29 June 1979 • Vol. 204 • No. 4400

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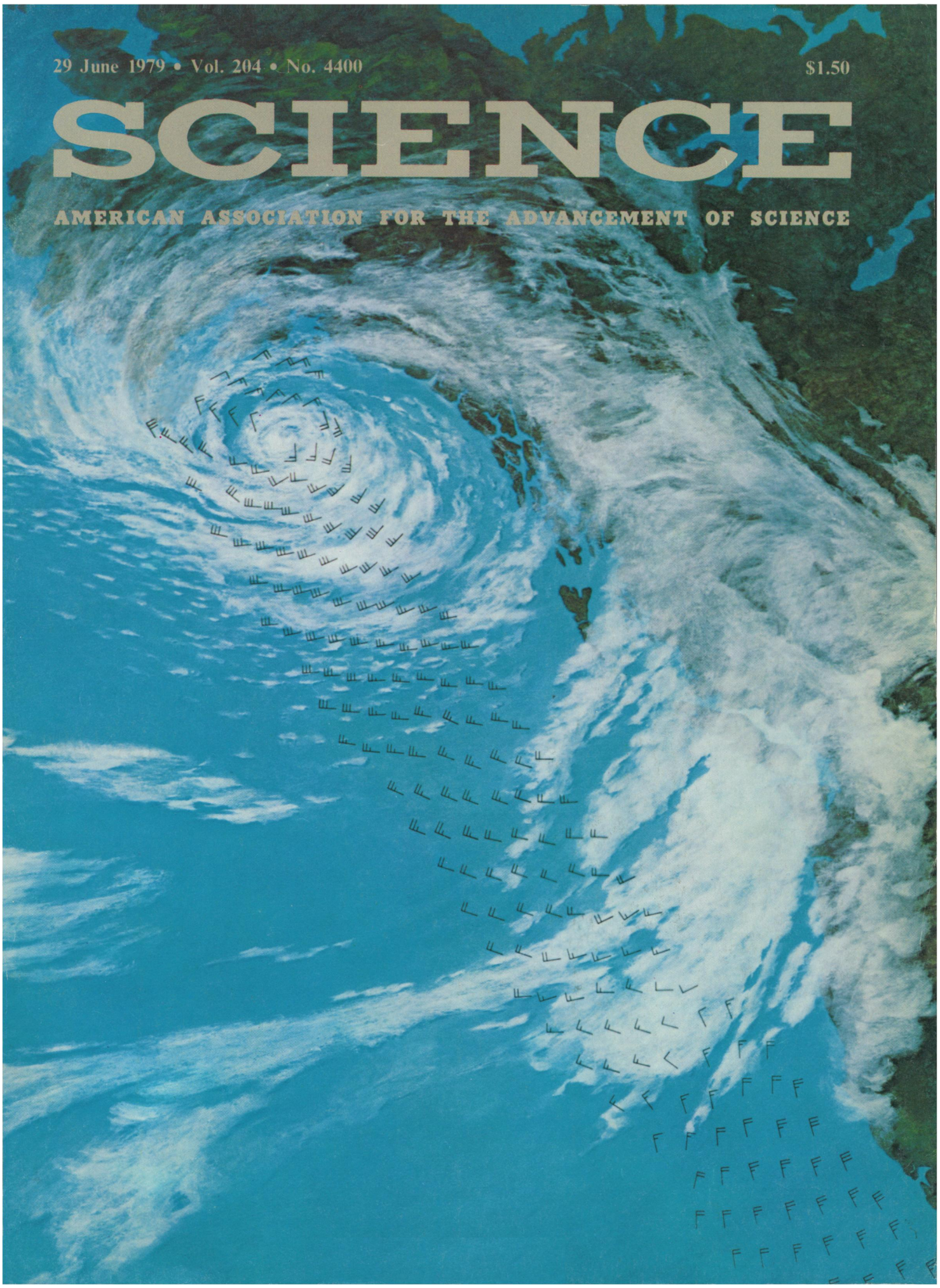
SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



1979 AAAS/ Westinghouse Science Writing Awards

Top: The Golden Gate, tallest bridge in the world. Bottom: an excerpt by Leonardo deVinci describing a proposed bridge which would have been the world's largest at the time.

RULES

1) The aim of this competition is to encourage and recognize outstanding writing on the sciences and their engineering and technological application in newspapers and general circulation magazines. The following categories are not eligible: articles on the field of medicine, articles published originally in AAAS publications, articles by employees of the AAAS or Westinghouse Electric Corporation.

2) Each entrant in a newspaper award competition and each entrant in the magazine award competition may submit three entries.

3) An entry for a newspaper competition may be any of the following: a single story; a series of articles; or a group of three unrelated stories, articles, editorials, or columns published during the contest year. A magazine entry may be a single story or series published during the contest year.

4) A completed entry blank must be submitted together with six copies of each entry in the form of tear sheets, clippings, reprints, or syndicate copy (not over 8½" x 11"), showing name and date of the publication. ENTRIES MUST NOT BE ELABORATE.

5) Each entry must have been published in a newspaper or general circulation magazine within the United States during the contest year — 1 October 1978 through 30 September 1979. (In the case of a series, more than half of the articles comprising it must have been published during the contest year.) Date on the issue in which an article appeared will be considered as the date of publication. All entries must be postmarked on or before midnight, 15 October 1979.

6) Persons other than the author may submit entries in accordance with these rules. Entries will not be returned.

7) Winners of the 1978 awards are not eligible for the 1979 awards. Persons winning three times are no longer eligible.

8) The Judging Committee, whose decisions are final, will choose the winners. There are three awards of $1000: for the winning entry in the over-100,000 daily circulation newspapers competition, for the winning entry in the under 100,000 circulation newspapers competition; and for the winning entry in the general circulation magazine competition. For award purposes, newspaper circulation will be sworn ABC daily circulation as of 30 September 1979. The Judging Committee may cite other entries for honorable mention.

9) The awards will be presented at the dinner meeting of the National Association of Science Writers, during the 1980 meeting of the American Association for the Advancement of Science in January, 1980. Travel and hotel expenses of the award winners will be paid. Entrants agree that, if they win, they will be present to receive their awards, unless prevented by circumstances beyond their control.

Grayce A. Finger

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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Ocean surface winds derived from Seasat microwave scatterometer data for 14 September 1979, 17:15 G.M.T. Winds are indicated at each point to the nearest 5 knots (full barb, about 10 knots, half barb, about 5 knots). The data identify the storm center in the Gulf of Alaska, the westerly jet associated with it, the ridge of high pressure and weak winds to the south, and the unusually strong northerly flow off the California coast. Cloud structure is taken from Western GOES imagery. See page 1405. [Jet Propulsion Laboratory, Pasadena, California]

AAAS–Newcomb Cleveland Prize
To Be Awarded for an Article or a Report Published in *Science*

The AAAS–Newcomb Cleveland Prize is awarded annually to the author of an outstanding paper published in *Science* from August through July. This competition year starts with the 4 August 1978 issue of *Science* and ends with that of 27 July 1979. The value of the prize is $5000; the winner also receives a bronze medal.

Reports and Articles that include original research data, theories, or syntheses and are fundamental contributions to basic knowledge or technical achievements of far-reaching consequence are eligible for consideration for the prize. The paper must be a first-time publication of the author's own work. Reference to pertinent earlier work by the author may be included to give perspective.

Throughout the year, readers are invited to nominate papers appearing in the Reports or Articles sections. Nominations must be typed, and the following information provided: the title of the paper, issue in which it was published, author's name, and a brief statement of justification for nomination. Nominations should be submitted to AAAS–Newcomb Cleveland Prize, AAAS, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. Final selection will rest with a panel of distinguished scientists appointed by the Board of Directors.

The award will be presented at a session of the annual meeting. In cases of multiple authorship, the prize will be divided equally between or among the authors.

Deadline for nominations: postmarked 15 August 1979

Nomination Form
AAAS–Newcomb Cleveland Prize

AUTHOR: _____

TITLE: _____

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DATE PUBLISHED: _____

JUSTIFICATION: _____

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29 June 1979, Volume 204, Number 4400 **SCIENCE**

The Cost of R & D Living

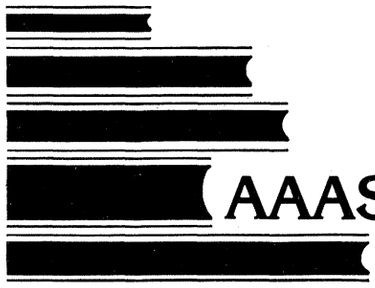
Inflation continues to affect all parts of our society. For the R & D community, increasing costs are an especially serious concern. Order-of-magnitude increases in all phases of research, from the price of new instruments to the cost of precommercialization demonstrations, are severely stressing the structural integrity of the nation's research system.

The 18 to 22 percent annual increase in the cost of equipping a modern research facility is twice the national inflation rate. A survey conducted by one of us (M.J.C.) at the National Science Foundation showed that the cost of scientific instruments in the price range above $5000 within five basic areas—molecular spectroscopy, atomic spectroscopy, chromatography, chemical analysis, and polymer characterization—grew from $412,000 in 1970 to $1,767,000 by the end of 1978. This fourfold increase translates into an average annual cost escalation of 20 percent. Part of this increase reflects the growing sophistication of research tools; part is due to the general inflation of the economy.

Few laboratories have had the growth in financial support required to keep pace. The result has been a decline in the availability of modern research instruments in some laboratories, or reduced research growth as funds have been diverted to purchase required tools. Shared use of facilities has been partially successful in reducing total capital requirements, but there is a point at which sharing begins to hinder scientific investigation. At one major research university, the administration has resorted to deficit financing to purchase research equipment. Repayment through user charges will further restrict future research programs. For the federal program managers who fund over 50 percent of the nation's R & D effort, escalating research costs translate into loss of program flexibility and mortgaging of future available monies. More often than not, it has been the higher-risk projects that have been deferred or canceled.

Industrial R & D may be hardest hit by the high rate of inflation. Research has always had to compete for financial resources, with the promise that tomorrow's payoff will exceed today's investment. But with inflation rates exceeding 10 percent, the discounted rate of return from long-term high-risk R & D is substantially reduced. There is growing evidence that the cost of the important precommercialization step has also increased much more rapidly than the general inflation rate. The expense of bringing a new product or process to market has increased fivefold in the past decade. The estimated cost of building a coal gasification plant has grown from $250 million in 1973 to $1.5 billion today; that of introducing a new drug is now measured in tens of millions of dollars, and the time is about a decade. That old rule of $1 for research, $10 for development, and $100 for demonstration is breaking down.

Research in times of high inflation may require new types of relations between industry, universities, and government. Additional funds or federal investment tax credits for R & D will be of limited benefit. Enhancing the productivity of our nation's R & D enterprise will require reassessment of the traditional guidelines for public and private investment in research, as well as incentives to encourage industry to undertake long-term research commitments. New strategies for coping with the cost of R & D living will include better sharing of our limited resources, greater access to facilities maintained at public expense, and more adequate protection for the intellectual property rights of those using the facilities. We must realize the mutual benefits of greater industry-university cooperation. Small investments in areas of common research interest can provide significant returns to both the industrial firm and the university researcher. Coping with inflation is *the* issue before our nation's R & D leadership.—MARTIN BERGER, *President, and* MARTIN J. COOPER, *Manager for Special Studies, Occidental Research Corporation, Irvine, California 92713*



AAAS BOOKS AAAS BOOKS

From heart disease to solar energy, from food to electronics—the American Association for the Advancement of Science publishes books which cover these topics and many more. Books that will keep you informed and abreast of important scientific advancements. Books that are designed for the researcher, scientist, engineer, student, and general public. Books that you need to read.

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Manuscripts submitted to *Science* for consideration for publication can be handled expeditiously if they are prepared in the form described in these instructions.

Submit an original and two duplicates of each manuscript. With the manuscript send a letter of transmittal giving (i) the name(s) of the author(s); (ii) the title of the paper and a one- or two-sentence statement of its main point; (iii) the name, address, and field of interest of four to six persons in North America but outside your institution who you think are qualified to act as referees for your paper; (iv) the names of colleagues who have reviewed your paper for you; and (v) the field or fields of interest of readers who you anticipate will wish to read your paper.

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All papers submitted are considered for publication. The author's membership or lack of membership in the AAAS is not a factor in selection. Papers are accepted with the understanding that they have not been published, submitted, or accepted for publication elsewhere. Authors will usually be notified of acceptance, rejection, or need for revision in 4 to 6 weeks (Reports) or 6 to 10 weeks (Articles).

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Organize your material carefully, putting the news of your finding or a statement of the problem first, supporting details and arguments second. Make sure that the significance of your work will be apparent to readers outside your field, even if you feel you are explaining too much to your colleagues. Present each step in terms of the purpose it serves in supporting your finding or solving the problem. Avoid chronological steps, for the purpose of the steps may not be clear to the reader until he finishes reading the paper.

Provide enough details of method and equipment so that another worker can repeat your work, but omit minute and comprehensive details which are generally known or which can be covered by citation of another paper. Use metric units of measure. If measurements were made in English units, give metric equivalents.

Avoid specialized laboratory jargon and abbreviations, but use technical terms as necessary, defining those likely to be known only in your field. Readers will skip a paper they do not understand. They should not be expected to consult a technical dictionary.

Choose the active voice more often than you choose the passive, for the passive voice usually requires more words and often obscures the agent of action. Use first person, not third; do not use first person plural when singular is appropriate. Use a good general style manual, not a specialty style manual. The University of Chicago style manual, the style manual of the American Institute of Physics, and the *Style Manual for Biological Journals*, among others, are appropriate.

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Prepare your manuscript in the form used by *Science*. Use bond paper for the first copy. Submit two duplicates. Double-space title, abstracts, text, signature, address, references (including the lines of a single reference), figure legends, and tables (including titles, column headings, body, and footnotes). Do not use single spacing anywhere. Put the name of the first author and the page number in the upper right-hand corner of every page.

Paging. Use a separate page for the title; number it page 1. Begin each major section—text, references and notes, and figure legends—on a new sheet. Put each table on a separate sheet. Place figure legends and tables after the references.

Title. Begin the title with a word useful in indexing and information retrieval (not "Effect" or "New").

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Journal: H. Smith, *Am. J. Physiol.* **98**, 279 (1931).

Book: F. Dachille and R. Roy, *Modern Very High Pressure Techniques* (Butterworth, London, 1961), pp. 163–180.

Chapter: F. Dachille and R. Roy, in *Reactivity of Solids*, J. H. de Boer, Ed. (Elsevier, Amsterdam, 1960), p. 502.

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you use for axes. Place labels parallel to the axes, using initial capital and lowercase letters; put units of measurement in parentheses after the label—for example, Length (m). Plan your figures for the smallest possible printed size consistent with clarity.

Photographs should have a glossy finish, with sharp contrast between black and white areas. Indicate magnification with a scale line on the photograph.

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Plan your table for small size. A one-column table may be up to 42 characters wide. Count characters by counting the widest entry in each table column (whether in the body or the heading) and allow three characters for spaces between table columns. A two-column table may be 90 characters wide.

Equations and formulas. Use quadruple spacing around all equations and formulas that are to be set off from the text. Most should be set off. Start them at the left margin. Use the solidus for simple fractions, adding the necessary parentheses. But if braces and brackets are required, use built-up fractions. Identify handwritten symbols in the margin, and give the meaning of all symbols and variables in the text immediately after the equation.

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Articles, both solicited and unsolicited, may range in length from 2000 to 5000 words (up to 20 manuscript pages). Write them clearly in reasonably nontechnical language. Provide a title of one or two lines of up to 26 characters per line and an objective summary of 50 to 100 words indicating the scope and main finding. Do not break words at the ends of lines. Write a brief author note, giving your position and address. Do not include acknowledgments. Place title, subtitle, and author note on page 1. Begin the text on page 2.

Insert subheads at appropriate places in the text to mark your main ideas. The set of subheads should show that your ideas are presented in a logical order. Keep subheads short—up to 35 characters and spaces.

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Short reports of new research results may vary in length from one to seven double-spaced manuscript pages of text, including the bibliography. Long papers are subject to delays in reviewing and editorial consideration. Short papers receive preferred treatment. Limit illustrative material (both tables and figures) to two items, occupying a total area of no more than half of a published page (30 square inches). A research report should have news value for the scientific community or be of unusual interest to the specialist or of broad interest because of its interdisciplinary nature. It should contain solid research results or reliable theoretical calculations. Speculation should be limited and is permissible only when accompanied by solid work.

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Signature. List the authors on the last page of the text and give a simple mailing address.

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The Letters section provides a forum for discussion of matters of general interest to scientists. Letters are judged only on clarity of expression and interest. Keep them short and to the point; the preferred length is 250 words. The editors frequently shorten letters.

Technical Comments

Letters concerning technical papers in *Science* are published as Technical Comments at the end of the Reports section. They may add information or point out deficiencies. Reviews are obtained before acceptance.

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The selection of books to be reviewed is made by the editors with the help of advisers in the various specialties; arrangements are then made with reviewers. A sheet of instructions accompanies each book when it is sent to the reviewer.

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