22 February 1980 • Vol. 207 • No. 4433 $1.50

SCIENCE

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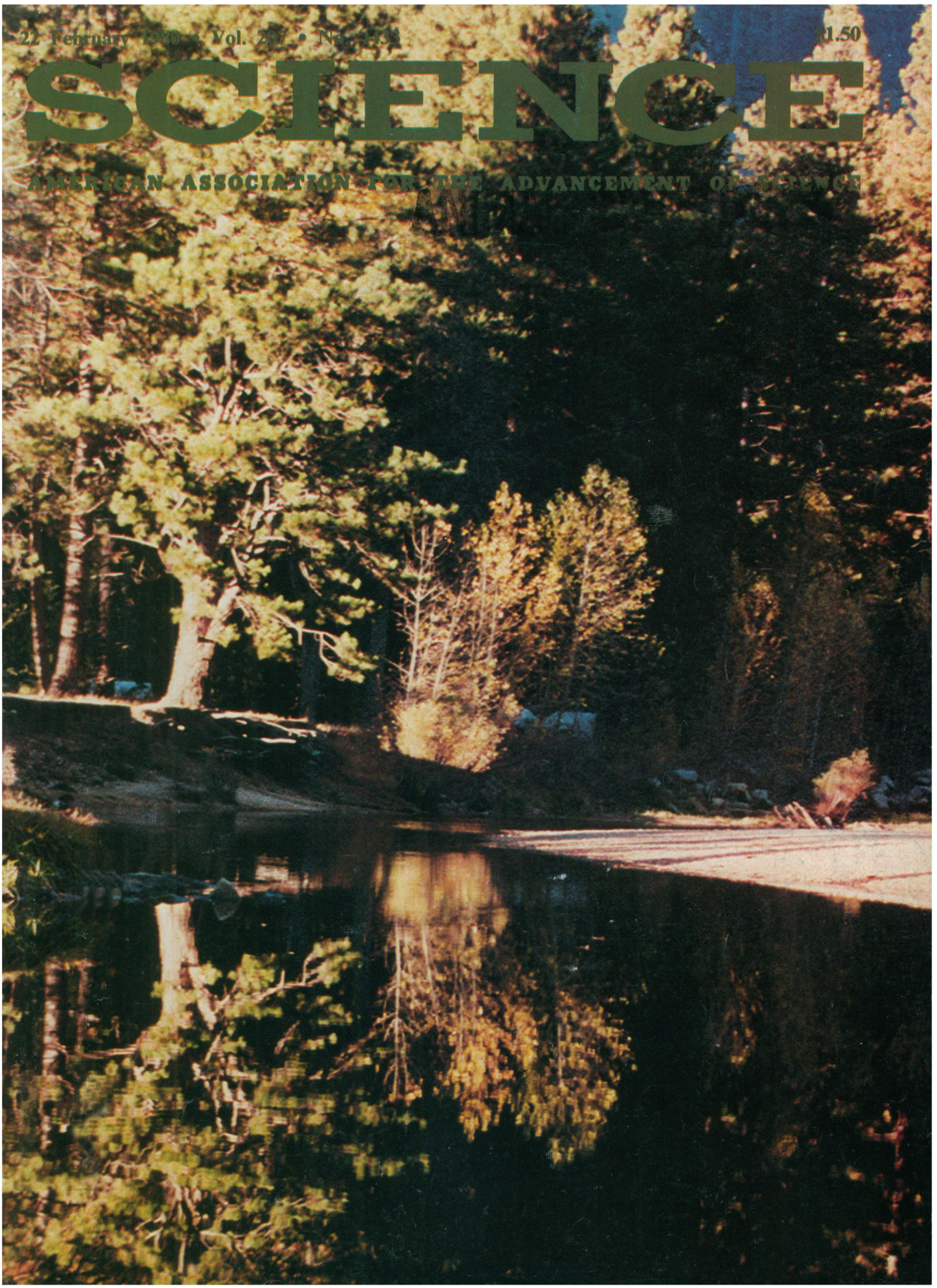

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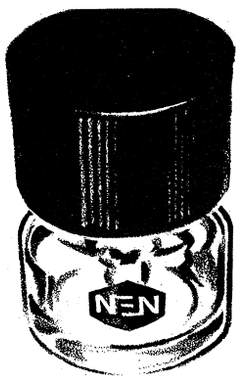

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Prepared fresh for stock on the 4th Monday of each month

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Merced River, central California. When sunlight interacts with dissolved humic substances in natural waters, transient free-radical oxidants are formed. These radicals can selectively oxidize the trace amounts of synthetic chemicals commonly found in many lakes and rivers of industrialized countries. See page 886. [Janice D. Mill, Palo Alto, California]

HP introduces the

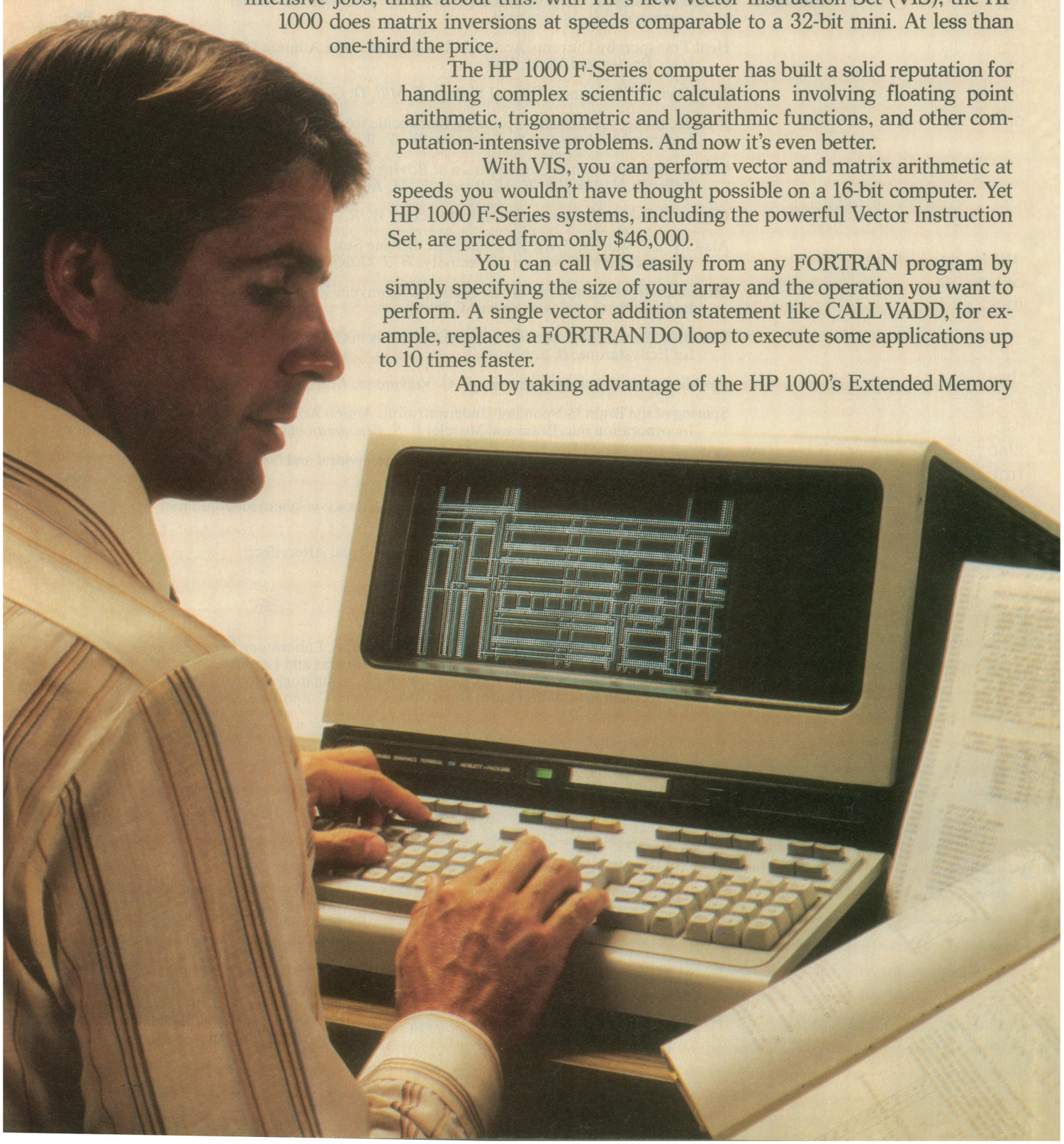
If you've been thinking that only a 32-bit computer can handle your matrix intensive jobs, think about this: with HP's new Vector Instruction Set (VIS), the HP 1000 does matrix inversions at speeds comparable to a 32-bit mini. At less than one-third the price.

The HP 1000 F-Series computer has built a solid reputation for handling complex scientific calculations involving floating point arithmetic, trigonometric and logarithmic functions, and other computation-intensive problems. And now it's even better.

With VIS, you can perform vector and matrix arithmetic at speeds you wouldn't have thought possible on a 16-bit computer. Yet HP 1000 F-Series systems, including the powerful Vector Instruction Set, are priced from only $46,000.

You can call VIS easily from any FORTRAN program by simply specifying the size of your array and the operation you want to perform. A single vector addition statement like CALL VADD, for example, replaces a FORTRAN DO loop to execute some applications up to 10 times faster.

And by taking advantage of the HP 1000's Extended Memory



Matrix Machine.

Area, VIS can address extremely large data sets (up to 1.8 megabytes) in main memory. All array and memory management tasks are handled automatically so you can do large array applications like image processing, three-dimensional graphics, process optimization and simulations. Without writing any new software.

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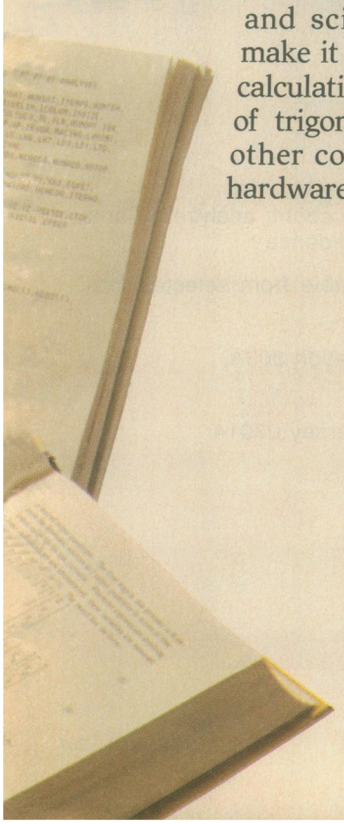
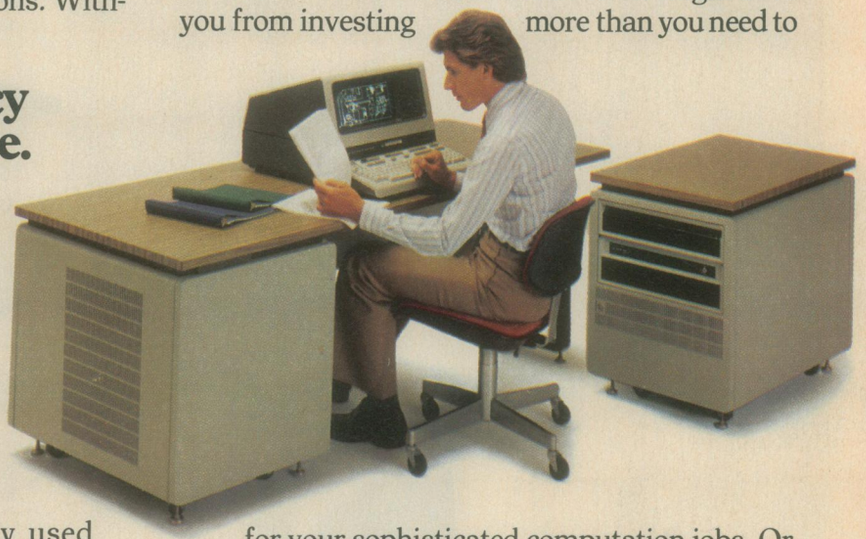


Crunch a matrix today.

To find out how the HP 1000 makes matrix arithmetic a snap on a 16-bit computer, call your nearest HP office listed in the White Pages and ask for a hands-on demonstration. It might save you from investing more than you need to



for your sophisticated computation jobs. Or write for more information to Hewlett-Packard, Attn: Roger Ueltzen, Dept. 3560, 11000 Wolfe Road, Cupertino, CA 95014.

Matrix Inversion Times*

Size	HP 1000 VIS-enhanced F-Series	32-bit Minicomputer
50x50	1.8 sec	1.5 sec
100x100	12.3 sec	11.7 sec
200x200	105 sec	92 sec
400x400	690 sec	720 sec

**Benchmark method—Matrix inversion using Gauss-Jordan Elimination.*

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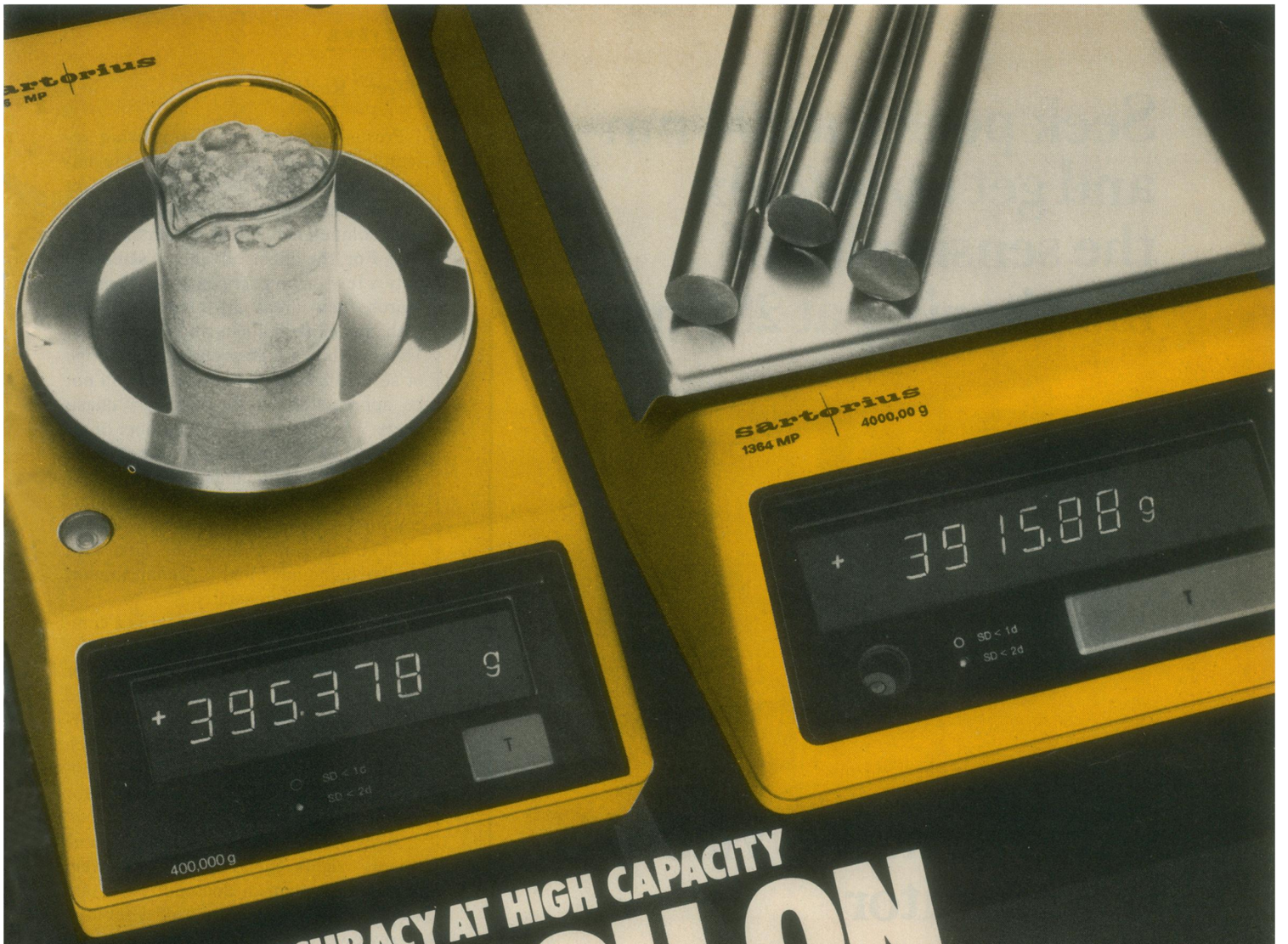

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LETTERS

"Peer" Review

Present procedures of reviewing research proposals may be not only impractical and wasteful but also deficient and harmful. Four problems relate to peer competence and peer rights.

1) For the most advanced scientists only a few or no peers exist. In their research, new areas are explored, often with special techniques and approaches. There is thus a high probability that one or several aspects of a proposal will not be appreciated by the judging "quasi-peers." In some cases, the number of reviewers in a committee may improve the chances for fair judgment. However, for advanced scientists, a competent review cannot be achieved unless a reviewer who is working in the same field with similar techniques and a similar amount of experience is consulted.

2) The closest scientific peer is a competitor. Even though reviewers try to be fair, nobody likes his or her programs or original ideas to be screened and judged by a real or potential competitor. Current procedures do not exclude such competitors. The present method violates democratic principles of respect for and protection of the individual.

3) Applicants are not given the same "peer" rights their "peer" reviewers have. A mechanism does not exist that would allow consideration of a rebuttal of reviewers' criticism before decisions for funding are made. Even when there is good evidence for errors of judgment, bias, incompetence, or negligence by the reviewer(s), the only recourse for denial of funding is resubmission of the research proposal. Each resubmission causes delay of funding for 8 to 12 months. Possible consequences are disruption of laboratory work, loss of momentum, discouragement, and dismissal of trained personnel.

4) "Peer" reviewers remain anonymous. Possible deficiencies in their competence and bias related to the competition problem are covered up by this practice. Imagine anonymity in book reviews, theater columns, political exposés, or letters to the editor. Would it not be considered escaping responsibility? Why do scientists provide and accept anonymous reviews of grant applications and journal manuscripts? In an *open review system*, merits and weaknesses would be assessed more thoughtfully and criticisms would be made more responsibly.

My recommendations? Do keep a review system. However, send the review-

ers' comments with names and signatures to the investigator, who would be allowed one rebuttal. Comments and rebuttal would then be available when the proposal is considered for funding.

WALTER E. STUMPF
Department of Anatomy, School of Medicine, University of North Carolina, Chapel Hill 27514

Appraising Psychotherapy

I choose to take a somewhat perverse pleasure in the fact that Eliot Marshall, in his article "Psychotherapy works, but for whom?" (News and Comment, 1 Feb., p. 506), found so much of my own article "Can psychotherapy research guide the policy maker?" (*1*) worthy of repeating. I do regret, however, that he did not quote from it fully enough to represent my views more faithfully.

The rather unflattering summary of the state of the art of psychotherapy which Marshall represented as my conclusion was in fact my synopsis of the position presented in the report of the President's Commission on Mental Health (PCMH) (*2*). One of the major points of my article was that the PCMH's appraisal was unwarranted. I do not believe I was being particularly obscure when I stated: "Practitioners will not and should not easily accept the modest assessment of their effectiveness." I followed this statement with a discussion of the limitations of assessment by diagnostic categories, which obscures the fact that the preponderance of patients who seek psychotherapy are effectively treated (*1*, pp. 301-302). Again on page 303 I discussed the shortcomings of the research on which the report of the PCMH was based and concluded, "In view of this fact, I am prepared to place but modest reliance on the present conclusions of the PCMH Report regarding psychotherapy."

I would be pleased indeed if Marshall's references to my statements had the effect of stimulating the reader to seek out my original article. It's really quite good.

MORRIS B. PARLOFF
Psychotherapy and Behavioral Intervention Section, Clinical Research Branch, National Institute of Mental Health, Rockville, Maryland 20857

References

1. M. B. Parloff, *Am. Psychol.* **34**, 296 (1979).
2. *President's Commission on Mental Health: Report to the President, 1978* (Government Printing Office, Washington, D.C., 1978), vol. 4.

University-Industry Programs

I want to offer a constructive criticism of the outstanding article "Research, innovation, and university-industry linkages" by D. J. Prager and G. S. Omenn (25 Jan., p. 379). The authors have made a thorough, thoughtful, and balanced presentation of the crucial national needs, the many opportunities, and the serious impediments that control the establishment of university-industry R & D linkages. They suggest several actions or initiatives that the federal government can and should take in order to develop and enhance these vital interactions. They mention several exciting examples of successful industry-university cooperation. However, they do not cite and draw on the experience of a successful, ongoing, university-industry-government R & D program that is the perfect model for the activities and actions they propose. I refer to the National Sea Grant College Program of the National Oceanic and Atmospheric Administration, Department of Commerce.

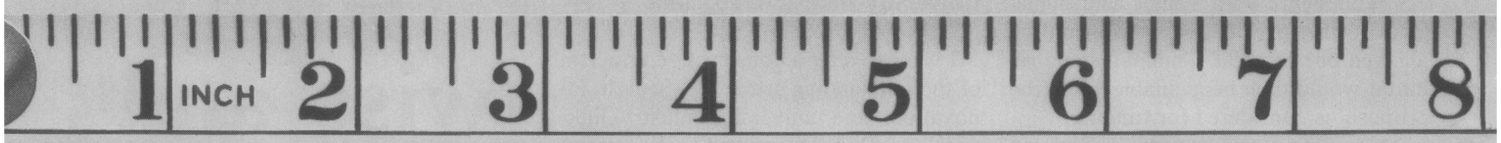
The Sea Grant Program was the vision of such farsighted individuals as Athelstan Spilhaus, John Knauss, Senator Claiborne Pell (D-R.I.), and former Congressman Paul Rogers. It has grown from the germ of an idea in 1966 to a major national program that taps the reservoir of talent and expertise available in our nation's universities and directs it toward economically and environmentally sound development and use of this country's marine resources. The original act stressed the need for strong industry-university ties in effective joint R & D. Today, thanks to the continued interest, close oversight, and increasing support by Congress, the Sea Grant Program is mutually supported, university-based, and does for marine industries and businesses exactly what the authors propose on a general, nationwide basis.

Twenty-eight successful Sea Grant programs now exist. By building on the Sea Grant concept and principles, universities can initiate other industry-university linkages of the type recommended by Prager and Omenn.

DEAN A. HORN
Sea Grant Program, Massachusetts Institute of Technology, Cambridge 02139

Erratum: In the report "Access of urinary nonvolatiles to the mammalian vomeronasal organ" by C. J. Wysocki *et al.* (15 Feb., p. 781), the parts of Fig. 1 were inadvertently interchanged.

Erratum: In the report by R. G. Wyatt *et al.* "Human rotavirus type 2: Cultivation in vitro" (11 Jan., p. 189), in the sentence describing the porcine rotavirus plaque reduction test (p. 190, column 3, line 16), the concentration of pancreatin in the agar overlay should have been given as "0.15 percent of 2.5 percent pancreatin 4 × N.F.; Gibco."



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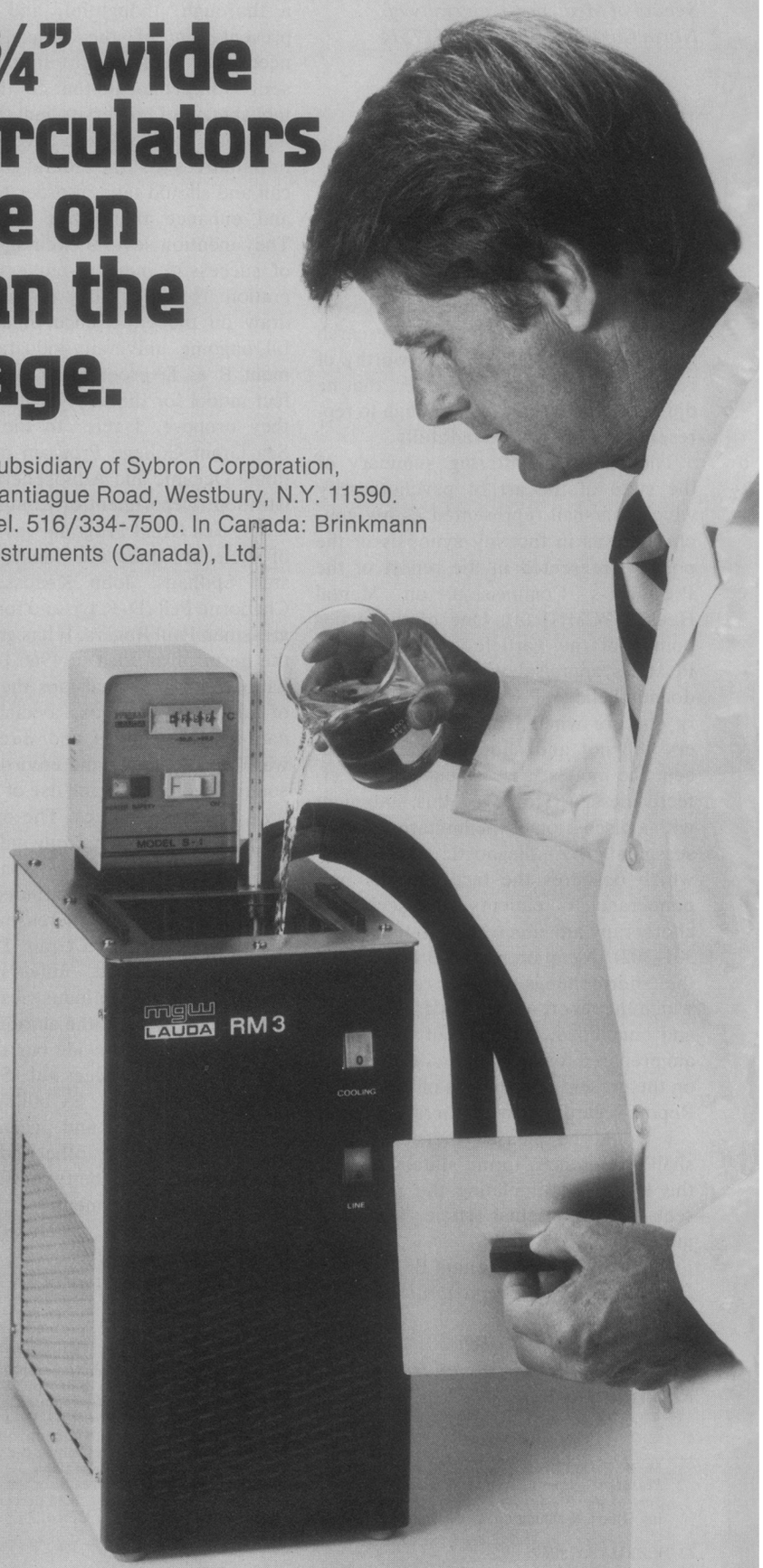

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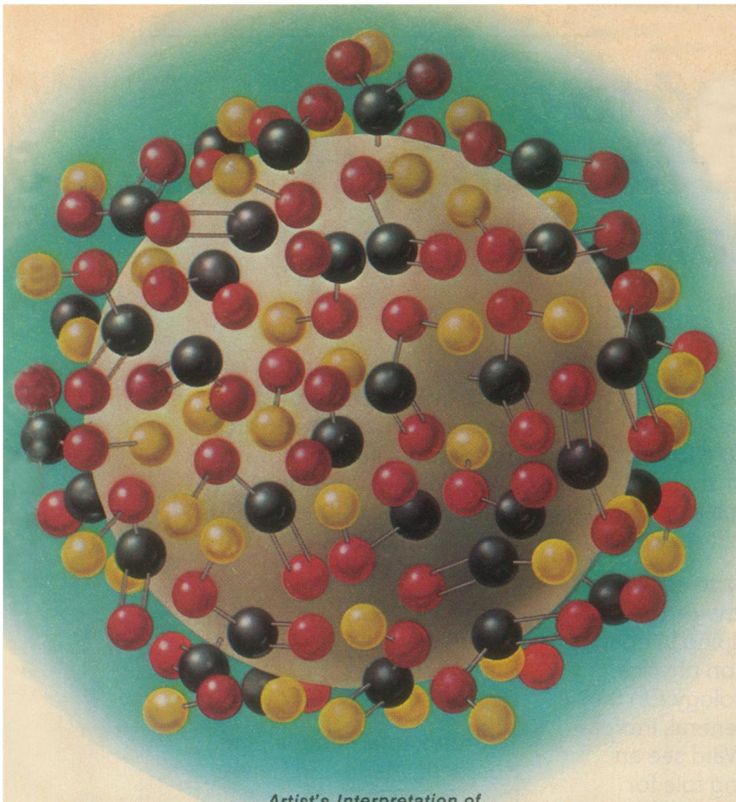

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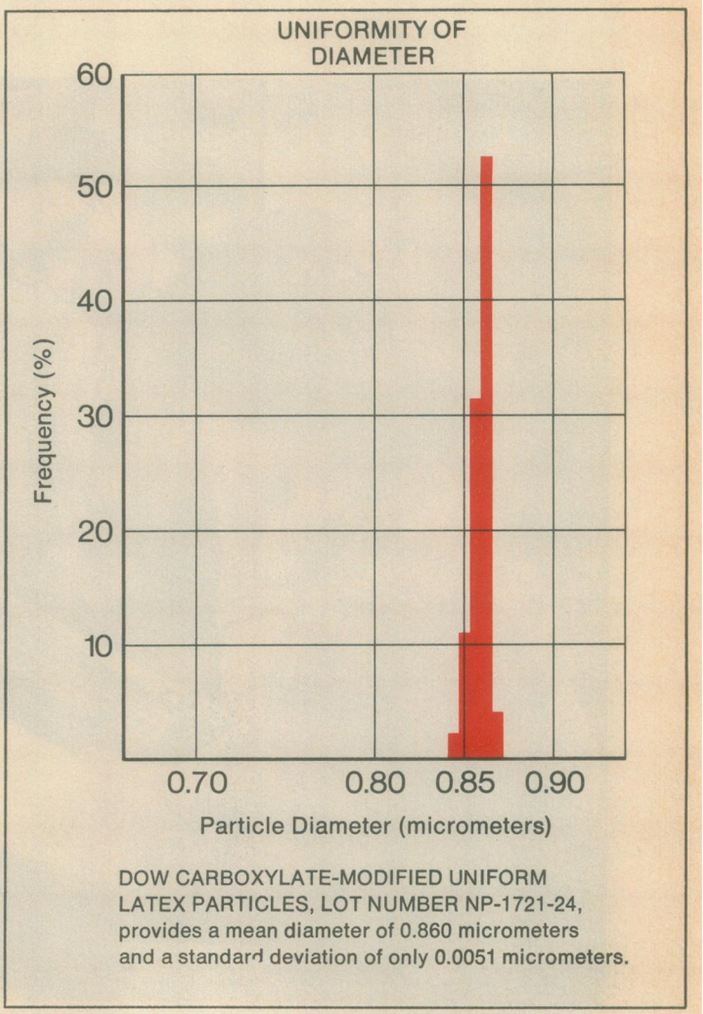

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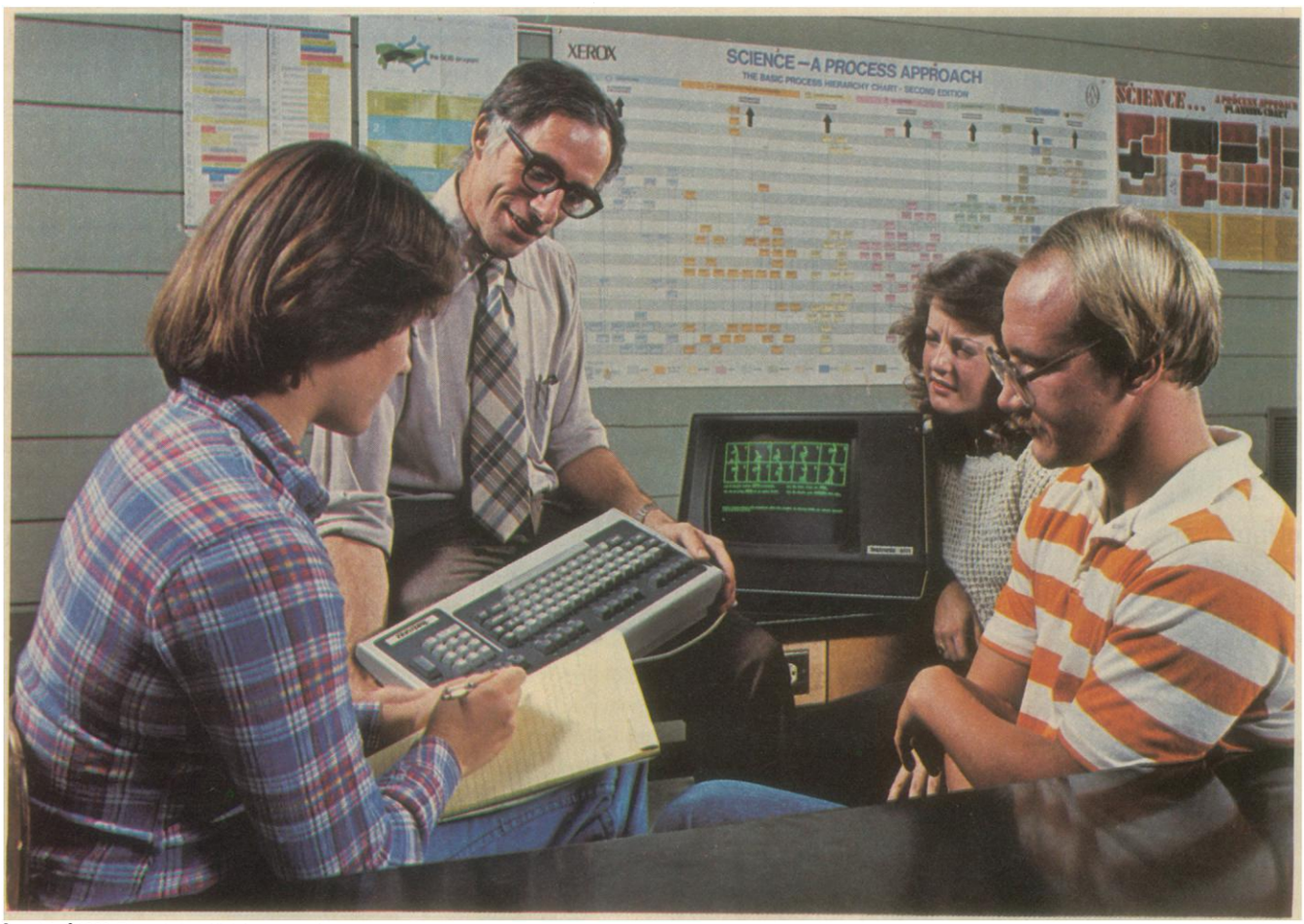

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*As reported in DATAQUEST Research Newsletter, Nov. 30, 1979; COMPUTER SYSTEMS NEWS, Dec. 3, 1979.

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 6. P105  ALPHA       8.     6/11/79   6/13/79     100.
13. P113  ALPHA       7.     6/10/79   6/13/79      91.
14. P114  ALPHA       8.     6/11/79   6/13/79     101.
21. P121  ALPHA       7.     6/11/79   6/13/79      93.
22. P122  ALPHA       8.     6/11/79   6/13/79     101.
29. P129  ALPHA       7.     6/11/79   6/13/79      91.
30. P130  ALPHA       8.     6/10/79   6/13/79     102.
37. P137  BETA        7.     6/10/79   6/14/79      92.
38. P138  BETA        8.     6/10/79   6/14/79     100.
45. P145  BETA        7.     6/11/79   6/13/79      93.
46. P146  BETA        8.     6/11/79   6/13/79     104.
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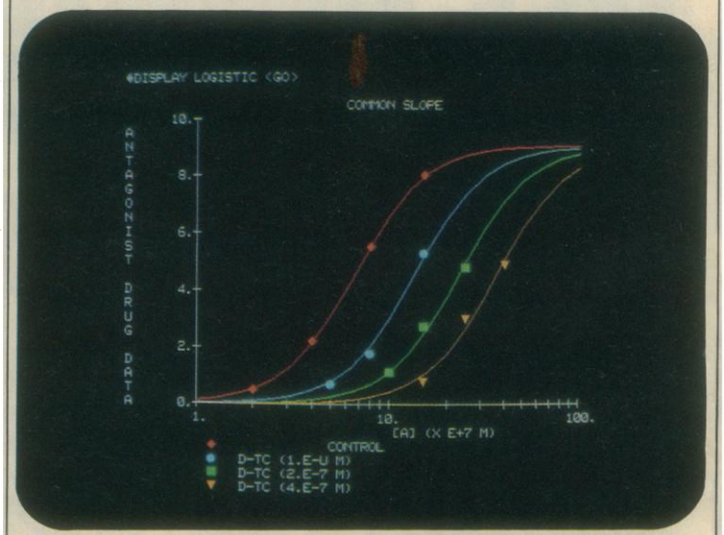

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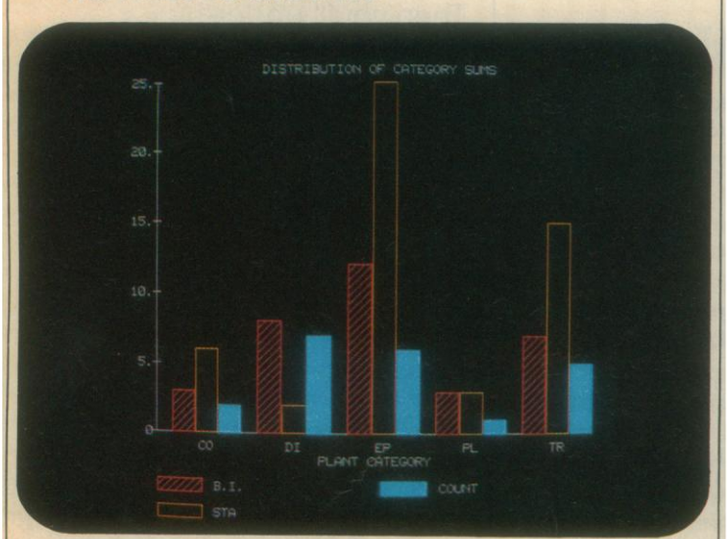

Display your results in presentation quality. Produce line plots or histograms to aid in the visualization of distribution data.

RS/1 IS PROGRAMMABLE

```
/* Classify each row of the source table. */
DO R=1 TO NR;
        CLASS=T(R,1);
        FOUND=0;
        DO I=1 TO LAST ROW OF DT;
          IF CLASS=DT(I,0)
                THEN FOUND=I;
        END;

        IF FOUND=0
                THEN DO;
/* A new class; create new row in class table.  */
                FOUND=I;
                DO C=NC TO 1 BY -1;
                  DT(FOUND,C)=0;
                END;
                DT(FOUND,0)=CLASS;
                END;
```

Perform specialized calculations and access data stored by other programs (e.g. FORTRAN) with RS/1's own structured programming language.

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Federal Support in the Social Sciences

The debate regarding the federal role in the support of social science research is long-standing and tends to intensify at this time of year as Congress begins its annual examination of the President's budget. There are supporters of the social sciences in Congress, but there are also vigorous critics. Criticism follows two contradictory lines of argument. In the first, social science research is regarded as irrelevant to societal needs and, therefore, a waste of taxpayers' dollars. The contrary argument is that the social sciences are all too relevant—leading to social engineering and manipulation of moral values—and should not be encouraged, let alone supported. Both of these views create difficulties for those who argue for increased support for social science research.

How has this debate affected federal funding for the social sciences? The facts are surprising. As a percent of the federal budget for both basic and applied research, the social sciences—defined in the National Science Foundation data base as anthropology, economics, political sciences, geography, and sociology—have remained remarkably constant at 5 percent of the total for well over a decade. A somewhat different picture emerges, however, if one examines where the research is performed (in colleges and universities, independent nonprofit organizations, industry, or government laboratories). Consider, for example, federal funds for basic research. Across all fields of science, the percentage of basic research performed at academic institutions has been roughly constant at 48 percent since 1973—the first year such data were collected. In contrast, 60 percent of basic research in the social sciences was performed at academic institutions in 1973, but that number had decreased to 47 percent by 1978. The cumulative impact is significant: from 1973 to 1979, federal funds for basic research at colleges and universities in all scientific fields increased 97 percent; in social sciences the increase was 37 percent. The same trends hold for federally supported applied research and for the composite of basic and applied research.

Setting aside questions about the classification of basic and applied research and possible spillovers from developmental work, these data indicate a shift of social science research away from academic institutions. We will have to know more about the nonacademic performers and the research they are doing before the trends can be interpreted. We do know that the job market is a factor. Although faculty positions in the social sciences have increased at about the same rate as the average for all fields of science, the number of new social science Ph.D.'s requires that many seek employment outside universities. Another factor may be that federal agencies are exercising more control over the content and climate of research. Professor Theodore Schultz, the University of Chicago's most recent Nobel Laureate in Economics, has commented on the distortions in economic research introduced by the influence of patrons—federal and private—and the resultant decline in academic research with no readily apparent utility. Constrained by the criticisms mentioned above, funding agencies may be trying to ensure that the relevance of the social science they support is easily justified and, at the same time, poses no threat to society's values.

The shift away from academia in the social sciences has consequences for graduate education, for methodological work, and for the balance between fundamental and policy-oriented research. A case can be made that the shift has been beneficial for certain specialties and has strengthened links between academia and the real world. Whatever the judgment, it is important that we be aware of what is taking place and consider the consequences in planning for the future.—RICHARD C. ATKINSON, *Director, National Science Foundation, Washington, D.C. 20550*

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