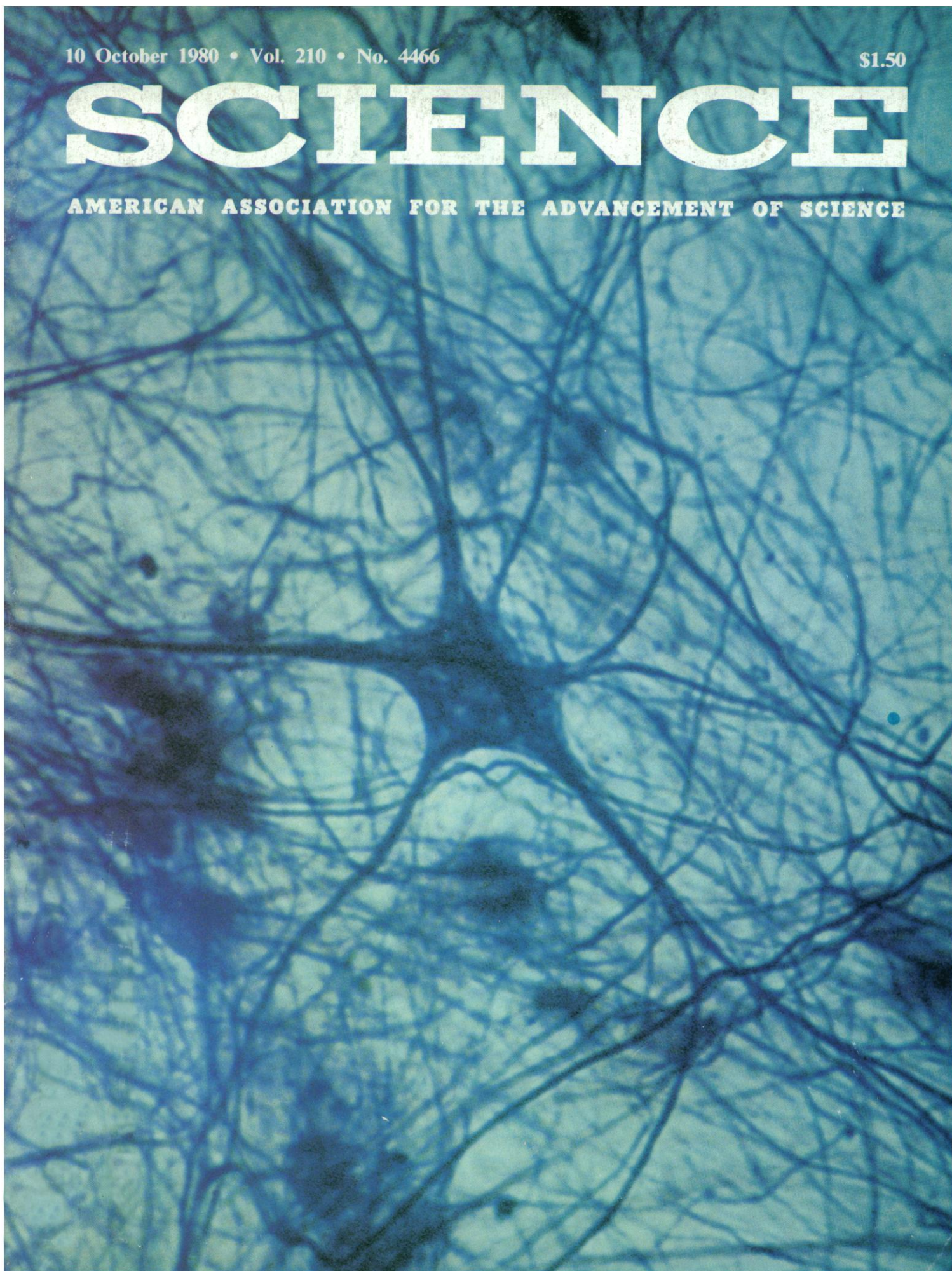


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SCIENCE is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. Second-class postage (publication No. 484460) paid at Washington, D.C., and at an additional entry. Now combined with *The Scientific Monthly*. Copyright © 1980 by the American Association for the Advancement of Science. Domestic individual membership and subscription (51 issues): \$38. Domestic institutional subscription (51 issues): \$76. Foreign postage extra: Canada \$14, other (surface mail) \$17, air-surface via Amsterdam \$45. First class, airmail, school-year, and student rates on request. Single copies \$1.50 (\$2 by mail); back issues \$2.50 (\$3 by mail); classroom rates on request. Change of address: allow 6 weeks, giving old and new addresses and seven-digit account number. Postmaster: Send Form 3579 to *Science*, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.



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## COVER

Photomicrograph of a mature multipolar neuron surrounded by axonal and dendritic processes of additional neurons in a 22-day-old explant culture of mouse cephalic tissue taken at 11 days' gestation (stained by silver-impregnation method of Bodian, about  $\times 750$ ). See page 190. [J. Sotelo *et al.*, National Institutes of Health, Bethesda, Maryland]

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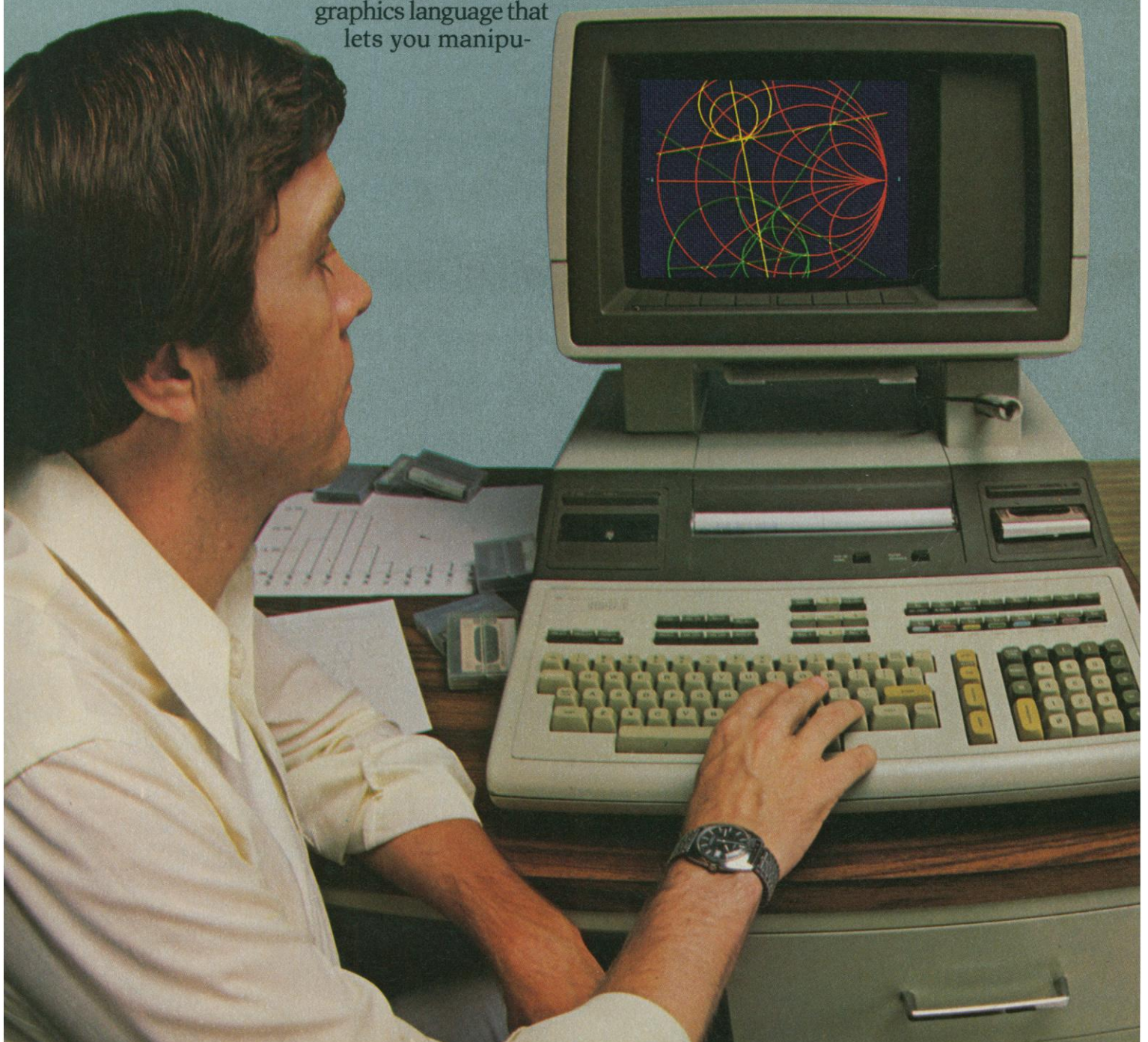
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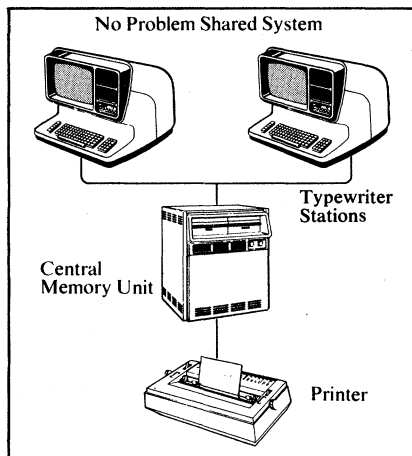


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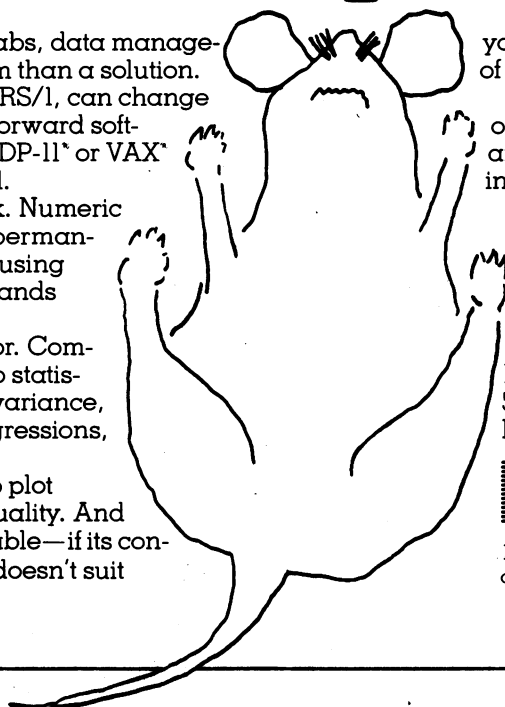
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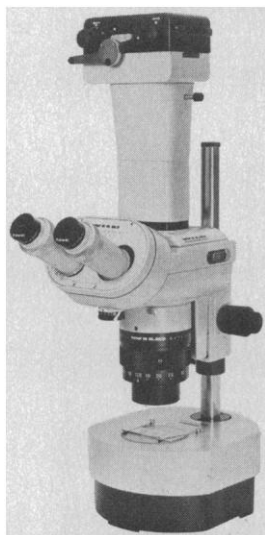


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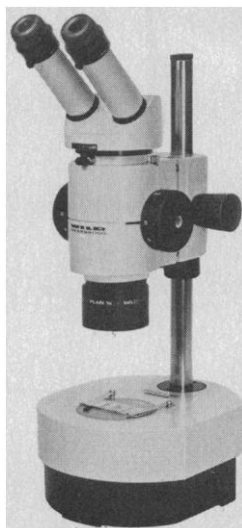
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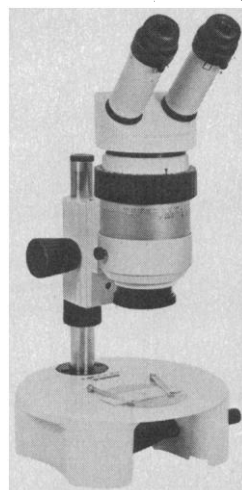
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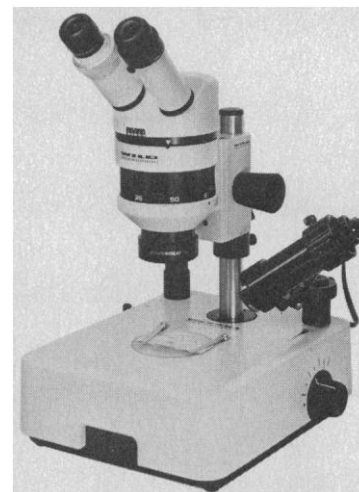


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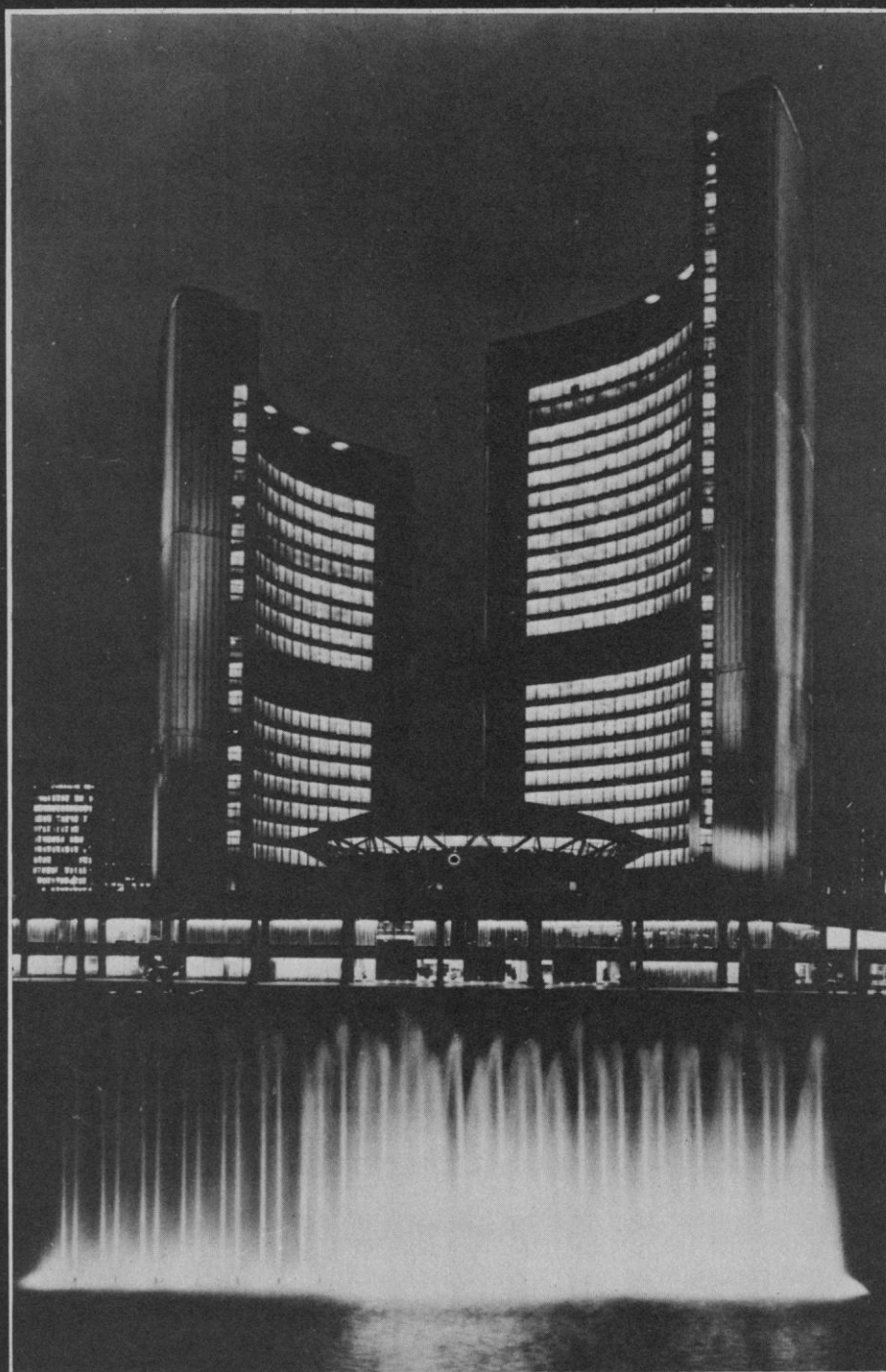
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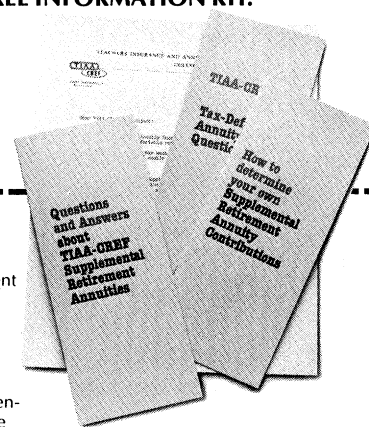
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### LETTERS

#### Cryptography Research Funding

I believe it is necessary to correct some misconceptions about the acts of the National Security Agency (NSA) as described in the article "Cryptography: A new clash between academic freedom and national security" (News and Comment, 29 Aug., p. 995).

NSA, as the primary user of cryptography and research in cryptography in the government, is increasingly interested in investing in primary research in cryptography as well as related fields, such as mathematics. Up to now this effort has been by means of entering into contracts with companies and institutions, although we are hoping to expand our efforts to include grants for significant primary research. This effort is meant in no way to supersede or freeze out any other funding mechanisms for research in cryptography.

In particular, although NSA has provided assistance to the National Science Foundation (NSF) for the last few years in evaluating research proposals in cryptographic areas, NSA does not now have and does not intend to seek the authority to prohibit NSF funding in this area. We do hope, however, that NSA will become an increasingly important sponsor of research in this area in addition to other sources of financing currently available.

I anticipate that the results of most of the research funded by NSA will raise no direct questions of national security and could be published and otherwise publicly released. On occasion, because of the nature of cryptographic materials and of the work done by NSA, it may be necessary to classify resulting publications because of their impact on the national security. We are currently working out the procedures for such classification, which I hope would permit sufficient channels of review and appeal to assure the researchers working with NSA that the agency is not acting arbitrarily with regard to classification. Such mechanisms for review and classification are commonplace to anyone who has worked under contracts or grants for the Department of Defense. I have asked Leonard Adleman and Ronald Rivest for their views on how such mechanisms should work, and I would hope that satisfactory procedures can be developed.

B. R. INMAN

National Security Agency,  
Fort George G. Meade,  
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Recent articles in *Science* about the potentially chilling effect of prior restraint on cryptographic and related research fields suggest impacts that could extend far beyond the comparatively narrow concerns of security, federal research funding, and academic tenure. One commentator is quoted (29 Aug., p. 995) as having said he believes a leading NSA figure in the dispute really does not "understand how the university and academic community works." There now may be sufficient cause to wonder if some NSA members understand how security works.

For the sake of argument one could well imagine that another nation's security service would be most pleased to champion the cause of prior restraint on cryptographic research in the United States on the grounds that it would

1) Hamper our scientists' capacity and willingness to undertake some aspects of basic research in such vital areas as mathematics, information science, and artificial intelligence.

2) Decrease the probability that U.S. scientists would appreciate the potential cryptographic significance of scientific work in other countries.

3) Diminish the incentive for research in the private sector by discouraging U.S. computer and communications manufacturers from developing cryptographic hardware and software to meet the growing private demand. This in turn would seriously compromise their ability to compete in international and domestic markets with foreign manufacturers who would be unrestricted by NSA policy. Conceivably, NSA might soon have to purchase its own cryptographic hardware from, say, Japanese manufacturers.

4) Perpetuate an anachronism of the 19th-century diplomacy of sealed royal letter boxes whose keys are worn around the necks of foreign ministers. Restricting cryptographic traffic and methodology to a security elite serves only to narrow sharply the focus of would-be interceptors and decipherers.

It is unfortunate that, in the extensive literature on cryptography, security, privacy, and related matters, surprisingly little appreciation is shown for the potentially positive applications of these functions. Only recently, through advances in electronic computation and communication, has it been feasible to explore the rewarding applications of truly anonymous information-gathering: protecting the rights of experimental subjects; facilitating anonymous peer review; enhancing scientific communication; and pre-



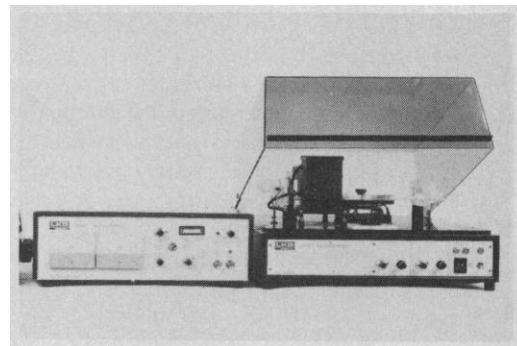
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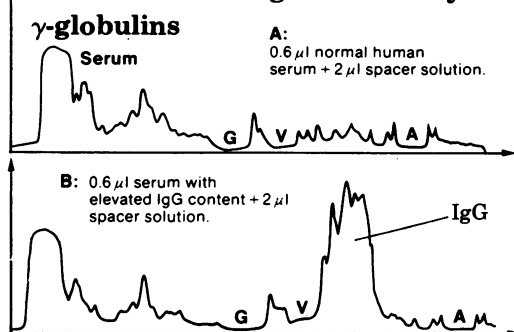
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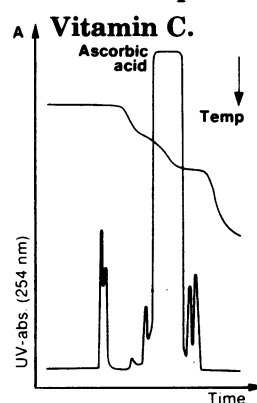


Analysis of  $\gamma$ -globulins related to neurological disease as in e.g. Multiple Sclerosis. The speed of assay and provision of quantitative information makes isotachophoresis superior.

#### Reference

Delmotte, P., Science Tools 24 (1977) 33–41.

### Analyze the sample without pretreatment.

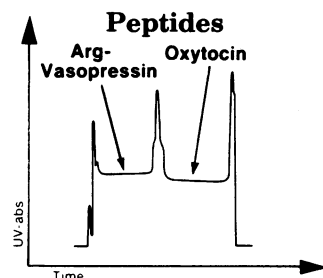


Analysis of vitamin C in 1.6  $\mu$ l of a commercially-available orange juice; the juice was analysed directly from the container, *without any pretreatment*. Analysis time: 12 minutes! Other acids of interest in the juice can be analysed simultaneously.

#### Reference

Baldesten, A., Hjalmarsson, S-G and Neumann, G., Fres. Z. Anal. Chem. 290 (1978) 148–149.

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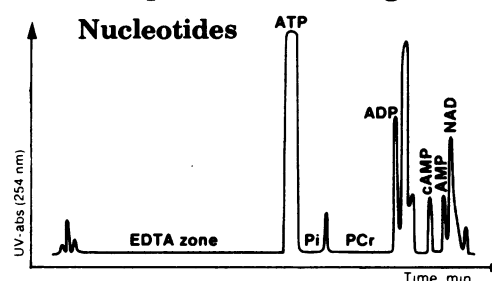


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LKB Isotachophoresis News IN 2 (1977)

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Gower, D.C. and Woledge, R.C., Science Tools 24 (1977) 17–21.

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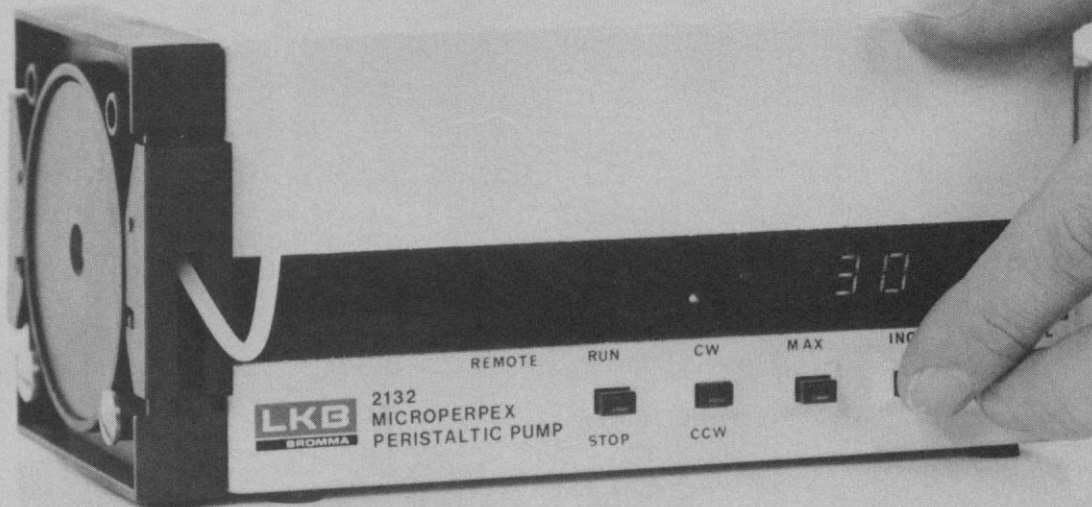
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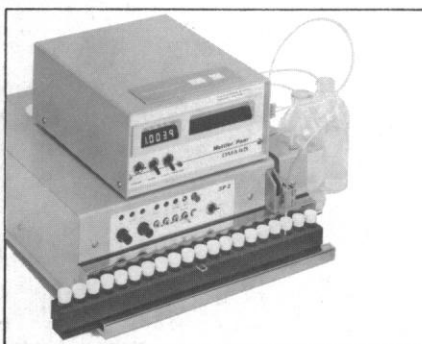
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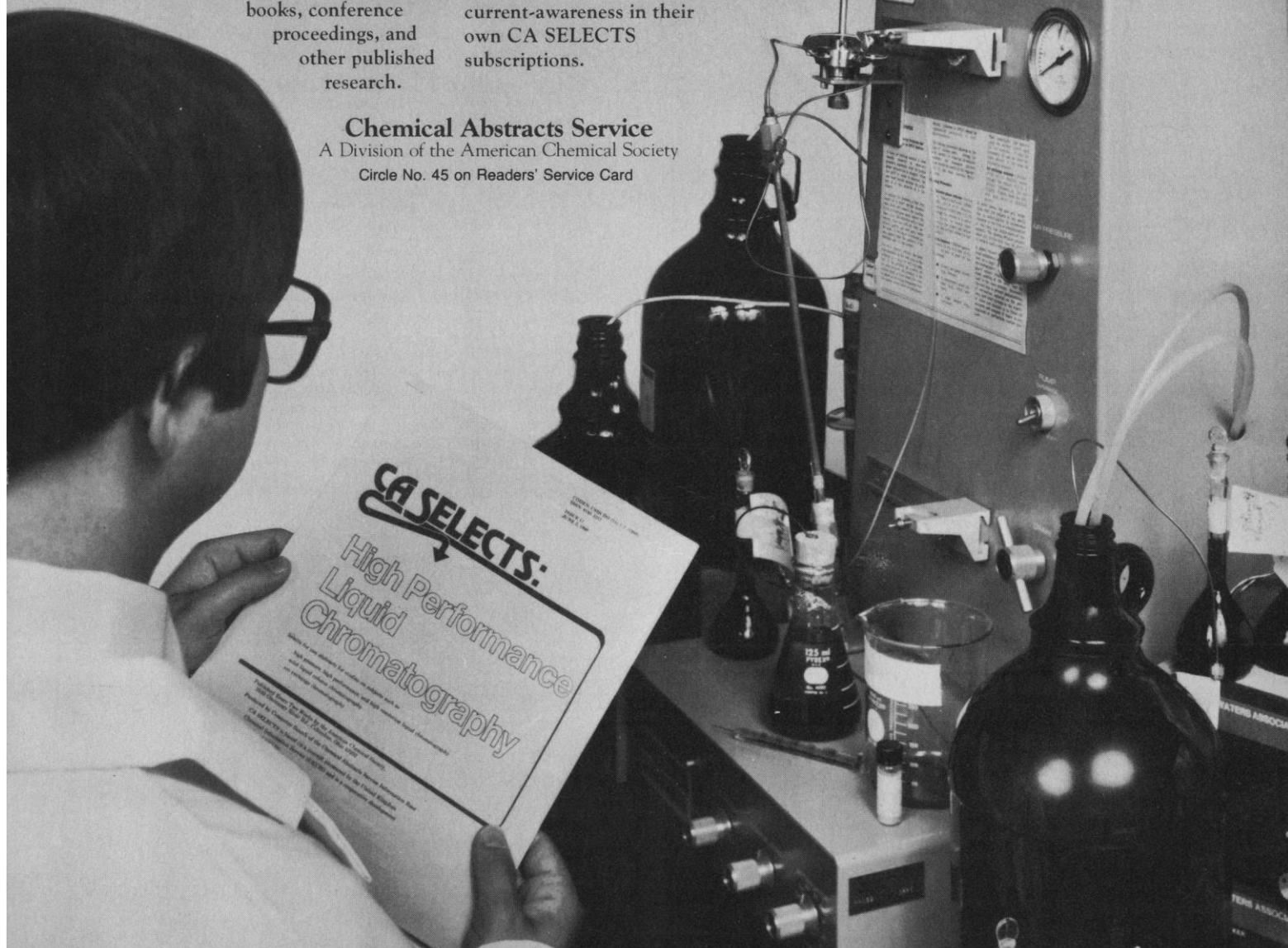
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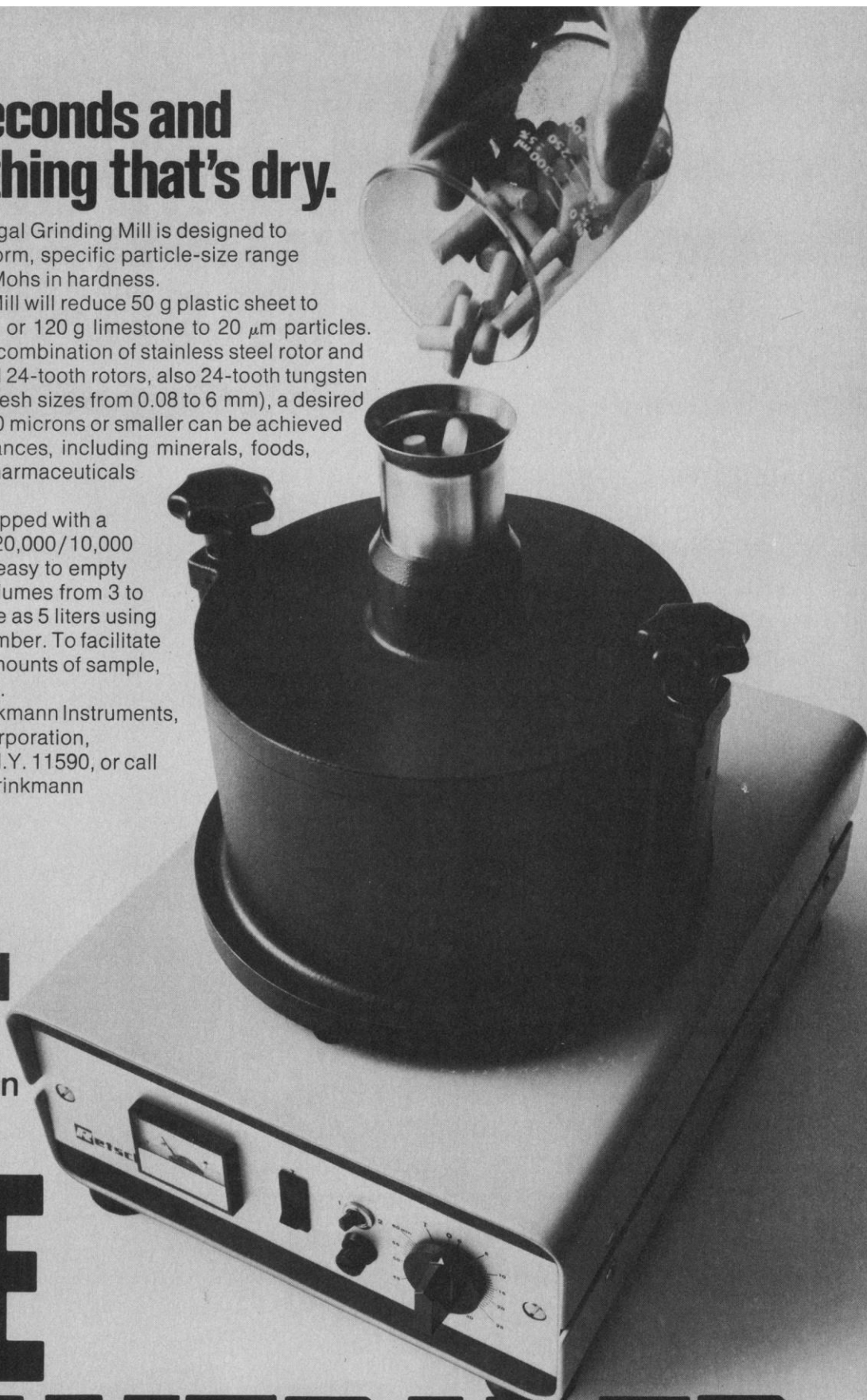
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## PSAC: Reestablish It Now

The President's Science Advisory Committee (PSAC) was organized to ensure competent, independent, and responsible scientific and technical awareness at the presidential level of policy-making. It was approved by President Truman in 1951 after the outbreak of the Korean war, reinforced by President Eisenhower in 1957 after Sputnik, and liquidated by President Nixon. The PSAC served an essential function and should promptly be reestablished to supplement the role of the science adviser. The dilution of our post-World War II military, political, economic, and cultural primacy increases the need for such action; rising international tensions, growing domestic problems, and the approaching election make it timely. This is the message conveyed by seven science advisers (DuBridge, Rabi, Killian, Wiesner, Hornig, David, and Stever) and some 15 other scientists, engineers, and administrators who have served under all Presidents since Truman.\*

The Truman-Eisenhower apparatus comprised a science adviser to the President, with staff, and the PSAC, which was appointed by and reported to the President and worked with but was independent of the adviser. In 1976, legislation encouraged by President Ford restored the office of science adviser (and gave Congress access to him) but did not recreate the PSAC. Resourceful enlistment of ad hoc panels by Frank Press, the present adviser, has palliated but cannot cure the statutory deficiency.

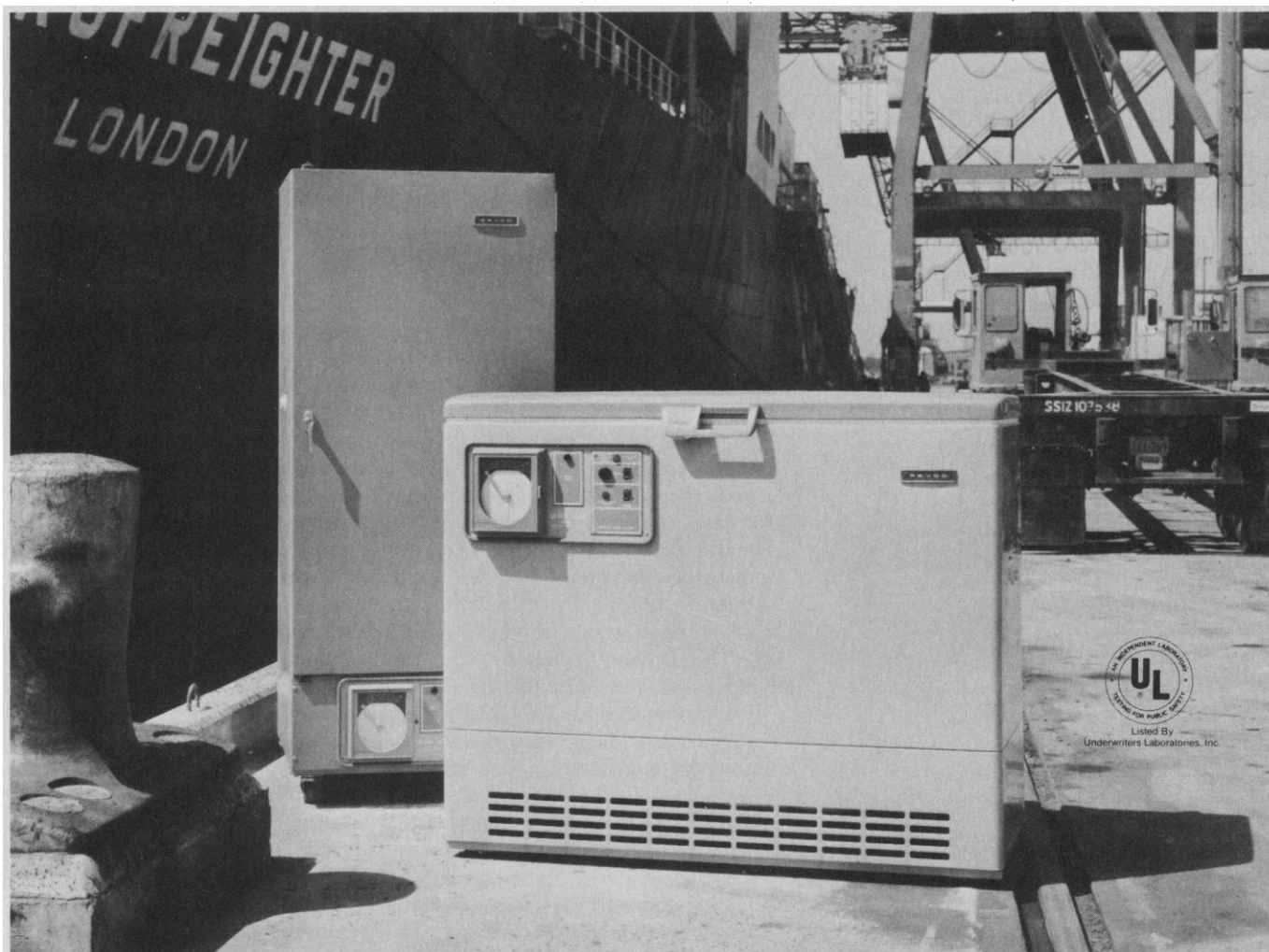
Science and technology ingredients are essential to policy-making on domestic and foreign issues involved in improving our living standards, promoting domestic tranquility, defending our borders, and seeking arms limitation agreements. Such issues, as Comptroller General Elmer B. Staats pointed out, transcend individual federal agencies and programs and require "improved measures and criteria to support federal decision-making." The President should not rely for guidance solely on his science adviser, who is limited by statute in staff and scope, and cannot rely unquestioningly on his cabinet members or the National Science Foundation director, who must advocate the special and sometimes competing interests of their departments. Nor should high-level scientific expertise be expected to flourish in the White House staff, the National Security Council, or the Office of Management and Budget, where this year's hostages, next year's budget, and the approaching elections constitute long-term issues.

The PSAC, well chosen and actively used, would meet the need. To ensure the requisite stature and visibility, the members of PSAC must be presidential appointees. They should be generalists characterized by prominence, wisdom, courage, discretion, independence, and patriotic dedication; experienced in government; and sensitive to the practicalities of politics. The physical, biological, medical, and social sciences should be broadly represented. There is no room for narrow specialists, however distinguished. Not every member should be a practicing scientist. The PSAC must have the judgment and loyalty to gain the confidence of its President. But this does not mean subservience. Expression of divergent views within the group should be encouraged, but the remedy for irreconcilable differences should be resignation, restoring freedom for public expression. The committee should be small; 9 to 12 members would permit diversity, focus responsibility, and encourage collegiality. The Federal Advisory Committee Act of 1972 and the Freedom of Information Act present serious but not insurmountable impediments. Should a crisis arise or the climate change, Congress may modify them, under the provision of Public Law 94-282 for "periodic revision and adaptation."

Reestablishment of the PSAC would benefit the nation, strengthen the presidency, gratify Congress, and encourage the scientific and technological communities.—WILLIAM T. GOLDEN

\**Science Advice to the President*, William T. Golden, Ed., Pergamon, Elmsford, N.Y., 1980. ix + 256 pp. Cloth, \$50; paper, \$9.95.





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