the forthcoming AAAS Annual Meeting in Denver (20-25 February 1977), we will depart from recent practice and *once again have contributed-paper sessions*, thanks to the cooperation of the AAAS Southwestern and Rocky Mountain Division (SWARM), which is meeting jointly with us in Denver. These sessions will be of two different types: *slide sessions* and *poster sessions*. In the slide sessions each contributor

will have 15 minutes to present his material and entertain questions about it (a 36 mm, that is, 2×2, slide projector will be available for use). In the poster sessions each contributor will have a bulletin board on which to place text and graphic material for a 3-hour period so that he can discuss his work, at length, with all interested parties. (See *Science*, 28 June 1974, page 1361.)

—ARTHUR HERSCHMAN

### Instructions for Contributors

Type abstracts on ordinary white bond paper (21.5cm×28cm) according to the format shown on the right (the example is reduced to approximately one half of the ordinary linear dimension). Indicate at the top of the page the kind of session it is intended for (*poster* or *slide*) and the letter of the AAAS Section to which its subject matter makes it most appropriate (see the bottom of the contents page of any issue of *Science*). Type the title and author block using the typography indicated in the example and a column width of 12 cm, continue with the abstract and footnote blocks. *Note that your original copy will be our camera-ready copy for reproduction; therefore type as carefully and cleanly as you can and hand letter (where necessary) as carefully as you can.* The total length of the abstract (from the top of the title to the bottom of the footnotes) should *not exceed 12 cm*.

At the bottom of the page type the name and affiliation of the AAAS member who is contributing the abstract and have this member sign the page. *The contributor need not be an author; however, the privilege of contributing an abstract for one of these sessions is limited to AAAS members (or fellows).*

Send the original together with two copies of your abstract to:

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**NO LATER THAN 15 October 1976.** Dr. Dunford will send you further instructions after he receives your abstract.

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AAAS Section nearest to subject matter \_\_\_\_\_.

Abstract is for poster session.

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in Parentheses), SECOND AUTHOR (Institution).\*

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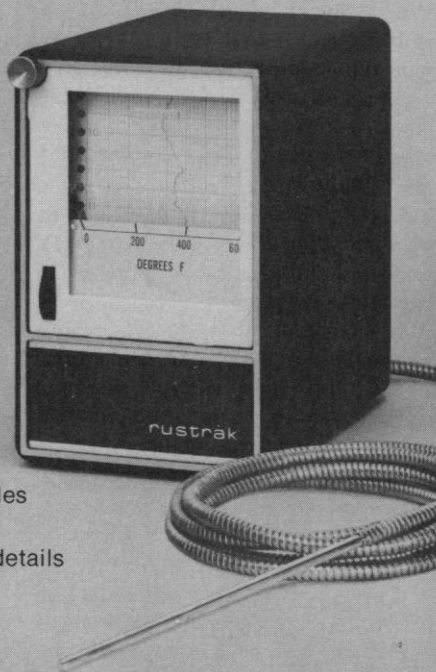
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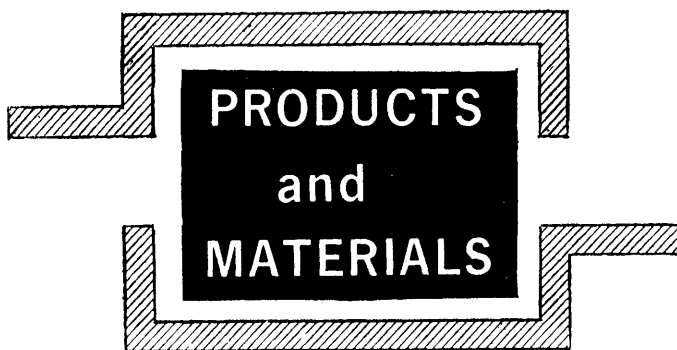
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### Small Helium Neon Laser

The ME-620 is an 8.625 by 1.375 inch cylindrical helium neon laser. It features adjustable mounting rings. The front and rear rings are locked in place with an Allen wrench. The beam may be positioned concentrically or off-center. Because the front ring is threaded to accept accessories and optics, alignment of the laser also centers the optics. The power is 0.8 milliwatt. The device consists of a power supply, a 2-meter cable, and the laser head. If the head requires replacement, it can be changed quickly. Metrologic Instruments. Circle 667.

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The model 900 freezing controller and the model 972 chamber eliminate subcooling before phase change which enhances or preserves viability of the sample. A dual chart displays a continuous, simultaneous trace of both the sample temperature and the chamber temperature on a single chart track. Freezing cycles may be programmed to ensure reproducibility. Rate of cooling is included in the program but any step in a freezing cycle may be readjusted manually during the cycle. Cryo-Med. Circle 670.

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suitable for interfacing to data processing equipment. The sensor uses a Peltier-cooled mirror held at the dew point temperature by a photoresistive, condensate-detecting optical system. The technique is a direct measurement and no calibration is required. The device is adaptable to fieldwork or to monitoring within environmental simulators. The complete system consists of a transmitter containing the sensor, a control unit with amplifier and signal conditioner, and a sensor cable which may be up to 500 feet long. Environmental Equipment Division, EG&G. Circle 665.

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*FX100 Spectrophotometer* is a 100-megahertz nuclear magnetic resonance instrument that features programmed operation. JEOL Analytical Instruments. Circle 674.

*Dual Station Stereomicroscopes* lists applications and optical accessories. Wild Heerbrugg Instruments. Circle 675.

*Monochromators, Light Sources and Photodetectors* is devoted to instruments for the generation and detection of light. Schoeffel Instrument. Circle 676.

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**Food, Foreign Policy, and Raw Materials Cartels.** William Schneider. Crane, Russak, New York, 1976. x, 122 pp. Cloth, \$5.95; paper, \$2.95. National Strategy Information Center Strategy Papers, No. 28.

**Fundamental Aspects of Metastasis.** Papers from a symposium, Buffalo, N.Y., July 1975. Leonard Weiss, Ed. North-Holland, Amsterdam, and Elsevier, New York, 1976. xx, 444 pp., illus. \$53.95.

**Fundamental Skills in Serology.** Agglutination Tests, Syphilis Serology, Fluorescent Staining. Leila J. Walker and Howard Tabu. Seba Kolb, Ed. Thomas, Springfield, Ill., 1976. xiv, 474 pp., illus. Spiral bound, \$14.95.

**Further Studies on the Tasaday.** D. E. Yen and John Nance, Eds. Panamin Foundation, Makati, Rizal, Philippines, 1976. xiv, 192 pp., illus. Paper, \$3. Panamin Foundation Research Series, No. 2.

**Geologia.** In Prezent și în Viitor. Nestor Lupei. Editura Tehnică, Bucharest, Romania, 1975. 264 pp., illus. Lei 17.50.

**Gifts from Lake Cowichan.** Patricia Baumgardner. *Legacy from Fritz.* Fritz Perls. Science and Behavior Books, Palo Alto, Calif., 1975. viii, 218 pp. \$7.95.

**Group-Analytic Psychotherapy.** Method and Principles. S. H. Foulkes. Interface (Gordon and Breach), New York, 1975. xii, 178 pp., illus. \$13.50.

**HB<sub>s</sub> Antigen Subtypes.** Proceedings of a workshop, Paris, Apr. 1975. A. M. Couroucé, P. V. Holland, and J. Y. Muller, Eds. Karger, Basel, 1976. viii, 158 pp., illus. Paper, \$30.50. Bibliotheca Haematologica, No. 42.

**Heresies.** Thomas Szasz. Anchor/Double-day, Garden City, N.Y., 1976. xiv, 186 pp. Paper, \$2.95.

**Histogenesis and Morphogenesis in Planarian Regeneration.** Rosine Chandebois. Karger, Basel, 1976. viii, 182 pp., illus. Paper, \$36.50. Monographs in Developmental Biology, vol. 11.

**A History of Engineering and Science in the Bell System. The Early Years (1875-1925).** M. D. Fagen, Ed. Bell Telephone Laboratories, Murray Hill, N.J., 1975. xiv, 1074 pp., illus. \$15.

**Human Anatomy.** Ruth Ashley in consultation with James A. McNamara. Wiley, New York, 1976. xiv, 274 pp., illus. Paper, \$5.95. Self-Teaching Guides.

**Human Learning.** David L. Horton and Thomas W. Trunage. Prentice-Hall, Englewood Cliffs, N.J., 1976. x, 502 pp., illus. \$12.95. Prentice-Hall Series in Experimental Psychology.

**Hyperactive Children.** Diagnosis and Management. Daniel J. Safer and Richard P. Allen. University Park Press, Baltimore, 1976. xvi, 240 pp., illus. Paper, \$8.50.

**Illustrated Guide to the Seaweeds and Sea Grasses in the Vicinity of Port Aransas, Texas.** Peter Edwards. University of Texas Press, Austin, 1976. iv, 132 pp. Paper, \$6.95.

**Infections in Cancer Chemotherapy.** Proceedings of a symposium, Brussels, Jan. 1975. J. Klastersky, Ed. Pergamon, New York, 1976. vi, 102 pp. \$15. Reprinted from *European Journal of Cancer*, vol. 11.

**Information Systems.** Their Interconnection and Compatibility. Proceedings of a symposium, Varna, Bulgaria, Sept. 1974. International Atomic Energy Agency, Vienna, 1975 (U.S. distributor, Unipub, New York).

x, 472 pp., illus. Paper, \$28. Proceedings Series.

**Insects That Feed on Trees and Shrubs.** An Illustrated Practical Guide. Warren T. Johnson and Howard H. Lyon with the collaboration of C. S. Koehler, N. E. Johnson, and J. A. Weidhaas. Comstock (Cornell University Press), Ithaca, N.Y., 1976. 464 pp. \$35.

**Introduction to Combustion Phenomena.** A. Murty Kantury. Gordon and Breach, New York, 1975. xviii, 412 pp., illus. \$34.50. Combustion Science and Technology Book Series, vol. 2.

**Introduction to Metascience.** An Information Science Approach to Methodology of Scientific Research. Thomas J. Hickey. Published by the author, P.O. Box 590, Oak Park, Ill. 60303, 1976. x, 74 pp. Paper, \$4.

**Introduction to Modern Sheet Metal.** Edward R. Kratzel. Reston (Prentice-Hall), Reston, Va., 1976. xiv, 242 pp., illus. \$12.95.

**Lies, Damn Lies, and Statistics.** The Manipulation of Public Opinion in America. Michael Wheeler. Liveright, New York, 1976. xx, 300 pp. \$9.95.

**The Making of Psychology.** Discussions with Creative Contributors. Richard I. Evans. Knopf, New York, 1976. xviii, 382 pp., illus. Paper, \$5.95.

**Marketing Models and Econometric Research.** Leonard J. Parsons and Randall L. Schultz. North-Holland, Amsterdam, 1976 (U.S. distributor, Elsevier, New York). xiv, 300 pp., illus. \$22.50.

**Medical Pharmacology.** Principles and Concepts. Andres Goth. Mosby, St. Louis, ed. 8, 1976. xii, 754 pp., illus. \$18.50.

**Memory and Attention.** An Introduction to Human Information Processing. Donald A. Norman. Wiley, New York, ed. 2, 1976. xvi, 262 pp., illus. Cloth, \$10.95; paper, \$5.95. Series in Psychology.

**Microbiology and Human Disease.** George A. Wistreich and Max D. Lechtman. Glencoe Press, Beverly Hills, Calif., and Collier Macmillan, London, ed. 2, 1976. xx, 906 pp., illus. \$15.95. Laboratory Exercises in Microbiology (ed. 3). George A. Wistreich and Max D. Lechtman. xiv, 310 pp., illus. Paper, \$6.95.

**Multiplication and Division in Mammalian Cells.** Renato Baserga. Dekker, New York, 1976. xiv, 240 pp., illus. \$22.50. The Biochemistry of Disease, vol. 6.

**Nuclear Fuels Policy.** Report of the Atlantic Council's Nuclear Fuels Policy Working Group. The Atlantic Council of the United States, Washington, D.C., 1976. xvi, 138 pp. Paper, \$4.50. Policy Papers Energy Series.

**Oil Shale.** Teh Fu Yen and George V. Chilingarian, Eds. Elsevier, New York, 1976. xii, 292 pp., illus. \$34.75. Developments in Petroleum Science, 5.

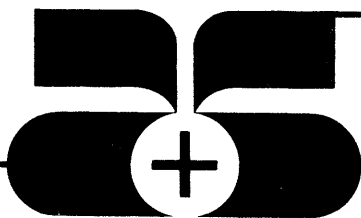
**Organ Culture in Biomedical Research.** Festschrift for Dame Honor Fell, FRS. Papers from a meeting, Norwich, England, Apr. 1975. Michael Balls and Marjorie A. Monnickendam, Eds. Cambridge University Press, New York, 1976. x, 570 pp., illus. \$58. British Society for Cell Biology Symposium 1.

**People and Predicaments.** Milton Mazer. Harvard University Press, Cambridge, Mass., 1976. xiv, 280 pp. \$12.50.

**The Principles of Physiology.** David Jensen. Illustrated by Barbara Jensen. Appleton-Century-Crofts (Prentice-Hall), New York, 1976. xvi, 1328 pp. \$24.75.

**Probability.** Peter Whittle. Wiley, New York, 1976. 240 pp., illus. Paper, \$7.50.

**Problems in Physical Chemistry.** I. M. Ritchie, R. A. Craig, and P. J. Thistlethwaite.



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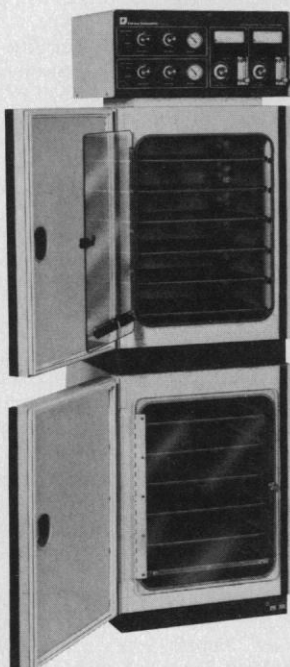
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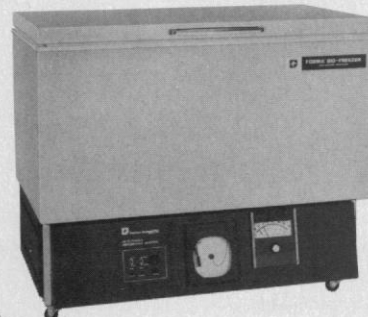
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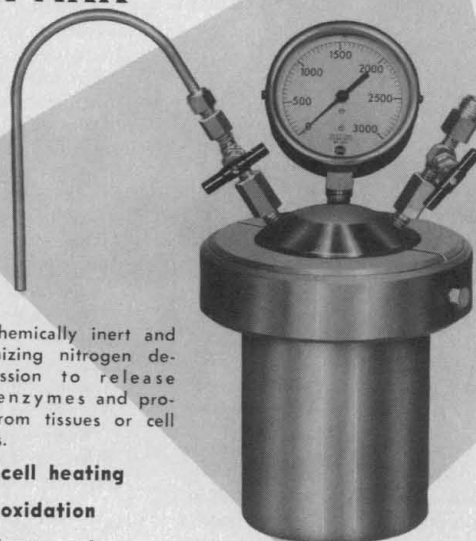
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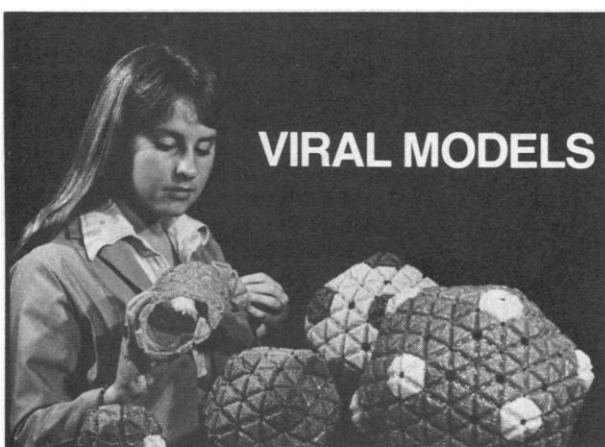
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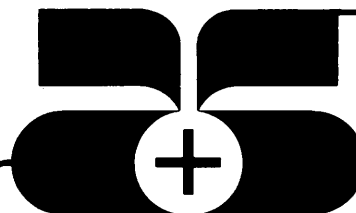
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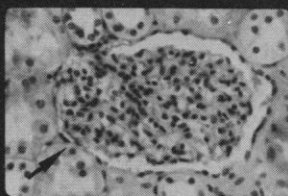


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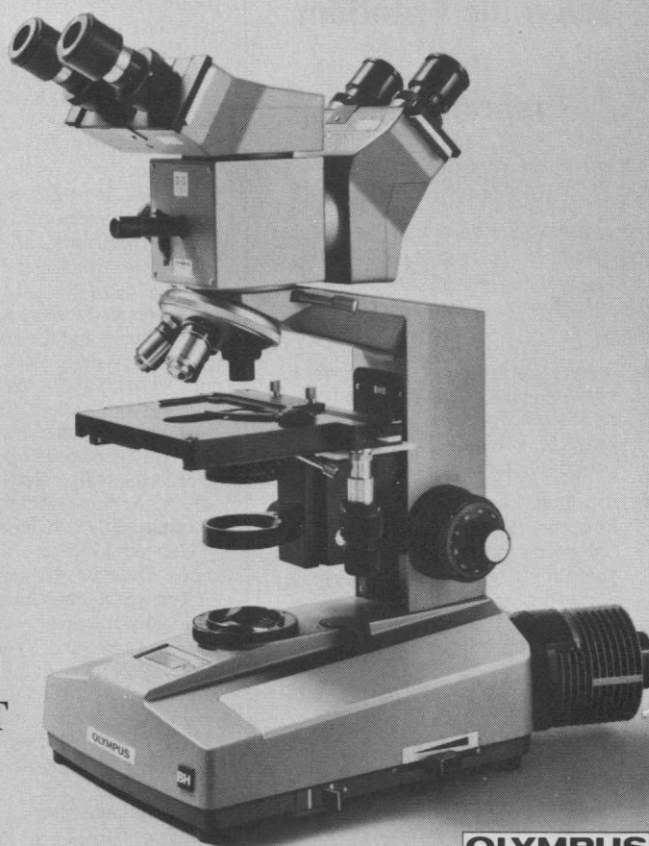
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