

SCIENCE

22 March 1974

Vol. 183, No. 4130

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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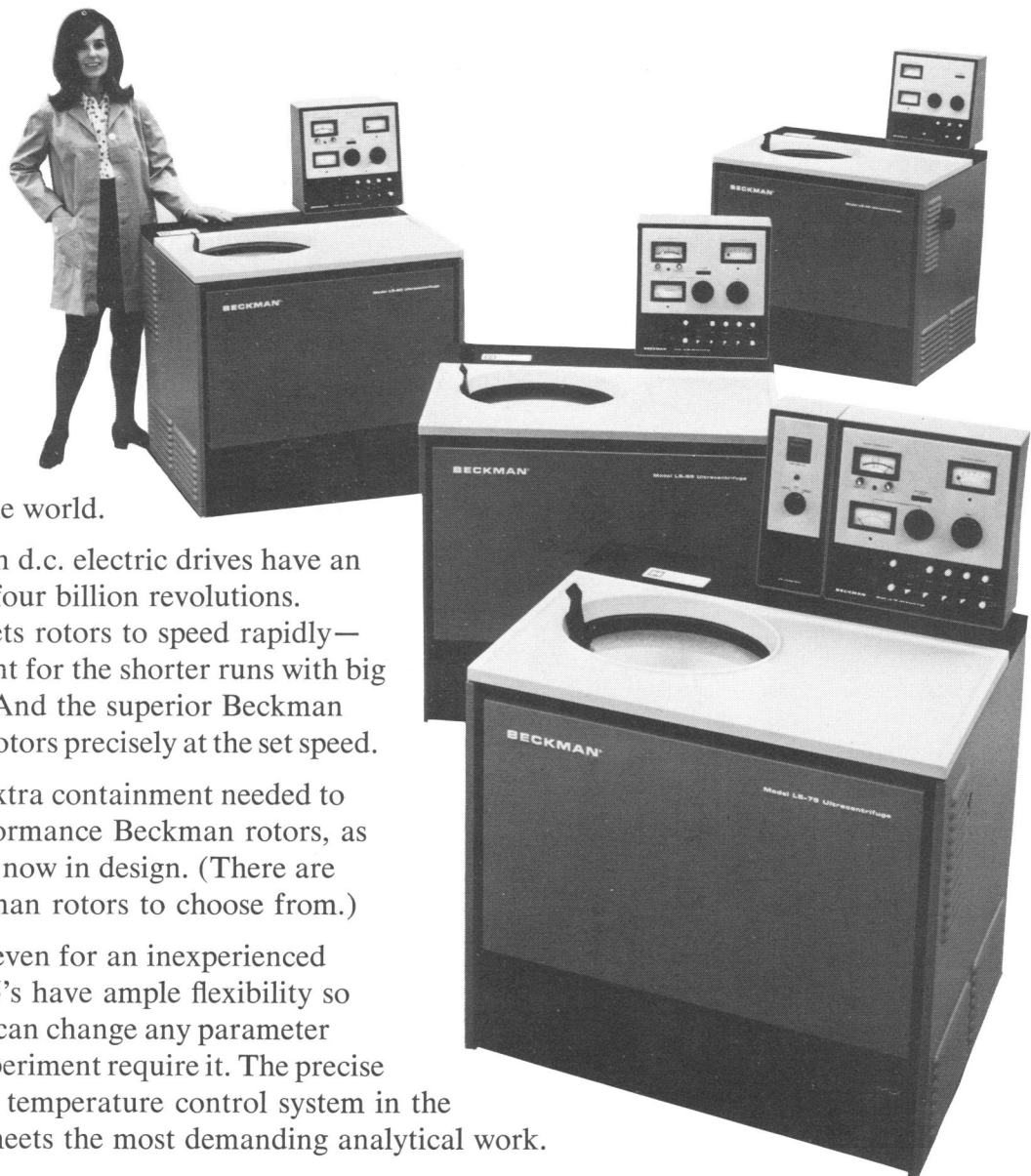
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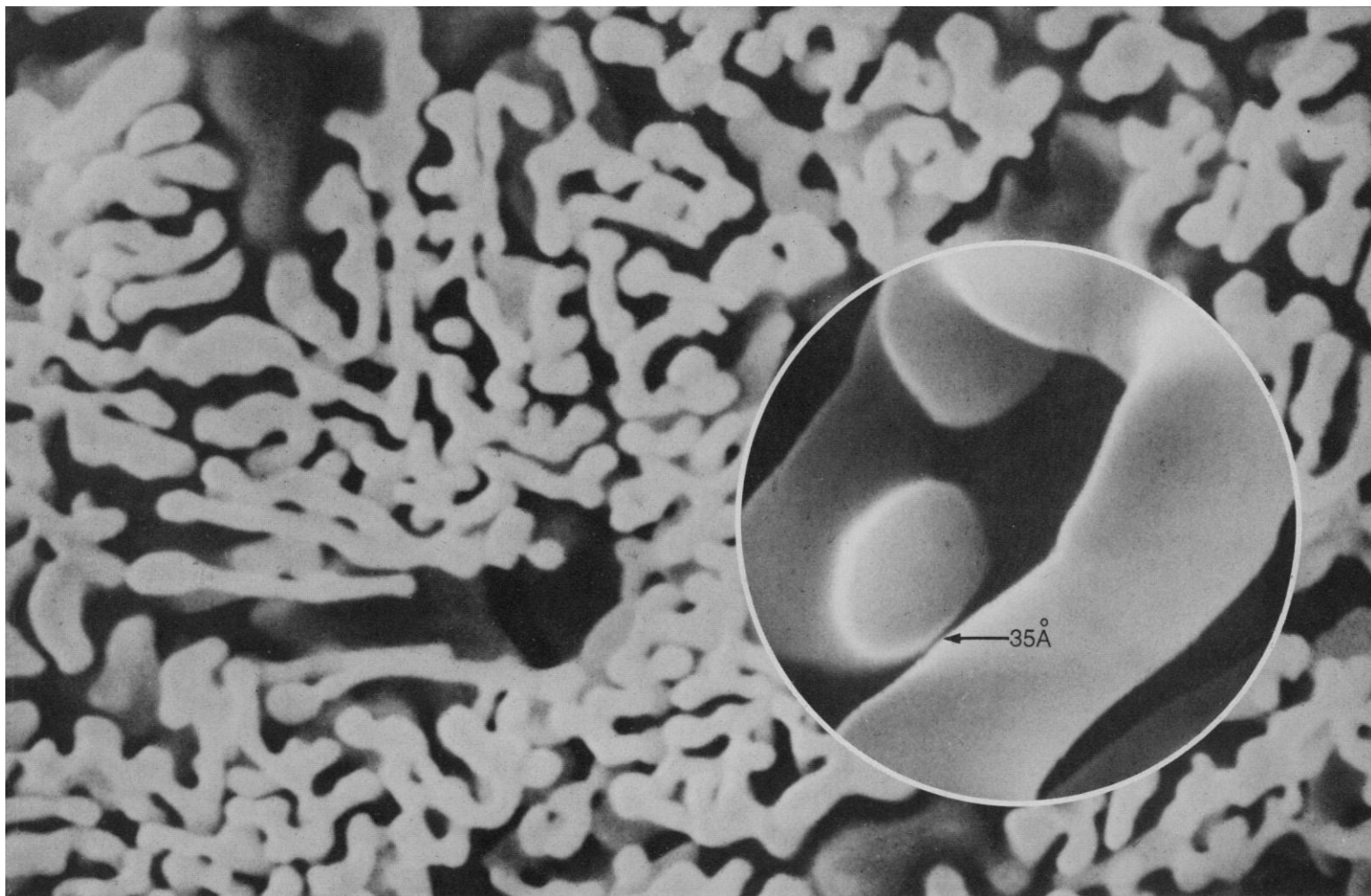
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COVER

A young rhesus monkey clings to its canine companion. Young monkeys differing in age and social history developed strong and specific attachments when housed individually with dogs. These results raise questions concerning critical periods in primate attachments and the irreversibility of filial bonds. See page 1209 [Jeff Fricker, University of California, Davis]

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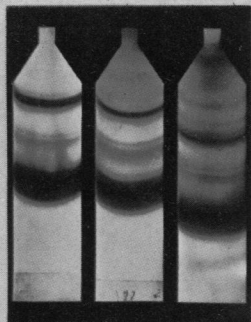


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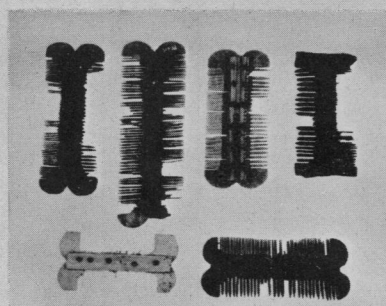
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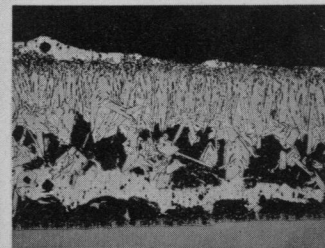
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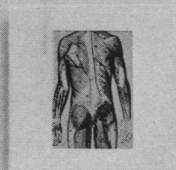
Chromatogram of urological specimen. Type 108.



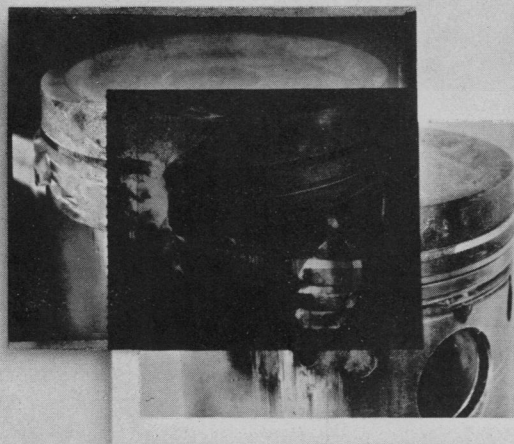
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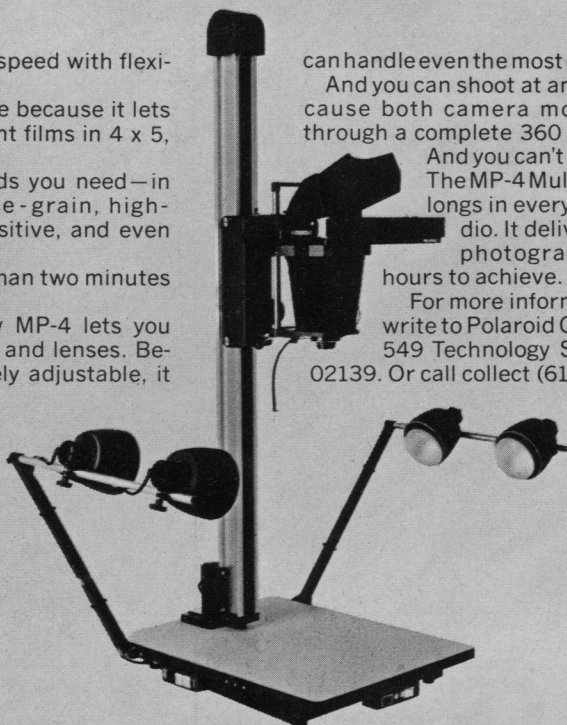
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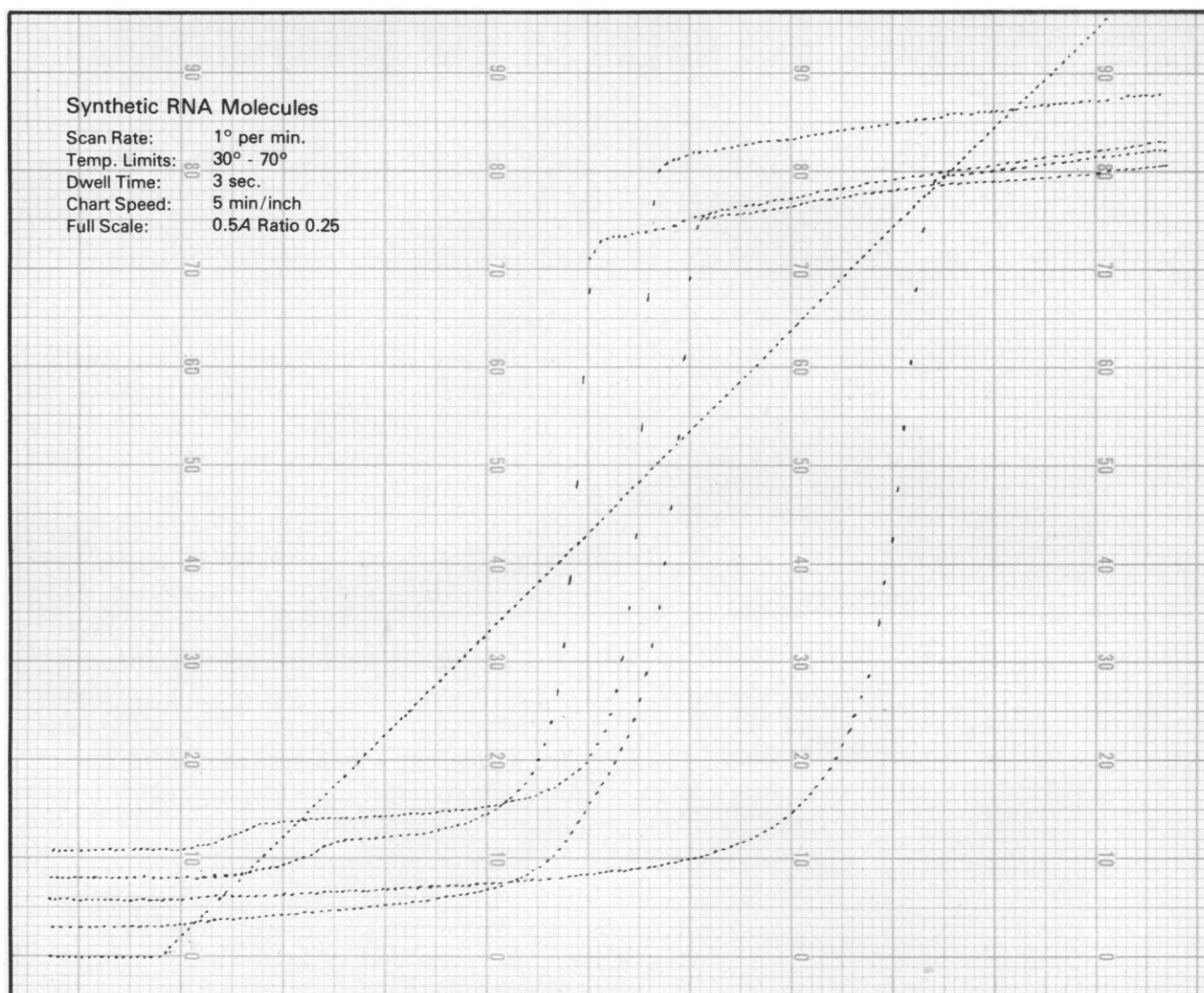
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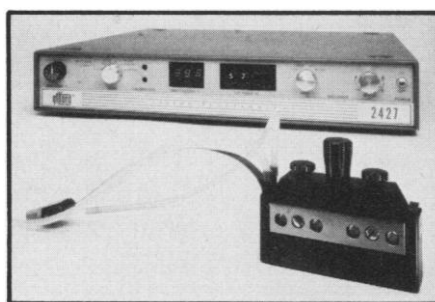
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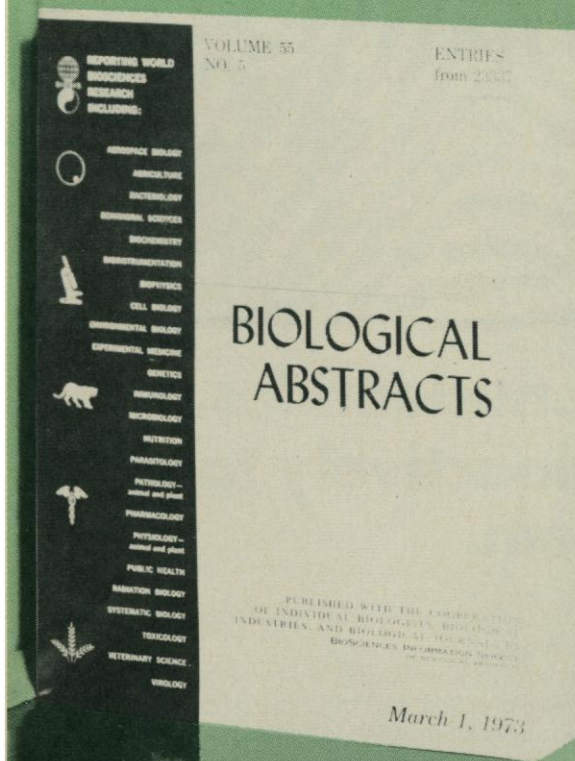
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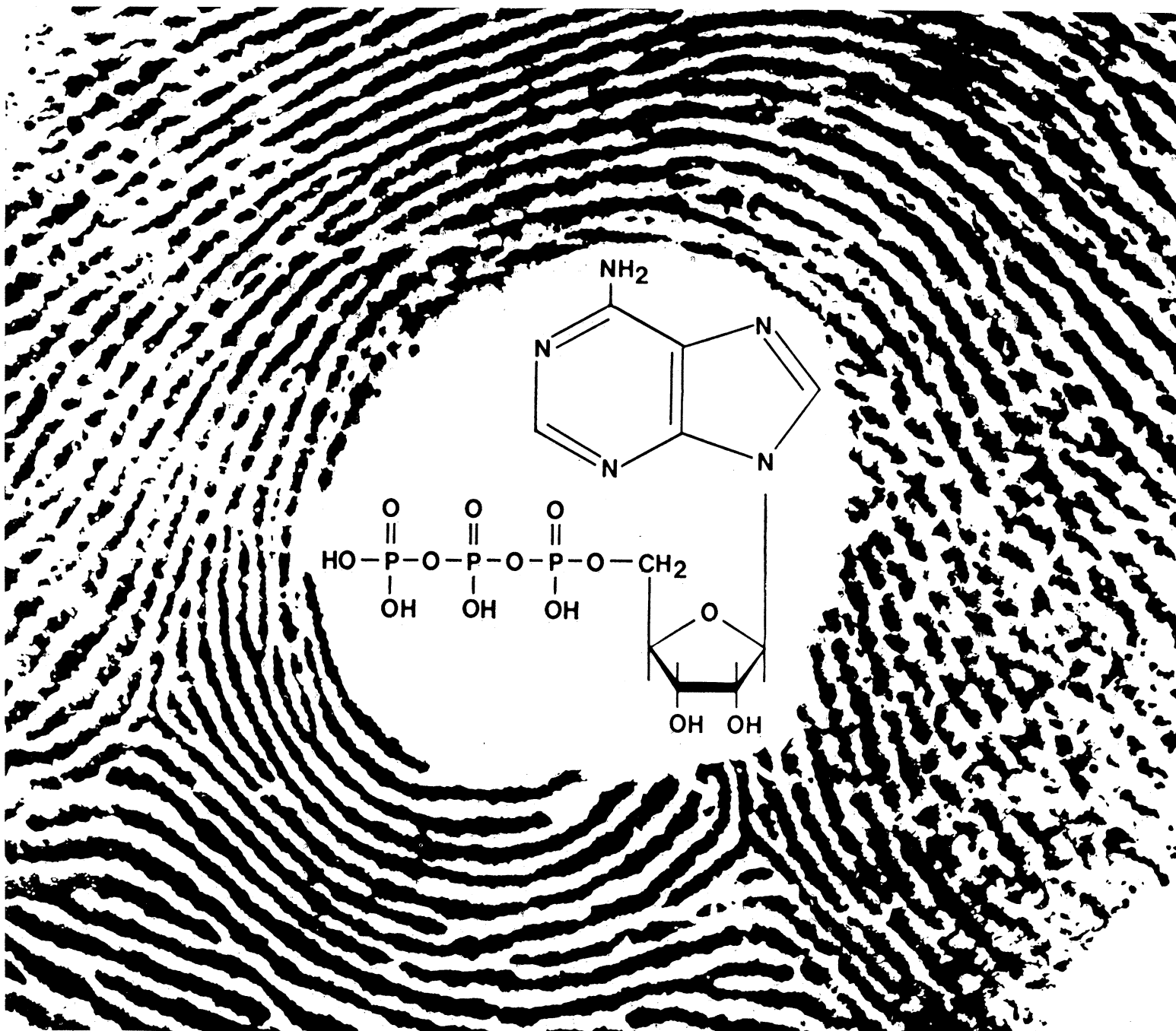
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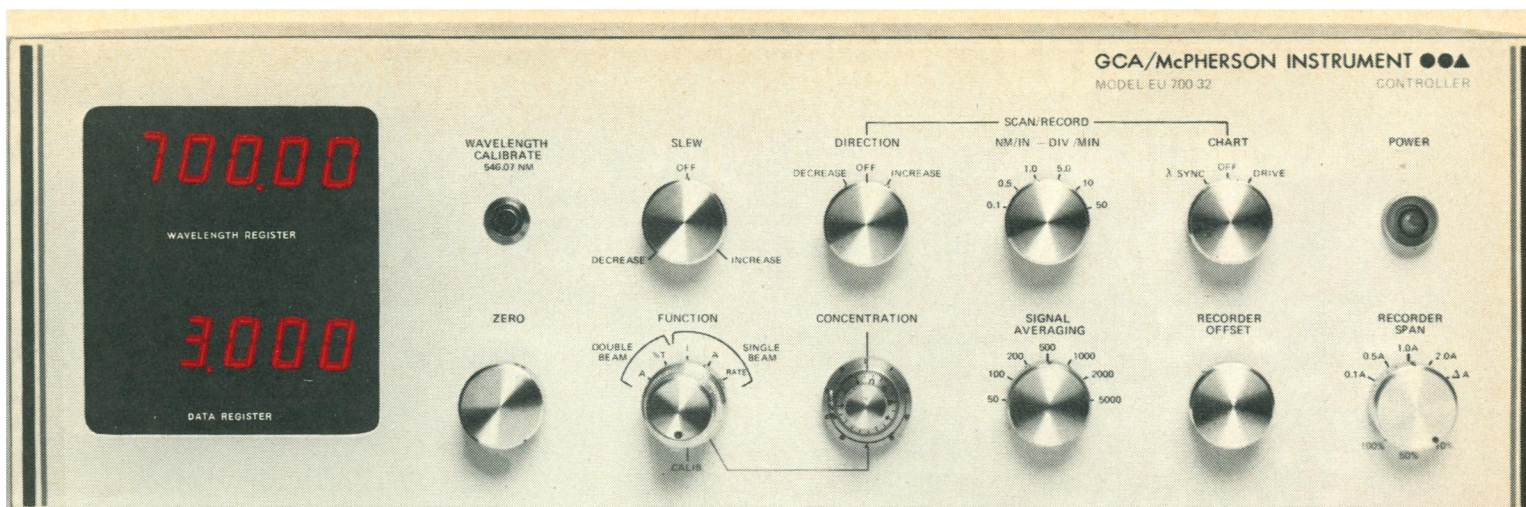
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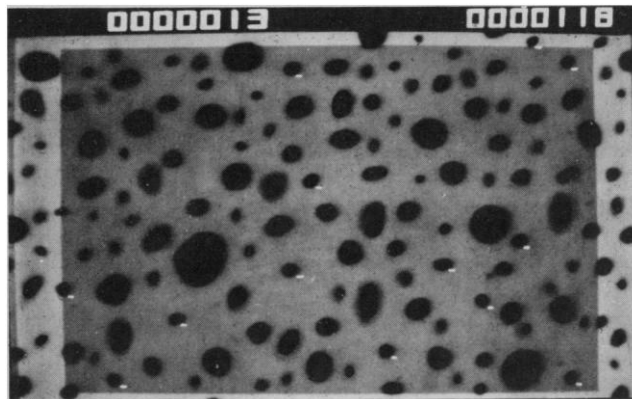
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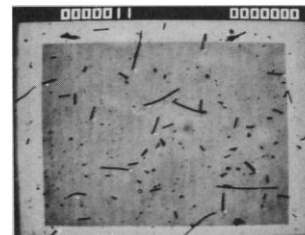
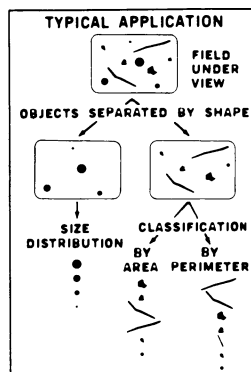
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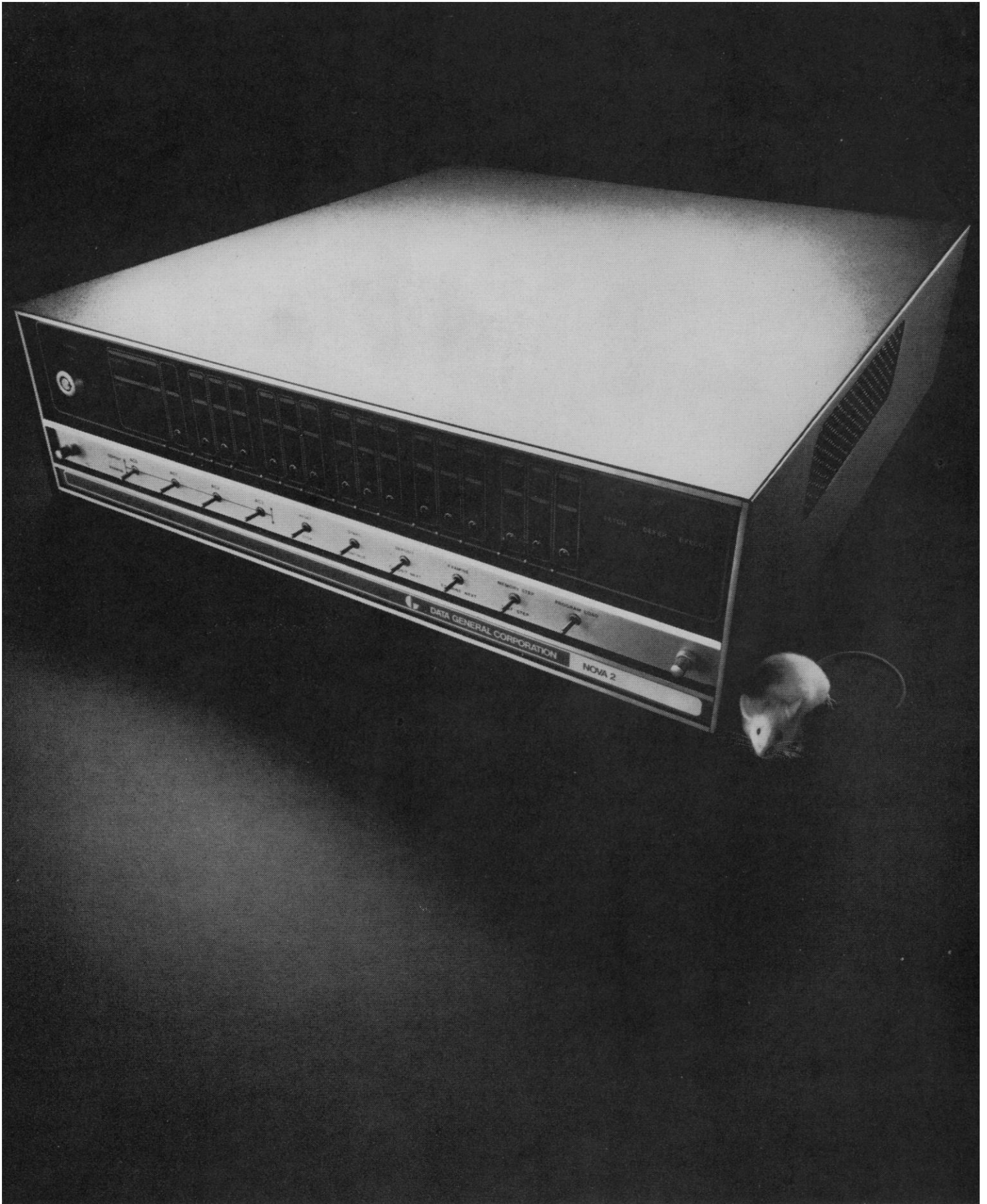
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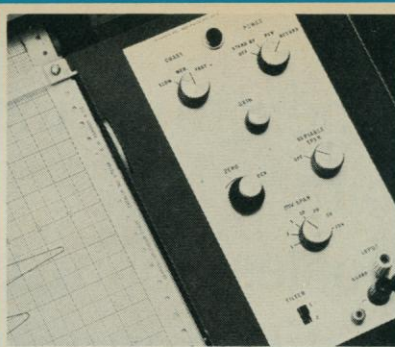
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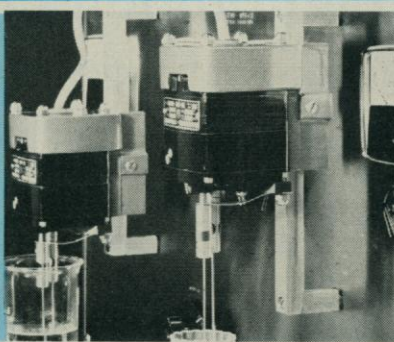
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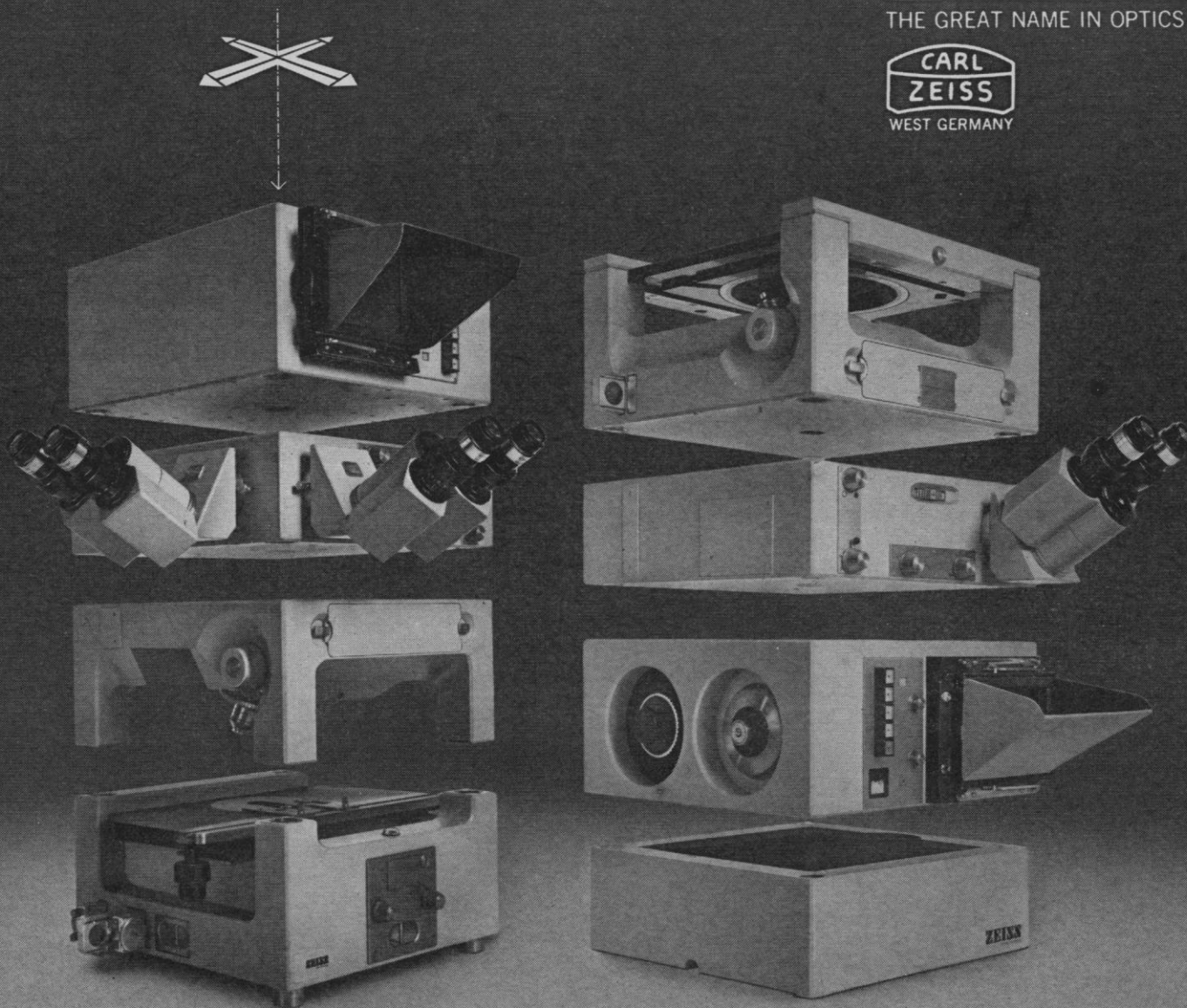
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Wildavsky's comment that technology assessment (TA) and other management information systems are being "established without a single successful demonstration, . . . are tried everywhere, and . . . do not work anywhere" triggers a question: How do we know whether or not TA works? I am troubled not so much by the performance of TA to date as by the dim prospects of rationally evaluating and improving performance in the future (1).

Such prospects would be enhanced by the performance of *multiple* (for example, three) TA's of given topics. Multiple TA's would enable comparison of usefulness to various parties, post hoc evaluation of the accuracy of forecasts, and estimation of the relative value per dollar invested—each as a function of who the assessors were, methods employed, and topics assessed. Users would be better able to gauge reliability and would be ensured a broader perspective.

While it has been asserted that a TA realistically costs about \$200,000 (2), the lack of TA evaluations makes it difficult to determine whether a project costing \$5,000 is less worthy than a

\$500,000 venture (3). Performance of multiple, coterminous TA's at different funding levels could clarify this issue. One could surmise that the cost would properly be a function of the technological complexity involved and the needs of the users.

ALAN L. PORTER

Program in Social Management of Technology, University of Washington, Seattle 98195

References

1. This relates to the basic question of social experimentation. See A. M. Rivlin, *Science* **183**, 35 (1974).
2. V. T. Coates, *Technology and Public Policy* (George Washington University, Washington, D.C., 1972), vol. 1, pp. 2-12.
3. This cost range is suggested in U.S. Senate, Committee on Rules and Administration, *Report on the Technology Assessment Act of 1972* (Government Printing Office, Washington, D.C., 1972), p. 21.

Exchanges with China

The informative article by Harrison Brown, "Scholarly exchanges with the People's Republic of China [PRC]" (11 Jan., p. 52), makes it clear that the Committee on Scholarly Communi-

cation has a tremendous task in the development of scientific exchanges between the United States and the PRC. As Brown states, the committee obviously cannot expedite exchanges in every field. However, I wonder about a system of priorities that resulted in the selection of a group of Americans to discuss the eradication of schistosomiasis, but not a group to discuss the eradication of venereal diseases.

Epidemic gonorrhea and communicable syphilis currently rank first and fourth, respectively, among reportable diseases in the United States, and the incidences are rising. It has been reported (1) that venereal diseases have, for all practical purposes, been eradicated in China. So far, there has been no evidence to refute such reports. Therefore it would seem that, in the order of priorities, one of the "particular areas in which Americans potentially have a great deal to learn from the Chinese" would be venereal disease control.

U. S. GRANT KUHN, III

*3355 Juhan Road,
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References

1. E. G. Dimond, *J. Am. Med. Assoc.* **218**, 1552 (1971).

I completely agree with Kuhn that the eradication of venereal disease in China is a great accomplishment. However, it may be attributed, not to advances in medical science unknown in the United States, but to China's very effective social mobilization and public education campaigns. The Committee on Scholarly Communication with the PRC has expressed considerable interest in sending scholars to China to study social organization in city neighborhoods and communes, but these programs have not yet been accepted by the PRC.

HARRISON BROWN

*Office of the Foreign Secretary,
National Academy of Sciences,
Washington, D.C. 20418*

Drug Education Conference

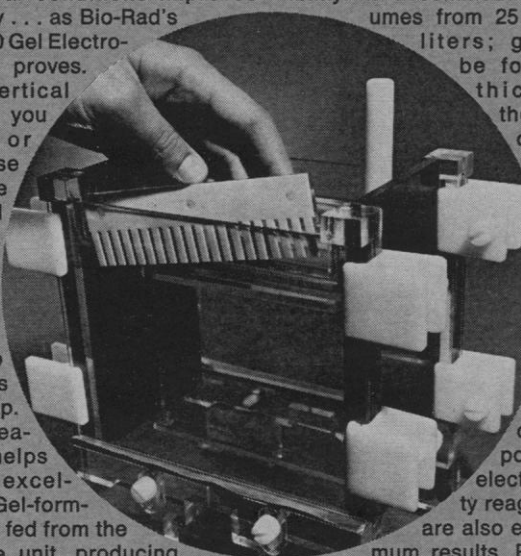
Nicholas Wade (News and Comment, 14 Dec. 1973, p. 1114) reports on a travel program which was presented to the participants of the International Congress on Drug Education, held in Montreux, Switzerland, in October 1973. This travel program, which

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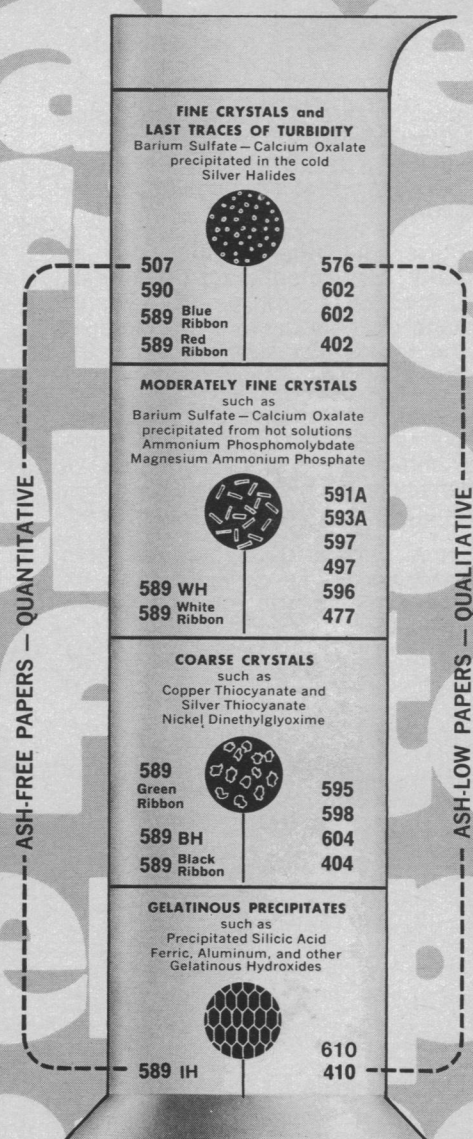
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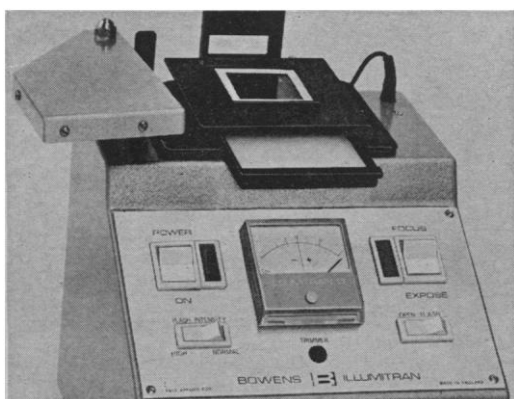
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is described as having been of inferior quality by Wade, offered absolutely everything to accommodate each participant at the lowest possible cost. The people responsible for the program provided more services than would be considered normal. Every individual received exactly what he paid for. The arrangements were clearly indicated and spelled out in the travel brochure received by the participants. Some people received what they did not pay for, since they left their hotels without checking with the cashier. Because prices were cut to the bone, it was not the U.S. taxpayer who was the "innocent victim" but the people in charge of the travel program.

Wade makes little mention of the scientific implications of this congress. Some leading industries apparently thought its value was great enough to underwrite the financial loss that resulted from insufficient participation.

CLAUDIUS A. CHORUS

*International Congress on Drug
Education, Secretariat, Rue de la
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Pathologic Evaluation and the Blind Technique

At the Conference on Carcinogenesis Testing in the Development of Drugs, held by the National Academy of Sciences-National Research Council (23 to 25 May 1973), Robert Elashoff suggested that, in carcinogenesis tests, the pathology slides should be sent to the pathologist blind (unidentified). Morris A. Weinberger (Letters, 23 July 1973, p. 219) comments on that suggestion.

While several of Weinberger's comments might be relevant to human pathology, Elashoff's suggestion referred to carcinogenesis testing with animals, and it is only in that context that we discuss Weinberger's letter.

A carcinogenesis test is performed in order to determine if a treated group is associated with a higher incidence of cancer than an untreated control group. The control group must be handled in exactly the same manner as the treated group. By sending unlabeled slides to the pathologist we ensure that the integrity of the control group is maintained during the pathologic evaluation.

Weinberger asserts that histopathologic diagnoses are considerably less influenced by subjective factors (for example, knowledge of the treatment given to each specimen) than by other factors. However, a carcinogenesis test is conducted to investigate carcinogenic properties of the treatment in question and not to determine the biases, no matter how small, of a particular pathologist. The prudent investigator should therefore give serious consideration to the blind technique as a means of avoiding errors associated with the influence of subjective factors.

The blind technique can be incorporated into most methods of evaluation. Weinberger points out that the pathologist often wants to review the control slides to establish a basis or orientation for the examination of the slides from the treated group. One method by which this could be done using the blind technique would be to make up extra control slides, select a portion of them by a random process, review these with full knowledge that they are control slides, and then put them aside; finally, the remaining treated and control slides could be examined in a random order using the blind technique. Thus, the pathologist's orientation would be established, and a reduction in bias would be achieved.

Weinberger implies that good pathology is objective. The good pathologist should therefore consider the blind technique as a simple means of control to help prevent systematic errors from being introduced when labeled slides are examined. He should also appreciate that use of the blind technique is an assurance of the lack of bias in the pathologic diagnosis made in an experiment.

There is nothing in the blind technique to preclude a pathologist's exploring "interesting new research clues," as Weinberger fears. Notes can be made on slides that show interesting or unusual findings. After the slides have been identified, the findings can be associated with the treatments received and the pathologist can explore his interests. By using the blind technique he may even avoid wandering down some blind alleys.

The blind technique does not require that the pathologist be kept ignorant of experimental information. Good pathology, like good statistics, requires that the professional partici-

pate extensively in all phases of the experiment. The only ignorance required when the blind technique is used is ignorance of the specific treatment given to the animal whose tissues are being examined.

Weinberger points out that bias can unconsciously creep into observations when the pathologist concentrates on treatment groups (overreading), and that a blind pathologic examination is a useful means to reduce this bias. We agree.

The real issue raised by Weinberger is whether the blind technique is worth the effort necessary for its proper implementation. We believe that the blind technique helps reduce bias and, in so doing, increases the repeatability of a study, protects those reading the slides from charges of bias, and increases the validity of the results. The blind technique is therefore worth a great deal of effort, but how much is too much? We look forward to elucidation of the conditions where blind techniques are important and where they are not important and to results of studies carried out partially with the blind technique and partially not. Such reports would help us and others make recommendations on protocol design in these large-scale animal studies. We also look forward to the development of any other techniques that reduce bias.

THOMAS R. FEARS

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The Confusion over Bacteriophage ϕ X-174

In 1935 Sertic and Boulgakov (1) analyzed a large number of *Enterobacteriaceae* phages and classified them into 14 antigenic types. They designated these types with the Roman numerals I through XIV. The lowercase Greek letter ϕ indicated that the phage was virulent for several bacterial species, and Arabic numbers identified the particular isolate. One of these phages, ϕ X-174, later became quite prominent in the field of molecular biology as a model virus containing single-stranded DNA, and a wave of papers emerged in the late 1950's (2). And that is when the real confusion started, because many workers in the field incorrectly called it

"phi ex," instead of "phi ten" as originally proposed by Sertic and Boulgakov (1). But to top off the confusion, a recent book (3) uses still another erroneous denotation ϕ X174 ("phi chi" 174). The symbols γ (4) and $\times$ (5) instead of Roman numeral ten have also been used in the past. I wonder how many new designations the ϕ X-174 phage may yet acquire, because of the unfortunate original choice of the Roman numeral ten and the carelessness of authors or printers.

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References

1. V. Sertic and N. Boulgakov, C. R. *Séances Soc. Biol. Fil.* 119, 826, 983, 985, 1270 (1935).
2. R. L. Sinsheimer, *J. Mol. Biol.* 1, 37, 43 (1959); A. W. Kozinski and W. Szybalski, *Virology* 9, 260 (1959).
3. R. D. Wells and R. B. Inman, Eds., *DNA Synthesis in Vitro* (University Park Press, Baltimore, Md., 1973).
4. P. Bonet-Maury and N. Boulgakov, C. R. *Séances Soc. Biol. Fil.* 138, 499 (1944).
5. C. Corno, R. Dettori, M. G. Neri, *G. Microbiol.* 17, 115 (1969).

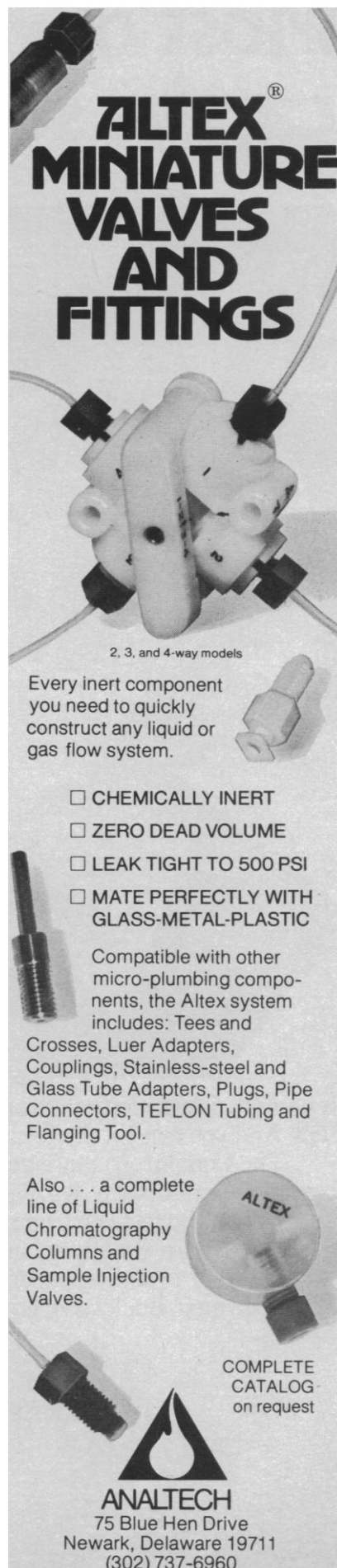
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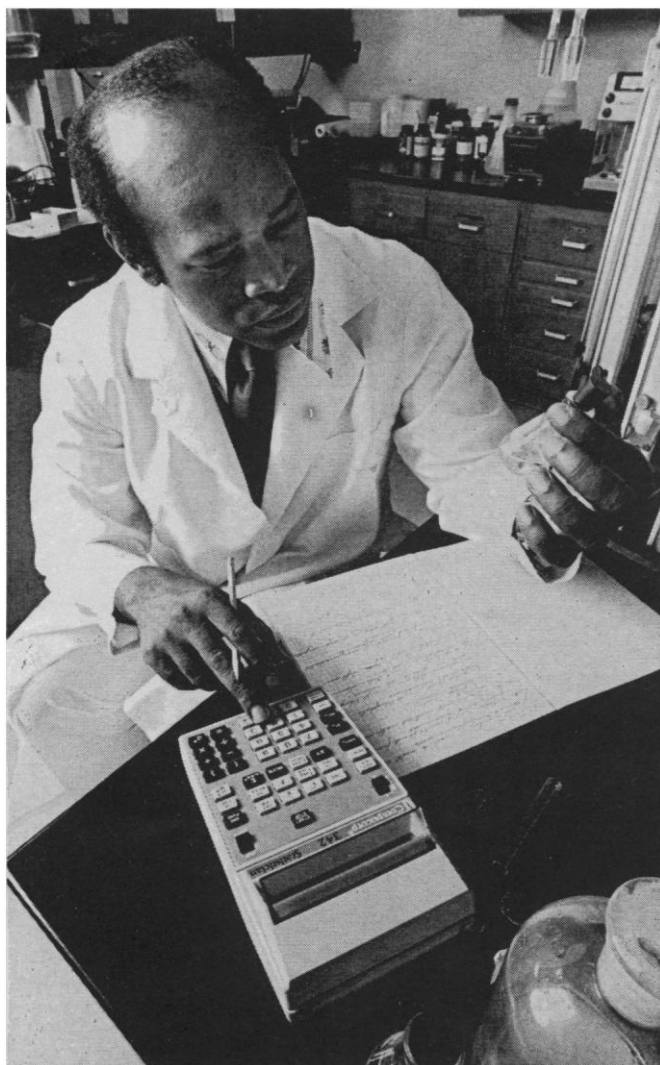
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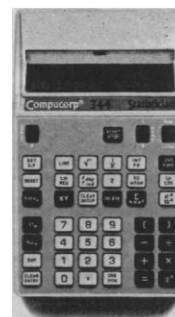
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Global Science Policy

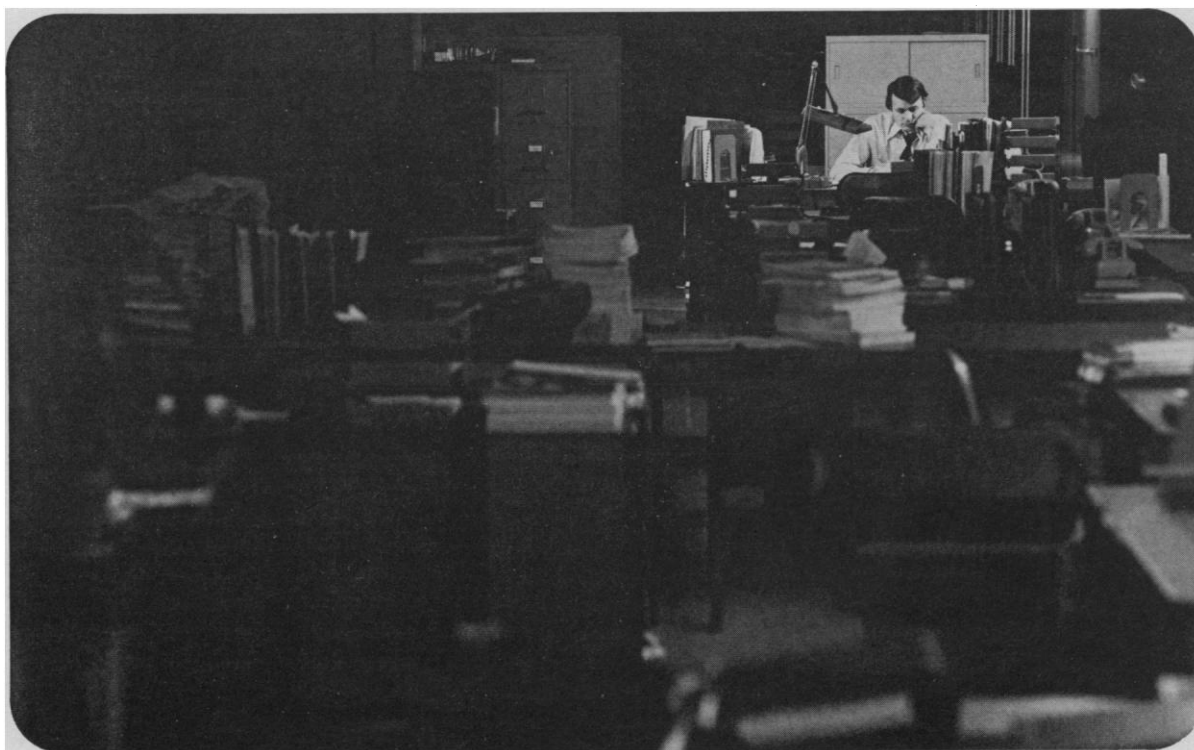
To suggest that world wisdom be incorporated into decisions about the directions and the uses of science and technology is like proposing that our modern gods be installed on Mount Olympus, with no assurance that they would better handle Prometheus or Pandora. Our predicament as mortals, however, compels the question of whether a global science policy—inside, outside, or in conjunction with the United Nations—is desirable, possible, or practical.

The Center for the Study of Democratic Institutions has broached the subject in a seminar reconnoitering the salient problems and pathways and looking for a detour around the roadblocks of national sovereignty, as exercised by 135 member states of the United Nations.

The seminar followed a report (U.N. E/5238 Add. 1) prepared for the secretary general of the United Nations on the role of science and technology in development during the past 27 years. That report on international cooperation in the handling of threats and opportunities created by science revealed, with encouraging exceptions, regrettable shortcomings. The one coherent institution we have—the United Nations—has never been given, nor has its specialized agencies been given, adequate money, high-caliber personnel, facilities, or authority. In the wake of each climacteric development, it has had to improvise and prompt from the wings. The present structure of the United Nations does not provide a nodal point for determining policy, either in terms of science and technology for development or for the development of science. The preoccupation has been with less developed countries, which at the moment are increasingly disenchanted by the nature of that aid because, having no scientific infrastructure, they could not properly evaluate the choices they were constrained to make. How they are going to be helped by shopping in what Lord Blackett called "the supermarket of science" needs rethinking. The advanced countries might wisely reflect in their national science policies a proper concern for the specific needs of those countries lacking scientific education or research facilities.

Whether a "global science policy" could ever be merely the sum of national science policies is questionable. "Global" is a carry-all word. It might imply "intergovernmental," but it also means developments in science that affect the whole of mankind and its living space and that are beyond the competence of a nation or nations, no matter how advanced. It also includes the "commonwealth of science"—the academies, the professional societies, and the movements like Pugwash, which are transnational instruments. That was why the rubric of the seminar was "inside, outside, or in conjunction with the United Nations." The term "science policy" raised questions of constraints on or control of science and technology. No one suggested that there could or should be a moratorium on scientific research, but a case can be made for establishing wise priorities in the technological use of scientific knowledge and, indeed, for offering caveats on trends in science that are raising profound ethical questions.

One structural proposal was that the now redundant Trusteeship Council be replaced by a Scientific Council on the level of the Security and Economic and Social Councils so that the issues would be aired and continually reviewed. At least the world ought to know what is going on.—The Right Honourable LORD RITCHIE-CALDER, *Senior Fellow, Center for the Study of Democratic Institutions, Box 4068, Santa Barbara, California 93103*



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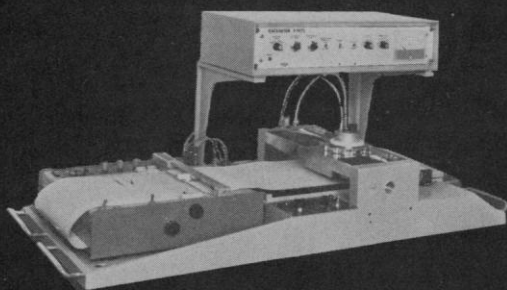
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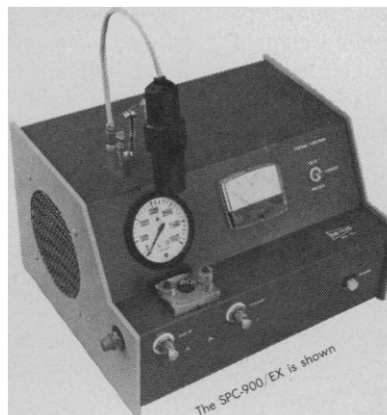
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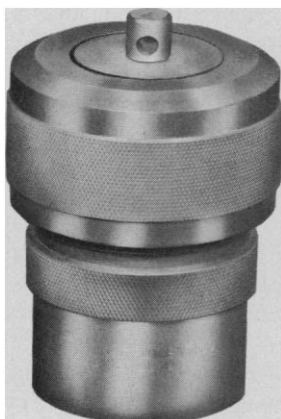
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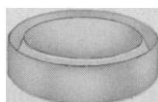
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SCIENCE, VOL. 183

carboxylic acid in vivo; rodents were unable to form the hydroxymethyl product. The metabolism of some drugs yielded multiple products. A good example is 17α -ethynylestradiol, which is converted to about eight different metabolites, varying markedly in relative amounts in rat and dog (beagle). One product, *d*-homoestrone, was formed by dog, but not by rat, liver microsomes.

Studies of drug interactions continue to yield important information. Drugs like ephedrine were shown to speed the rate of blood clearance of other drugs like dexamethasone, possibly by altering its rate of biotransformation. Other drugs have similar effects but may act, like phenobarbital, by altering hepatic blood flow. Phenobarbital was reported to increase hepatic blood flow up to 30 percent, thereby increasing hepatic drug clearance and altering body distribution and metabolism of almost any drug present in the patient's blood.

The importance of knowing all drug metabolites and their biological significance was stressed by many studies. Overdoses of glutethimide, for example, caused toxic manifestations that did not correlate well with the concentrations of glutethimide in the plasma. Upon examination, it was found that a hydroxy metabolite is formed, with a potency twice that of the parent drug. It can reach much higher concentrations than those of glutethimide when large doses are administered, thereby causing toxic manifestations. However, when normal doses are given, the concentrations of the metabolite are very low.

The objective of clinical pharmacology and toxicology is better patient care. Research efforts in this area are directed toward improving the safety of drugs by recognizing and eliminating the causes of undesirable drug effects. In addition, biochemical studies of pathways of drug metabolism have generated ingenious new treatments for previously untreatable diseases.

Immunoglobulin D antibodies to penicillin may be important mediators of nonanaphylactoid but serious reactions to penicillin, such as exfoliative dermatitis, serum sickness, and the potentially fatal Stevens-Johnson syndrome, according to J. R. Caldwell (University of Florida).

Hematologic toxicity has severely limited the use of chloramphenicol, an otherwise effective antibiotic. Adel A.

Yunis (University of Miami) and his colleagues have studied the reversible and irreversible effects of this drug on bone marrow cultures. Chloramphenicol and its sulfur-containing analog exert a dose-related but reversible suppression of bone marrow cells by inhibiting synthesis of mitochondrial proteins. An irreversible suppression of mitochondrial protein synthesis in bone marrow cells is thought to be caused by an alteration of DNA synthesis in genetically predisposed patients that is caused by the para-nitro group of chloramphenicol.

Treatment for the porphyrias in man has been lacking. T. R. Tephly (University of Iowa) and his colleagues reported results of research that may lead to the prevention of serious and painful attacks of this disease. Metabolic studies have indicated that all porphyrias are associated with a derangement of the heme biosynthetic pathway. This results in an accumulation of various intermediates instead of the end product, which should be hemo-protein. Using sodium benzoate and para-aminobenzoic acid, Tephly and his associates diverted glycine away from heme biosynthesis to hippurate synthesis. The clinical and biochemical manifestations of porphyria in animals were thus ameliorated. Both sodium benzoate and para-aminobenzoic acid have been safely used in humans for other disorders. Based on a firm biochemical foundation, this clever and apparently safe pharmacologic method of control of porphyria may soon be used to treat humans.

This was a unique symposium in that all of the research was supported by grants from the Pharmacology-Toxicology Program of the National Institute of General Medical Sciences.

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Forthcoming Events

April

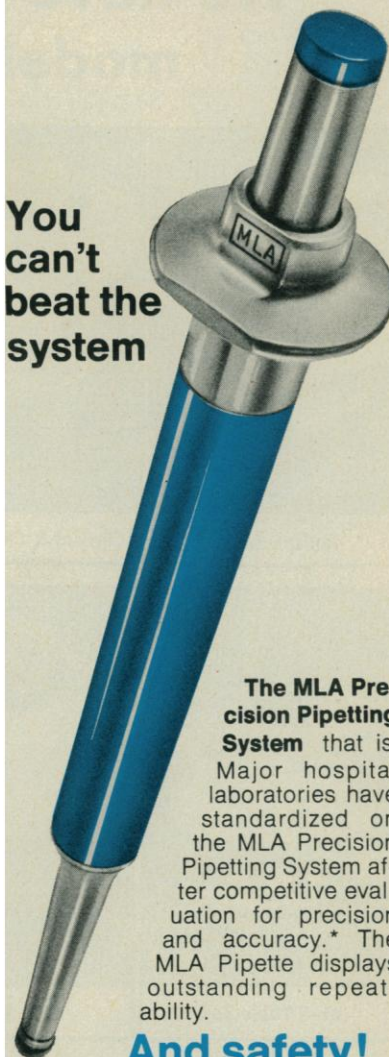
22-25. American Acad. of **Pediatrics**, Bal Harbour, Fla. (R. G. Frazier, 1801 Hinman Ave., Evanston, Ill. 60204)

22-26. Conference on **Anomalous Scattering**, Intern. Union of Crystallography and Commission on Crystallographic Apparatus, Madrid, Spain. (S. C. Abrahams, Bell Labs., Murray Hill, N.J. 07974)

22-26. European Conf. on **Electrotechnics**, Inst. of Electrical and Electronics Engineers and Natl. Societies of Electrical

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23-24. **Water Quality**, 7th intern. symp., Water Quality Research Council, Washington, D.C. (David X. Manners Co., Inc., 237 E. Rocks Rd., Norwalk, Conn. 06851)

23-25. Society for the **Advancement of Material and Process Engineering**, 19th natl. symp., Buena Park, Calif. (M. Smith, SAMPE, P.O. Box 613, Azusa, Calif. 91702)

23-26. **Acoustical Soc. of America**, New York, N.Y. (B. H. Goodfriend, ASA, 335 E. 45 St., New York 10017)

23-27. **Arizona Medical Assn.**, Scottsdale. (B. E. Robinson, AMA, 810 W. Bethany Home Rd., Phoenix 85013)

24-26. **Pittsburgh Conf. on Modeling and Simulation**, 5th annual, Pittsburgh, Pa. (W. G. Vogt, 231 Benedum Engineering Hall, Univ. of Pittsburgh, Pittsburgh 15213)

24-26. **North Carolina Acad. of Science**, Boone. (J. A. Yarbrough, Dept. of Biology, Meredith College, Raleigh, N.C. 27602)

24-27. **American Assoc. for the Advancement of Science**, Southwestern and Rocky Mountain Div., Laramie, Wyo. (M. P. Dunford, P.O. Box 3AF, Las Cruces, N.M. 88003)

24-27. **Biological Rhythms in the Marine Environment Symp.**, Georgetown, S.C. (P. J. DeCoursey, Baruch Inst., Univ. of South Carolina, Columbia 29208)

25-26. **American Broncho-Esophagological Assoc.**, Palm Beach, Fla. (W. H. Maloney, ABEA, 2065 Adelbert Rd., Cleveland, Ohio 44106)

25-27. **Ohio Acad. of Science**, Wooster. (J. H. Melvin, OAS, 445 King Ave., Columbus 43201)

25-27. **Louisiana Acad. of Sciences**, Lafayette. (R. Smith, Dept. of Physics, Northeast Louisiana Univ., Monroe 71201)

25-29. **Association for Research in Vision and Ophthalmology**, Dallas, Tex. (R. D. Reinecke, Dept. of Ophthalmology, Albany Medical College, Albany, N.Y. 12208)

26-27. **Georgia Acad. of Science**, Valdosta. (G. Koch, Dept. of Geology, Univ. of Georgia, Athens 30601)

26-27. **Iowa Acad. of Science**, Fayette. (R. W. Hanson, Dept. of Chemistry, Univ. of Northern Iowa, Cedar Falls 50613)

26-27. **Missouri Acad. of Science**, Maryville. (R. G. Combs, 206 Electrical Engineering Bldg., Univ. of Missouri, Columbia 65201)

26-27. **North Dakota Acad. of Science**, Fargo. (A. W. Johnson, P.O. Box 8123, University Station, Grand Forks 58201)

26-27. **Wisconsin Acad. of Sciences, Arts and Letters**, Green Bay. (J. R. Batt, WASAL, 5001 University Ave., Madison 53706)

26-27. **American Assoc. of University Professors**, Washington, D.C. (B. H. Davis, AAUP, Suite 500, 1 Dupont Circle, NW, Washington, D.C. 20036)

26-28. **National Assoc. for Research in Science Teaching**, Chicago, Ill. (R. W. Lefler, Dept. of Physics, Purdue Univ., Lafayette, Ind. 37907)

26-28. **International Symp. on the**

SCIENCE, VOL. 183



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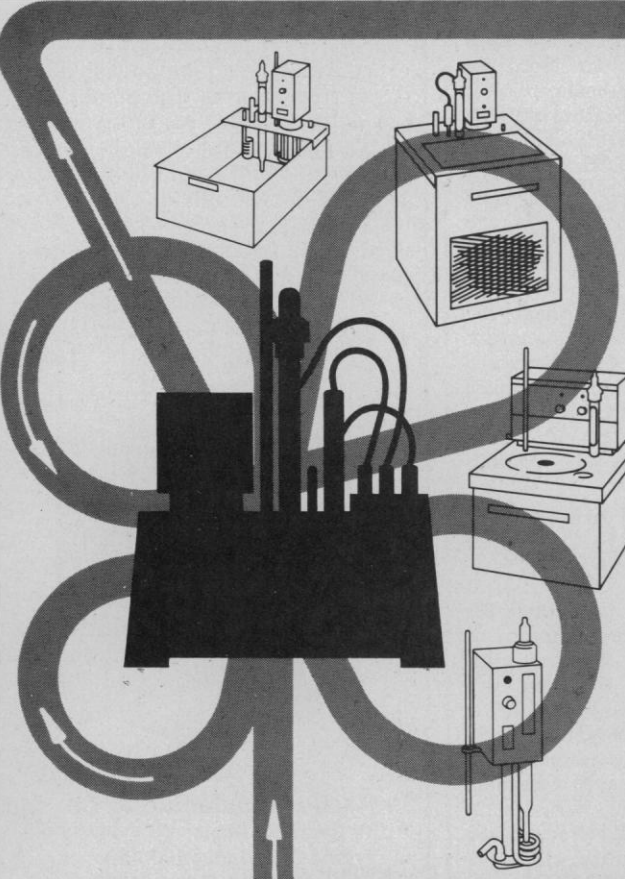
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27-3. American **Pediatric Soc.**, Washington, D.C. (C. D. Cook, Yale Univ. School of Medicine, 333 Cedar St., New Haven, Conn. 06510)

28-1. Association of **American Geographers**, Seattle, Wash. (J. W. Nystrom, AAG, 1710 16th St., NW, Washington, D.C. 20009)

28-1. Institute of **Environmental Sciences**, 20th annual, Washington, D.C. (B. L. Peterson, IES, 940 E. Northwest Highway, Mount Prospect, Ill. 60056)

28-1. **Arkansas Medical Soc.**, Little Rock. (P. C. Schaefer, AMS, P.O. Box 1208, Fort Smith 72901)

28-1. **Nebraska Medical Assoc.**, Omaha. (K. E. Neff, 1901 First National Bank, Lincoln 68508)

28-2. American **Ceramic Soc.**, 76th annual, Chicago, Ill. (F. P. Reid, ACS, Inc., 65 Ceramic Dr., Columbus, Ohio 43214)

28-2. **Diesel and Gas Engine Power Conf.**, American Soc. of Mechanical Engineers, Houston, Tex. (M. Churchill, ASME, 345 E. 47 St., New York 10017)

28-2. American **Oil Chemists' Soc.**, Mexico City, Mexico. (J. C. Lyon, AOCs, 508 S. 6 St., Champaign, Ill. 61820)

28-3. Society of **Photographic Science and Engineering**, 27th annual, Boston, Mass. (R. A. Eynard, SPSE, P.O. Box 2001, Teterboro, N.J. 07608)

29-30. **Ambulatory Pediatric Assoc.**, Washington, D.C. (E. Hillman, Montreal Children's Hospital, 2300 Tupper St., Montreal 108, Canada)

29-1. Institute of **Electrical and Electronic Engineers** and Intern. Soc. for **Hybrid Microelectronics**, Orlando, Fla. (C. E. Jones, Mail Joint 47, Martin Marietta Corp., P.O. Box 5837, Orlando 32805)

29-1. American **Power Conf.**, American Soc. of Mechanical Engineers, Chicago, Ill. (M. Churchill, ASME, 345 E. 47 St., New York 10017)

29-2. American College of **Obstetricians and Gynecologists**, Las Vegas, Nev. (M. Newton, 1 E. Wacker Dr., Chicago, Ill., 60601)

29-2. **Physical Organic Chemistry**, 2nd Conf., Intern. Union of Pure and Applied Chemistry, Noordwijkerhout, Netherlands. (Th. J. de Boer, Lab. for Organic Chemistry, Nieuwe Achtergracht 129, Amsterdam, Netherlands)

29-3. Society of **Manufacturing Engineers**, Philadelphia, Pa. (R. W. Taylor, SME, 20501 Ford Rd., Dearborn, Mich. 48128)

29-3. American Assoc. of **Workers for Children**, 8th congr., Intern. Assoc. of Workers for Maladjusted Children, Fribourg, Switzerland. (S. B. Ross, Jr., AAWC, 26 E. 31 St., New York 10016)

30. American Assoc. of **Scientific Workers**, New York, N.Y. (I. Goodman, College of Physicians & Surgeons, Columbia Univ., 630 W. 168 St., New York 10032)

30-2. Conference on **Electrodeposited Metallic Coatings**, American Soc. for Testing and Materials, Philadelphia, Pa. (J. McFadden, ASTM, 1916 Race St., Philadelphia 19103)

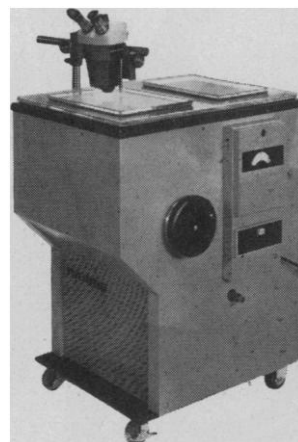
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30-2. Connecticut State **Medical Soc.**, Hartford. (W. R. Richards, 160 St. Ronan St., New Haven 06511)

30-3. Virginia Acad. of **Science**, Norfolk, Va. (B. M. Bruner, Box 8454, Richmond 23226)

30-4. Mexican **Pediatric Assoc.**, 4th, Mexico City. (G. S. Santibanez, José Ma Izizaga 70, 2° Piso, Mexico 1, D.F.)

May

1-3. Conference on **Metal Powders and Metal Powder Products**, Committee B-9, American Soc. for Testing and Materials, Fort Lauderdale, Fla. (J. McFadden, Meetings Dept., ASTM, 1916 Race St., Philadelphia, Pa. 19103)

1-3. American **Surgical Assoc.**, Colorado Springs, Colo. (G. T. Shires, ASA, 5323 Harry Hines Blvd., Dallas, Tex. 75235)

1-3. International Conf. on **Transport of Persistent Chemicals in Aquatic Ecosystems**, Natl. Research Council of Canada, Ottawa. (M. K. Ward, Natl. Research Council of Canada, Ottawa K1A 0R6)

1-4. International Symp. on **Flammability and Fire Retardants**, Cornwall, Ont., Canada. (V. M. Bhatnagar, 209 Dover Rd., Cornwall, Ont.)

1-6. American **Psychoanalytic Assoc.**, Detroit, Mich. (M. A. Berezin, 90 Forest Ave., West Newton, Mass. 02165)

2-3. **Fiber Soc., Inc.**, Williamsburg, Va. (L. Rebenfeld, Textile Research Inst., P.O. Box 625, Princeton, N.J.)

2-3. American Soc. of **Naval Engineers**, Washington, D.C. (ASNE, Suite 807, 1012 14th St., NW, Washington, D.C. 20005)

2-4. Society for American **Archaeology**, Washington, D.C. (R. E. W. Adams, College of Humanities and Social Sciences, Univ. of Texas, 4242 Piedras E, San Antonio 78284)

2-4. **Midwestern Psychological Assoc.**, Chicago, Ill. (R. W. Schulz, Dept. of Psychology, Univ. of Iowa, Iowa City 52240)

2-5. Christian **Medical Soc.**, Ann Arbor, Mich. (H. W. Robinson, CMS, 3909 Swiss Ave., Dallas, Tex. 75214)

2-6. North Dakota **Medical Assoc.**, Fargo. (L. A. Limond, Box 1198, Bismarck, N.D. 58501)

3-4. American College of **Clinical Pharmacology**, Atlantic City, N.J. (W. D. Sharpe, ACCP, 100 Bergen St., Newark, N.J. 07103)

3-4. **Drug-Induced Carcinogenesis Symp.**, American College of Clinical Pharmacology, Atlantic City, N.J. (ACCP, 2 E. 103 St., New York 10029)

3-4. Minnesota Acad. of **Science**, St. Paul. (M. I. Harrigan, MAS, 3100 38th Ave., S, Minneapolis 55406)

3-4. Southern California Acad. of **Sciences**, Fullerton. (S. L. Warter, Dept. of Biology, California State Univ., Long Beach 90840)

3-5. American Soc. of **Internal Medicine**, San Francisco, Calif. (W. R. Ramsey, ASIM, 525 Hearst Bldg., 3rd at Market, San Francisco 94103)

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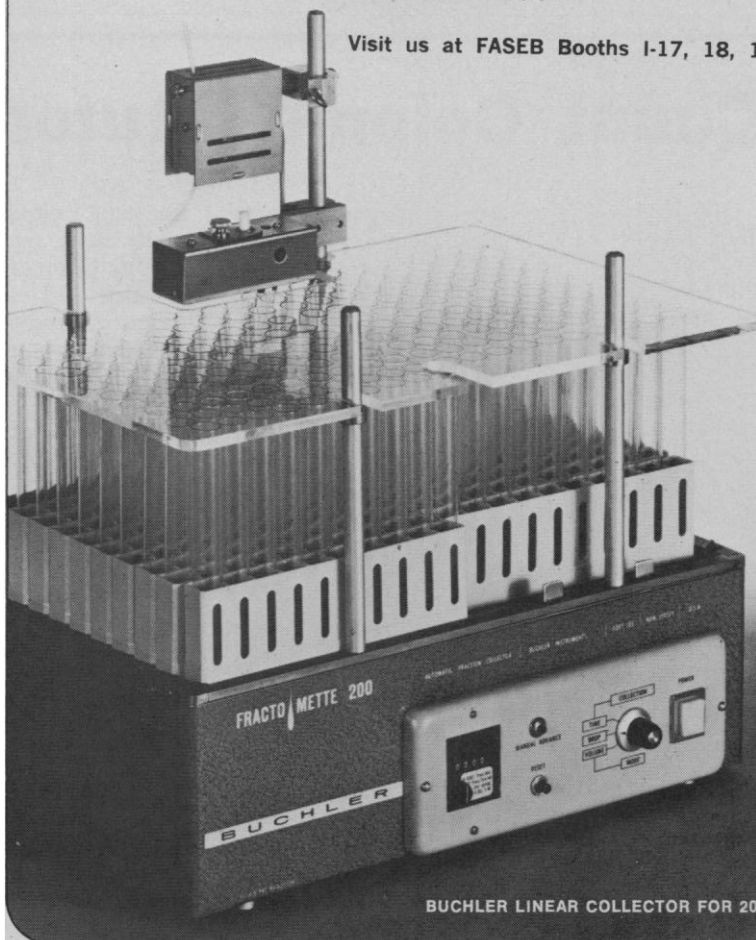
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