28 November 1980 • Vol. 210 • No. 4473

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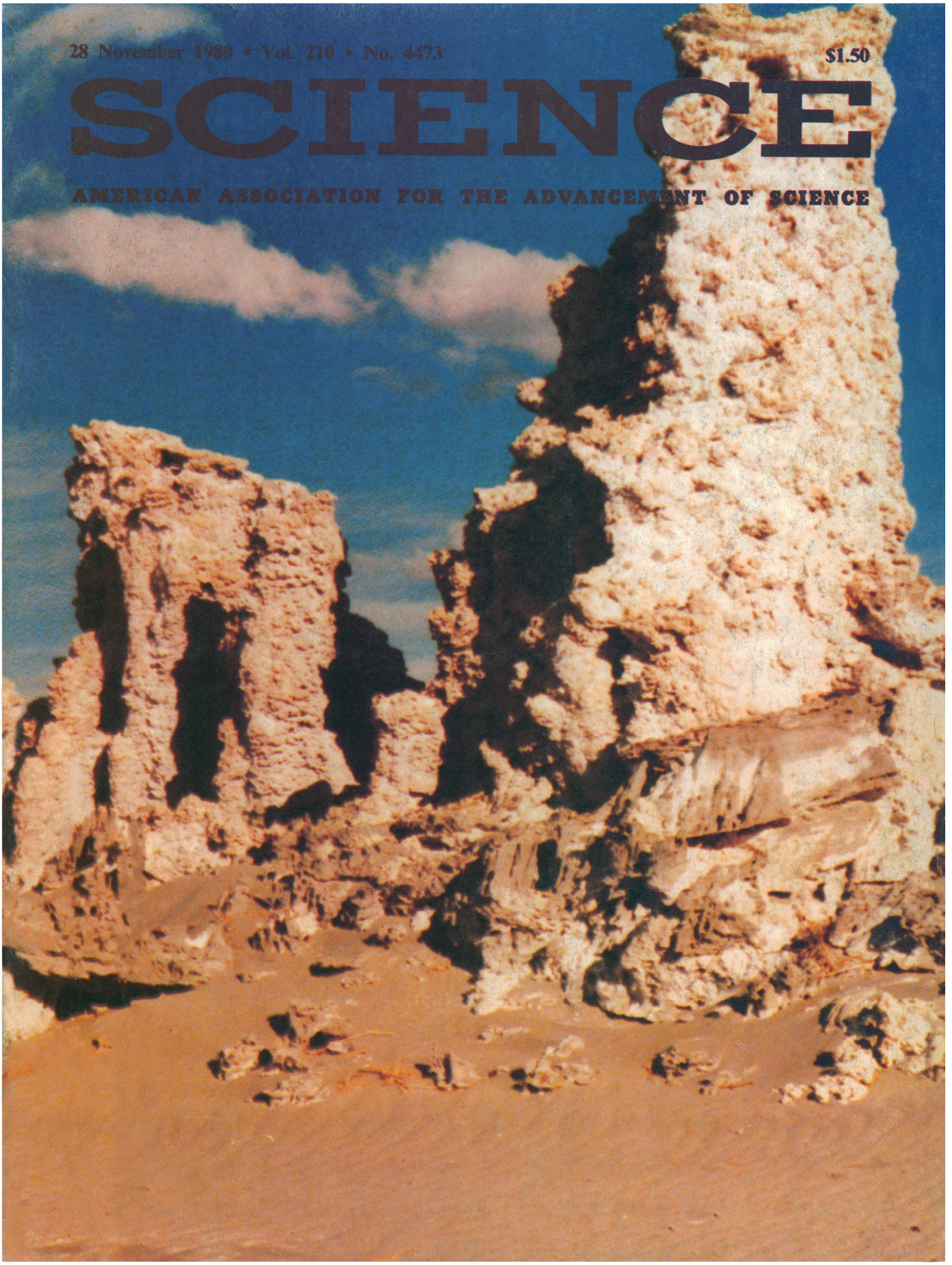

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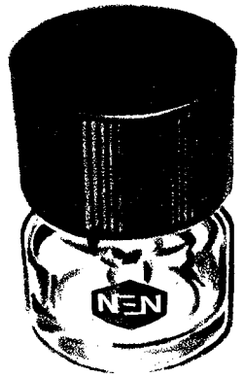

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ISSN 0036-8075

28 November 1980

Volume 210, No. 4473

SCIENCE

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®.** 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

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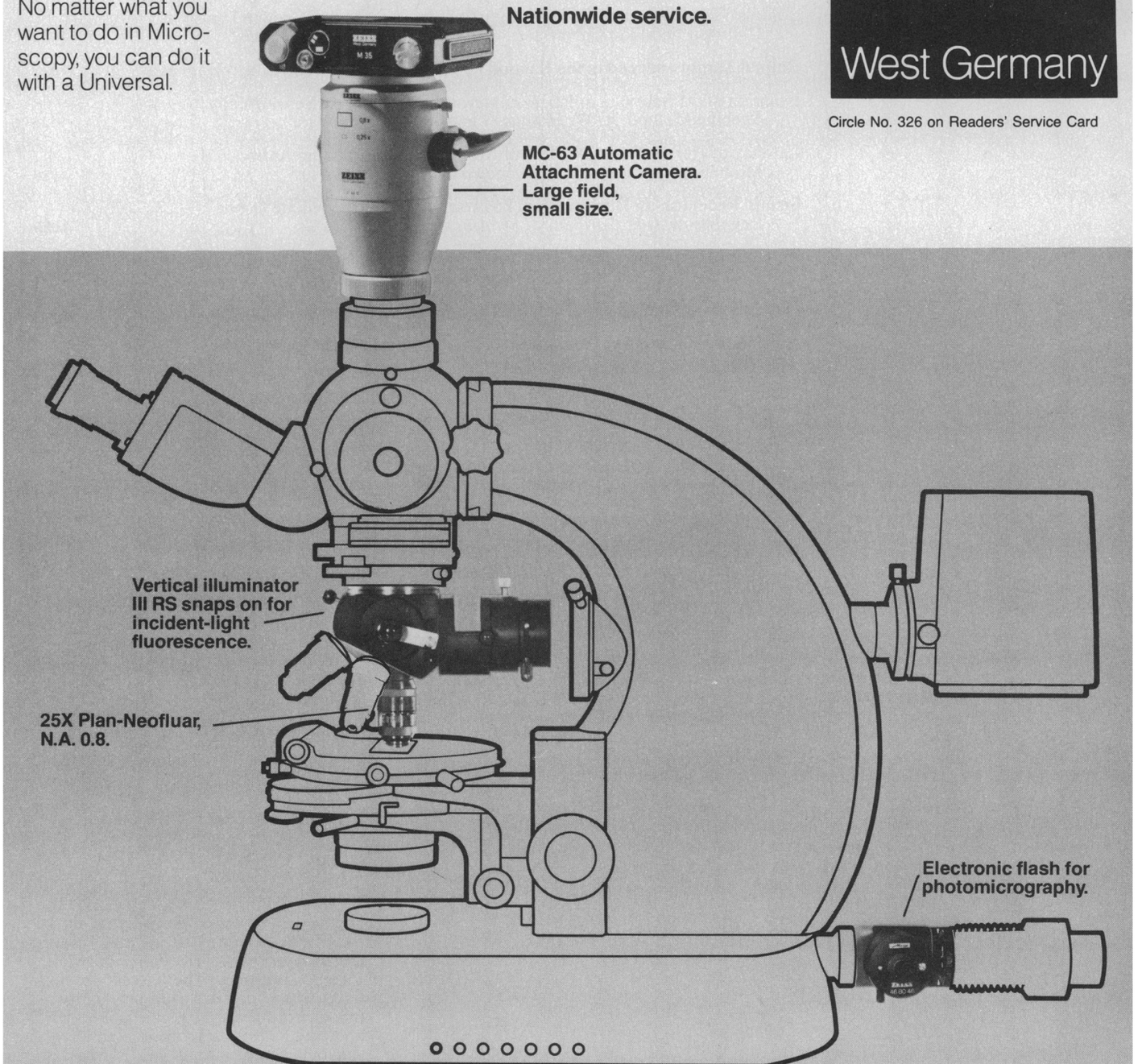

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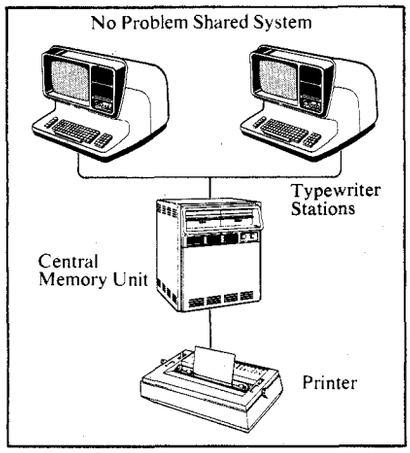

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LETTERS

Cryptography, NSF, and NSA

In view of the extensive recent discussion (News and Comment, 31 Oct., p. 511) of the respective roles of the National Science Foundation (NSF) and the National Security Agency (NSA) in support of cryptologic research, I believe it may be useful to restate the Foundation's established policy in this area.

The essential points of our policy with respect to cryptologic research are these:

1) Since mid-1977, we have routinely referred proposals with relevance to cryptology to NSA for review. We will continue to do this. The practice serves to keep NSA informed of NSF's activities in this area and gives NSA an opportunity to make technical comments on proposals which can be useful in making funding decisions. It is not a "clearance" process; whatever comments NSA may make are advisory.

2) The NSF has long had a policy of encouraging other agencies to support basic research in areas relevant to their missions. We have specifically encouraged NSA to establish an unclassified basic research program and stand ready to assist that agency in this effort. We believe it is fundamentally healthy to have alternative sources of support in important areas of science and anticipate no difficulties in maintaining close coordination between NSF and NSA.

3) In cases in which alternative sources of support are available, we routinely encourage principal investigators to apply to such sources as well as to NSF. However, if an investigator prefers to apply only to NSF, we will consider the proposal in the usual manner, without prejudice, and reach a decision on funding using our usual criteria and peer review process.

4) The NSF does not expect that the results of the basic research which it supports will be classified, except in very rare instances. The NSF does not currently have classification authority, but it has responsibility, under routine executive orders issued by both the current and previous administrations, to refer any information which it believes might require classification to the agency with appropriate subject-matter interest and original classification authority. For cryptologic research, that agency is NSA. The important point here is that it makes no essential difference, in terms of the likelihood of classification, whether research is supported by NSF or NSA. This policy is of long standing, and applies to all areas of research.

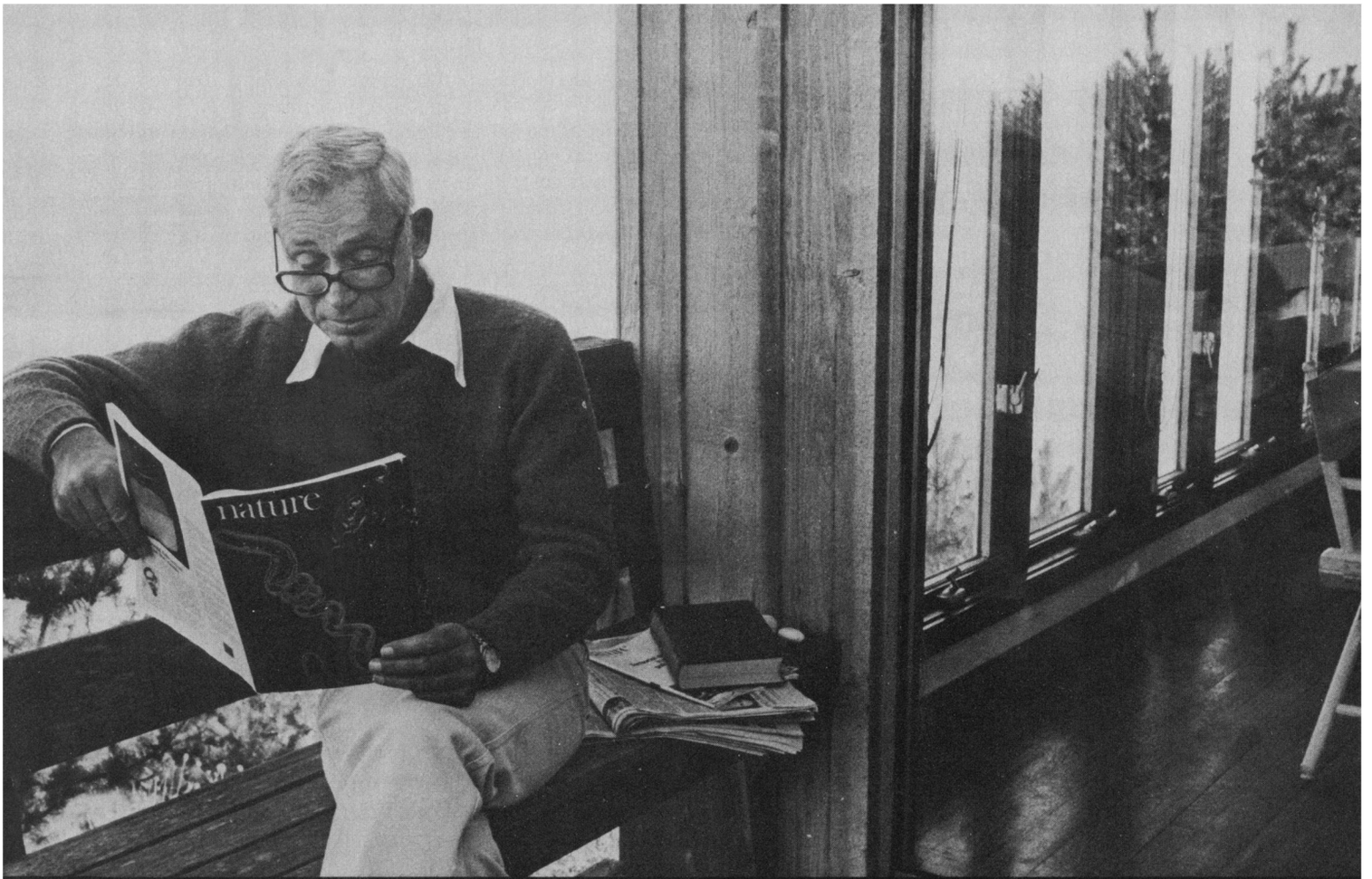
5) The NSF has long-established reporting requirements which allow it to meet its responsibility for prudent use of public funds. These might not be adequate in all cases where research could have special relevance to national security, and in such cases we may consider special reporting requirements. We have not done this in the past, and we may not have to do it in the future. If we did have to establish such reporting requirements, however, we would regard this not as a change in policy but simply as a change in administrative procedure necessary to apply a long-standing policy to a changed situation.

In summary, NSF will continue to support cryptologic research, will continue to coordinate such research with NSA, and will continue to encourage NSA to develop its own basic research support program. The results of such research have not been classified in the past, and we do not expect them to be in the future, but we will ensure that our reporting requirements are adequate to allow us to meet our responsibilities with respect to possible classification. Most important, NSF has a fundamental policy of supporting the best research it can find in all areas of science and engineering, with the fewest possible restrictions on investigators.

DONALD N. LANGENBERG
Office of the Director, National Science Foundation, Washington, D.C. 20550

I find it very strange that the Public Cryptography Study Group was put together by the American Council on Education, which represents university administrators, rather than by the mathematical community. As a result the group seems to have missed the essential feature of modern-day communication of information among mathematicians. Most new results in mathematics are circulated by means of preprints at least 1 to 2 years before they are published. Furthermore, preprints are usually sent out simultaneously with the submission of a paper for publication. Thus prepublication review of math journals (voluntary or otherwise) by the NSA would do little to impede the circulation of new results in cryptography obtained by mathematicians not affiliated with the NSA.

If the NSA seriously wants to restrict such circulation, it would have to prevent individual researchers from mailing out preprints of new results which the NSA deems relevant to cryptography. How does the NSA propose to do this? What does the NSA consider as being



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work relevant to cryptography? The work of Miller (*1*) on primality depends on the truth of the generalized Riemann conjecture, and it is not inconceivable that future factoring algorithms would also depend on basic results in number theory of the same ilk. Would that then mean that all future work on the Riemann conjecture would have to be cleared by the NSA before publication? What about general work on zeta functions that might relate to the Riemann conjecture?

Similarly the work of Rivest, Shamir, and Adleman (*2*) is based on number-theoretic results attributable to Euler and Gauss among others. Does that then mean that all future extensions of Gauss's and Euler's work must be cleared by the NSA before they can be discussed with colleagues?

The threat of possible classification of a research result as well as the knowledge that publication would be delayed due to the extra NSA review is sure to have chilling effects on the eagerness with which nontenured researchers would approach problems relating to cryptography. A major result, therefore, of an NSA review will undoubtedly be less research in this area. Is this one of the NSA's aims?

It seems to me that the scientific community should give much more thought to the question of the implications of prior restraint and should oppose it. If the NSA wants to exercise a policy of prior restraint, it should either be forced to obtain a legislative mandate for such a policy or made to test its current authority in the courts.

RICHARD MANDELBAUM

Department of Mathematics, University of Rochester, Rochester, New York 14627

References

1. G. L. Miller, thesis, University of California, Berkeley (1975).
2. R. Rivest, A. Shamir, L. Adleman, *Commun. ACM* (February 1978).

Participatory Management

Amitai Etzioni (Editorial, 22 Aug., p. 863) concludes that "We have overburdened our industrial machine, the modern American economy. . . . We have indulged in overconsumption . . . and underinvestment. This is reflected in most . . . components of the industrial system . . . . Once the broader picture is drawn, the corrective practically suggests itself: a decade or so of reindustrialization of America . . . ."

The manner in which decisions are made and implemented to modernize equipment or plant may have very considerable influence on payoff from the investment. Many organizations overlook this point in their managerial decision-making. As an illustration, a small steel company that I was consulting with a few years ago decided to install a new furnace at the cost of several million dollars. This furnace had the rated capacity to yield x melts a day with fewer workers, compared with the existing furnace from which the company was getting an average of $3/5x$ melts per day. The potentially much more efficient and productive furnace seemed necessary to lower costs and thus make it possible to compete with the Japanese steel imports that had seriously decreased this company's share of the market.

The manner of planning, making, and implementing that decision was (characteristically) unilateral—the company's top management and engineering department just arranged with the furnace manufacturer to build and install the new equipment, without involving the various stakeholder groups (union, workers, foremen, and so forth) in the plan. The result: Because of some design errors (not all relevant personnel were consulted in the planning), inadequate training with the new equipment, and the workers' fear of losing their jobs by potential technological displacement, yield from the new furnace was only about the same number of melts a day as that from the old furnace—until union-management relations improved and a more participatory style of management was introduced.

Etzioni's Rx includes (among his priorities) the shoring up of human capital. One demonstrably effective way to do that—and to improve productivity and product quality in the process—is through joint management-labor efforts at improving the quality of working life. The nature of such efforts, and of conditions needed to optimize the likelihood of sustained success, has been well described in readily available articles and books. Despite evidence offered of outcomes such as markedly improved morale, job satisfaction, productivity, product quality, and overall economic performance, the spread of this managerial modus operandi has been slow.

EDWARD M. GLASER

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Erratum: The correct surname of the first editor of *The Universe at Large Redshifts*, reviewed in the issue of 14 November, p. 781, is Kalckar.

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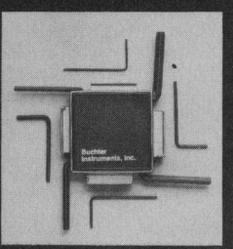

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28 November 1980, Volume 210, Number 4473 SCIENCE

Science and Engineering Education

In comparison with other advanced countries, the United States is becoming a nation of scientific illiterates. Our principal commercial and military rivals have recognized that future superiority will rest heavily on competence in applied science and engineering, and they are preparing their young people for the world of the future. For example, in Japan instruction in science begins in the first grade. From the third through the ninth grades, science and mathematics are required subjects and constitute two of the four major courses taught. Most students who intend to go on to universities continue to take science and mathematics courses in upper secondary schools. Their curriculum includes differential and integral calculus and probability and statistics.

Conspicuous examples of American achievements, such as Nobel Prizes or pictures from the Voyager spacecraft, serve to blind the public to the fact that a problem exists here. Actually, the Nobel laureates and the engineers responsible for Voyager are products of an earlier era. During their formative years (the 1940's and 1950's) a different attitude, one more favorable to science and engineering, prevailed in America. Around 1965 the environment for science and engineering began to deteriorate, and while Nobel Prizes still come, our superiority in technology has about vanished.

A recent report prepared by the National Science Foundation and the Department of Education* provides some sobering comments. At a time when the world faces an enormous need for engineers, the United States lags behind Japan, West Germany, and the Soviet Union in the number of engineering graduates per capita. The contrast is especially marked with respect to Japan, where engineering enjoys high prestige and the total number of degrees granted to engineers annually has surpassed that in the United States. In Japan 20 percent of all baccalaureate and about 40 percent of all master's degrees are granted to engineers. This compares with about 5 percent for each of these degree levels in the United States. Moreover, many of the U.S. graduates are foreign nationals.

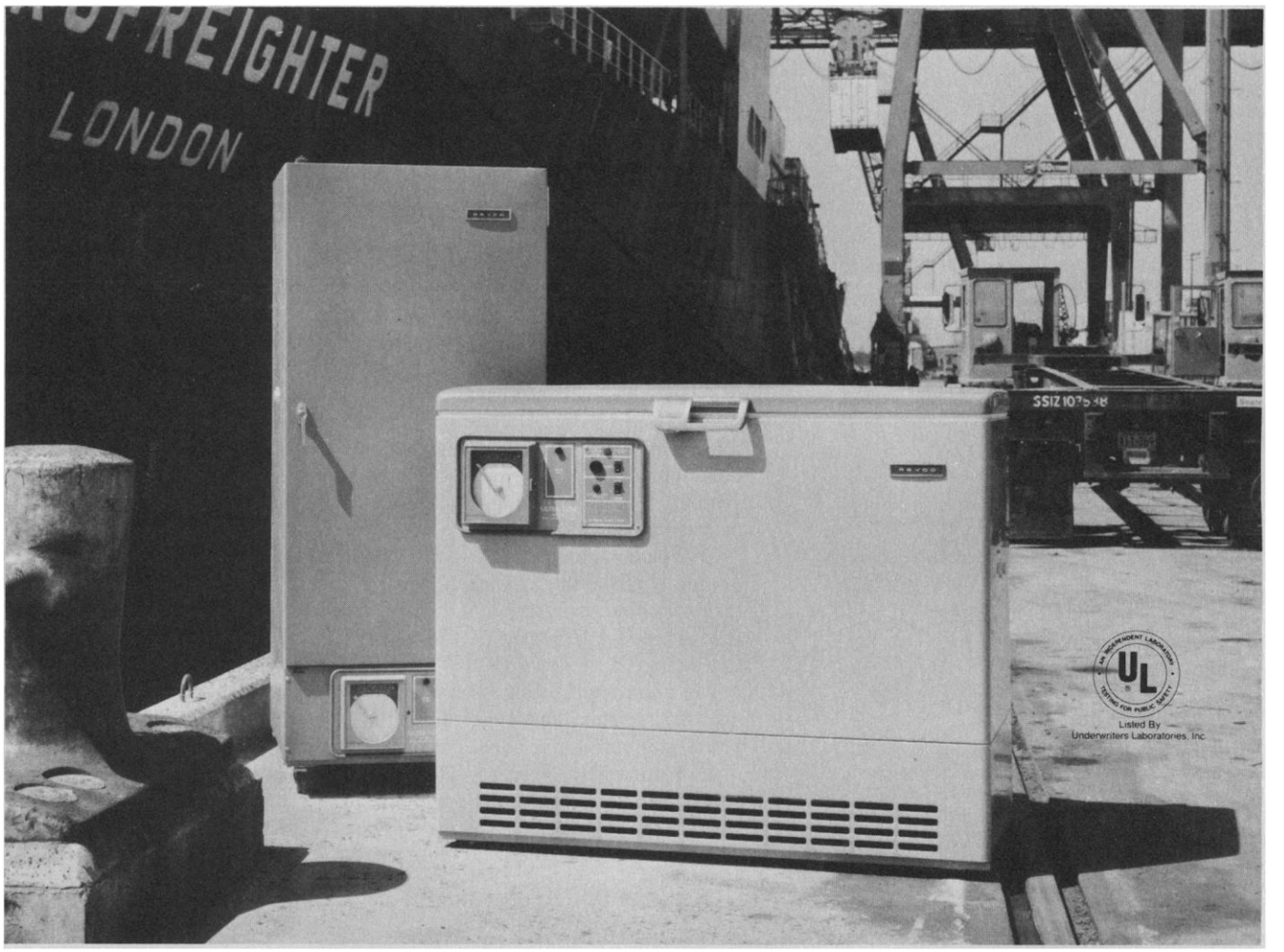
In Japan an engineering degree is a favorable route to business and social success. The report states that in Japan "only about 50 percent of the engineers produced each year . . . enter the engineering profession. The others become civil servants and managers in industry. Around one-half of the senior civil service hold degrees in engineering or related subjects. . . . In industry, about 50 percent of all directors have engineering qualifications."

The educational situation in Germany is similar to that in Japan, with emphasis on science and mathematics in primary and secondary schools. "The overall picture in Germany is one of a very high level of science and mathematics literacy among college graduates as well as a strong science/mathematics understanding among the general population."

In the Soviet Union students are exposed to an intense mathematics and science curriculum. Algebra and geometry are taught in the sixth and seventh grades, and additional mathematics, including calculus, is part of the high school curriculum. All youngsters are required to complete 5 years of physics and 4 years of chemistry. About five times as many Soviet students as Americans go on to engineering training. The inefficiencies of the Soviet system dissipate much of this advantage, but one can scarcely feel comfortable about the contrast in educational level between the military forces of the U.S.S.R. and the United States.

Our present policy is moving us toward becoming a colonial supplier of raw materials and food to more advanced countries and is placing us in a position of increasing peril. Unfortunately, there is no crisis to alert the public. The one positive factor operating at this time is a strong demand for engineering graduates, which is driving up salaries. Overcoming scientific illiteracy will take decades.—PHILIP H. ABELSON

*National Science Foundation and Department of Education, *Science and Engineering, Education for the 1980s and Beyond* (Washington, D.C., October 1980).



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Annual Meeting
Toronto
3-8 January 1981

Tours

For the Annual Meeting Program, please see the Preconvention Program in the 14 November issue of *Science*, pages 764–773. Tours are limited to Meeting Registrants only.

Tours

1. **Ontario Science Centre, Tour A:** Sunday, 4 January, 1:30 pm.–5:00 p.m.

Trip to Centre which includes 570 exhibits, most of them participational, demonstrations, mini-theatres, films, and workshops designed to stimulate the interest of the public in science.

2. **Centre for Forensic Sciences:** Monday, 5 January, 8:30 a.m.–12:00 noon.

Tour will provide an opportunity to view the workings of a modern "crime laboratory." Visits to some of the laboratories in forensic chemical-toxicology, biology, photography, firearms identification, and document examination will be included as well as illustrations of actual cases.

3. **TVOntario:** Monday, 5 January, 1:30 p.m.–5:30 p.m.

Includes demonstrations of Telidon, a computer communications system, Program Evaluation Analysis Computer, Anik B Satellite Experiment, FAST FOWARD, a new television series dealing with technology, and a tour of the master control and studio facilities.

4. **Gulf Oil Refinery and Research and Development Laboratories:** Tuesday, 6 January, 8:30 a.m.–4:00 p.m.

Refinery utilizes hydrogen treatment process for the manufacture of superior lubricants from Canadian crude oils. Tour of Gulf Research and Development Centre will feature laboratories involved in analytical product development, specialty products, engine testing a pilot plant. Box lunch included.

5. **Ontario Hydro's Pickering Generating Station:** Tuesday, 6 January, 1:30 p.m.–5:00 p.m.

Ontario Hydro operates four nuclear generating stations. CANDU reactor is highlighted in tour of the Nuclear Communications centre and Pickering Generating Station.

NOTE: Name and affiliation is required in advance of the tour from each person. Regulations do not permit visitors under 18 years of age. They are welcome, however, in the visitors' centre and exhibit area.

6. **Research Facilities Sheridan Park:** Wednesday, 7 January, 8:30 a.m.–2:00 p.m.

Includes Atomic Energy of Canada Limited (AECL) which supports design engineering of CANDU reactors, repair, installations and development programs. Visit to Ontario Research Foundation, a multi-disciplinary resource for industry, consultants, and government. Areas of major emphasis are energy, environment, materials, products and processes, and resources. Box lunch included.

7. **Resource Exploration and Environmental Sciences:** Wednesday, 7 January, 1:30 p.m.–5:00 p.m.

Includes tours of Barringer Research Limited and Scintrex Limited, which concentrate on the development and manufacture of devices for measuring natural force fields, physical and chemical properties of the solid earth and its atmosphere.

8. **Medical Sciences Building—University of Toronto:** Thursday, 8 January, 8:30 a.m.–12:00 noon.

Tour will visit several laboratories to illustrate some of the research activities in the field of medicine in the Toronto area.

9. **Ontario Science Centre, Tour B:** Thursday, 8 January, 1:30 p.m.–5:00 p.m.

See description for tour No. 1.

Special Post-Meeting Tour

10. **Canada Centre for Inland Waters and Niagara Falls:** Friday, 9 January, 8:30 a.m.–5:00 p.m.

Includes Canada Centre for Inland Waters' facility for Great Lakes research, Niagara Falls, and hydroelectric power plant. Lunch available.

As part of the activities at the forthcoming AAAS Annual Meeting, tours provide an opportunity for the meeting participants to explore some of the outstanding facilities in Greater Toronto focusing on the areas of science and technology. Using the reservation form that follows, please make advance reservations as soon as possible; space is limited and early commitments must be made to the host organizations. Reservations received after 15 December will be returned. Tickets will be available at the Ticket Desk in the Meeting Registra-

Please be sure to make your reservations early—space is limited.

tion area, Concourse Lobby, in the Sheraton Centre Hotel. Reserved tickets should be picked up by noon of the day preceding the day of the tour(s) selected. Reserved tickets not picked up by this deadline will be released to others up to one half hour before tour departure. A nominal charge will be made to help defray transportation and lunches (when provided). Handicapped persons who need assistance for the tours (or any Meeting function) should consult the staff at the Resource Centers for Disabled Registrants (Wentworth Room, second floor of the Sheraton Centre, or the New Brunswick Room, Main Mezzanine of the Royal York Hotel). All tours depart from and return to the Richmond Street entrance of the Sheraton Centre at the respective times listed for each tour.

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Reservation Form for Tours

AAAS Meeting registrants who wish to reserve tickets for any of the tours should complete the coupon below and return it to AAAS as soon as possible—space is limited. Reservations received after *15 December* will be returned. Reserved tickets will be held at the Ticket Desk in the Meeting Registration area, Concourse Lobby, in the Sheraton Centre Hotel. *Tickets should be picked up by noon of the day preceding the day of the tour.* Reserved tickets not picked up by this time will be released to others up to one half hour before the tour departs. *Do not send any remittance with this coupon*; it is a reservation form only. Please note that tours are limited to Meeting registrants only.

Tour	No. of Tickets
1. **Ontario Science Centre, Tour A** [Sun., 4 Jan., 1:30 p.m.-5:00 p.m.]	____
2. **Centre for Forensic Sciences** [Mon., 5 Jan., 8:30 a.m.-12:00 noon]	____
3. **TVOntario** [Mon., 5 Jan., 1:30 p.m.-5:30 p.m.]	____
4. **Gulf Oil Refinery, R & D Labs** [Tues., 6 Jan., 8:30 a.m.-4:00 p.m.] Lunch included.	____
5. **Pickering Generating Station** [Tues., 6 Jan., 1:30 p.m.-5:00 p.m.]	____
6. **Sheridan Park** [Wed., 7 Jan., 8:30 a.m.-2:00 p.m.] Lunch included.	____
7. **Resource Exploration** [Wed., 7 Jan., 1:30 p.m.-5:00 p.m.]	____
8. **Medical Sciences Building** [Thurs., 8 Jan., 8:30 a.m.-12:00 noon]	____
9. **Ontario Science Centre, Tour B** [Thurs., 8 Jan., 1:30 p.m.-5:00 p.m.]	____
Special Post-Meeting Tour	
10. **Canada Centre for Inland Waters, Niagara Falls** [Fri., 9 Jan., 8:30 a.m.-5:00 p.m.]	____
Total Number of Tickets Reserved	____

Indicate any special requirements due to a handicap: _____

_____

Name _____

Affiliation _____

Address _____

City _____ State _____ Zip _____

Mail to: **Tours**
AAAS Meetings Office
1776 Massachusetts Avenue, NW
Washington, D.C. 20036