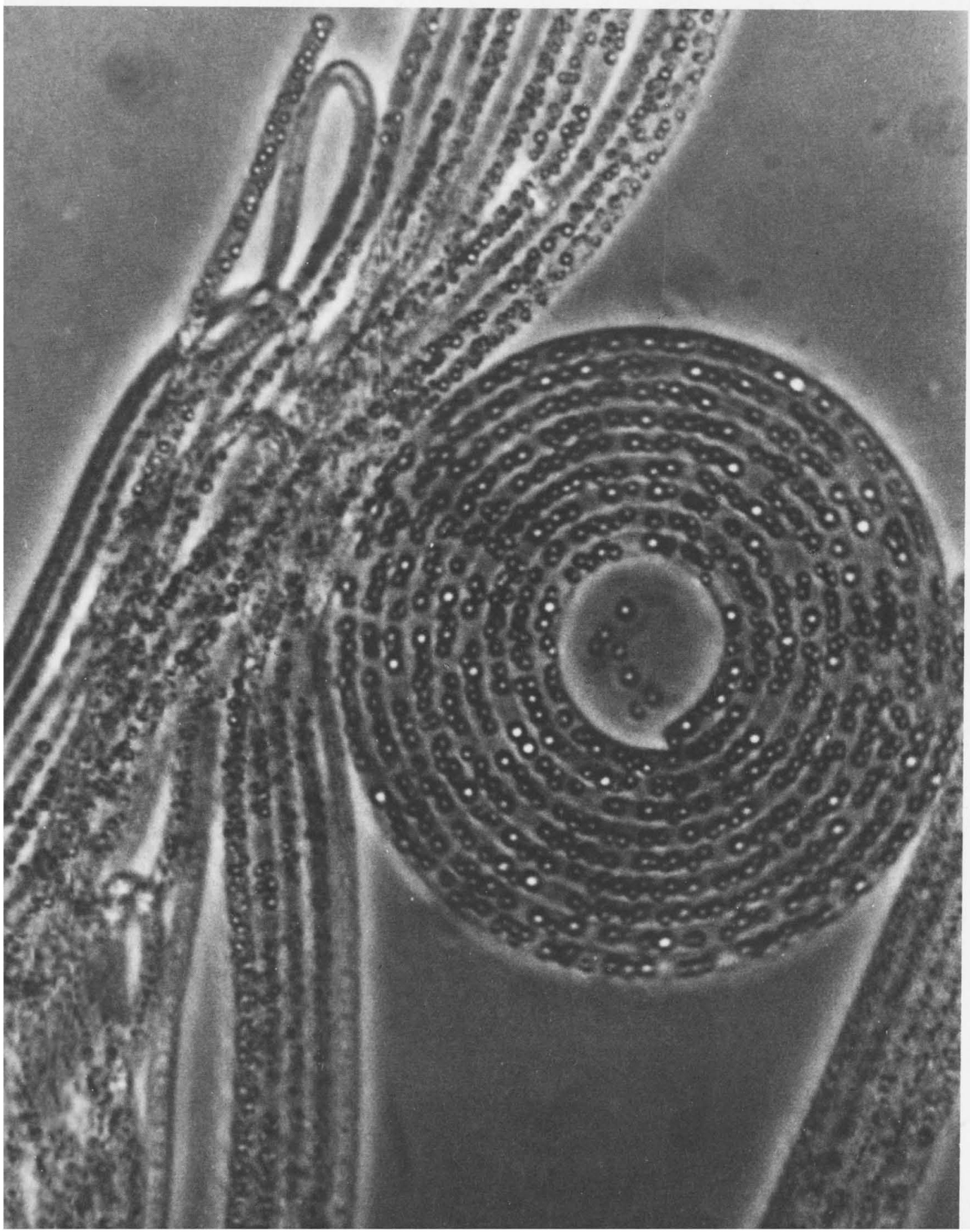
SCIENCE

14 January 1977

Volume 195, No. 4274

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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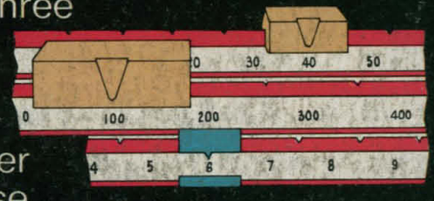

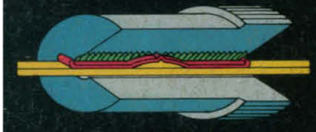

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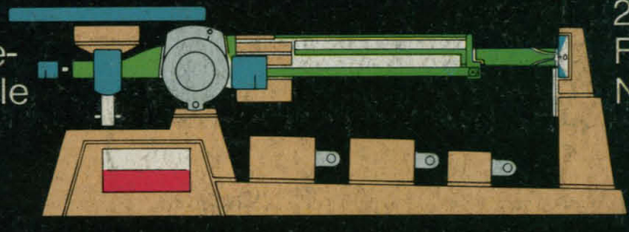

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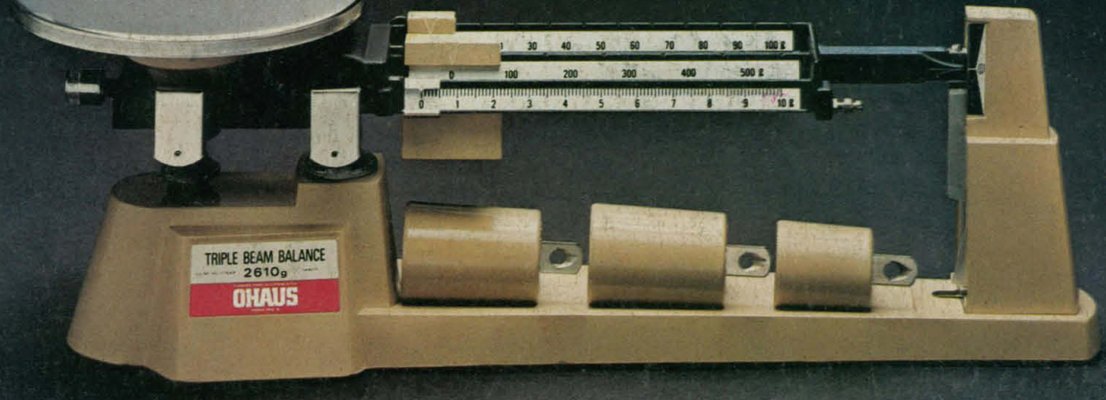

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14 January 1977

Volume 195, No. 4274

SCIENCE

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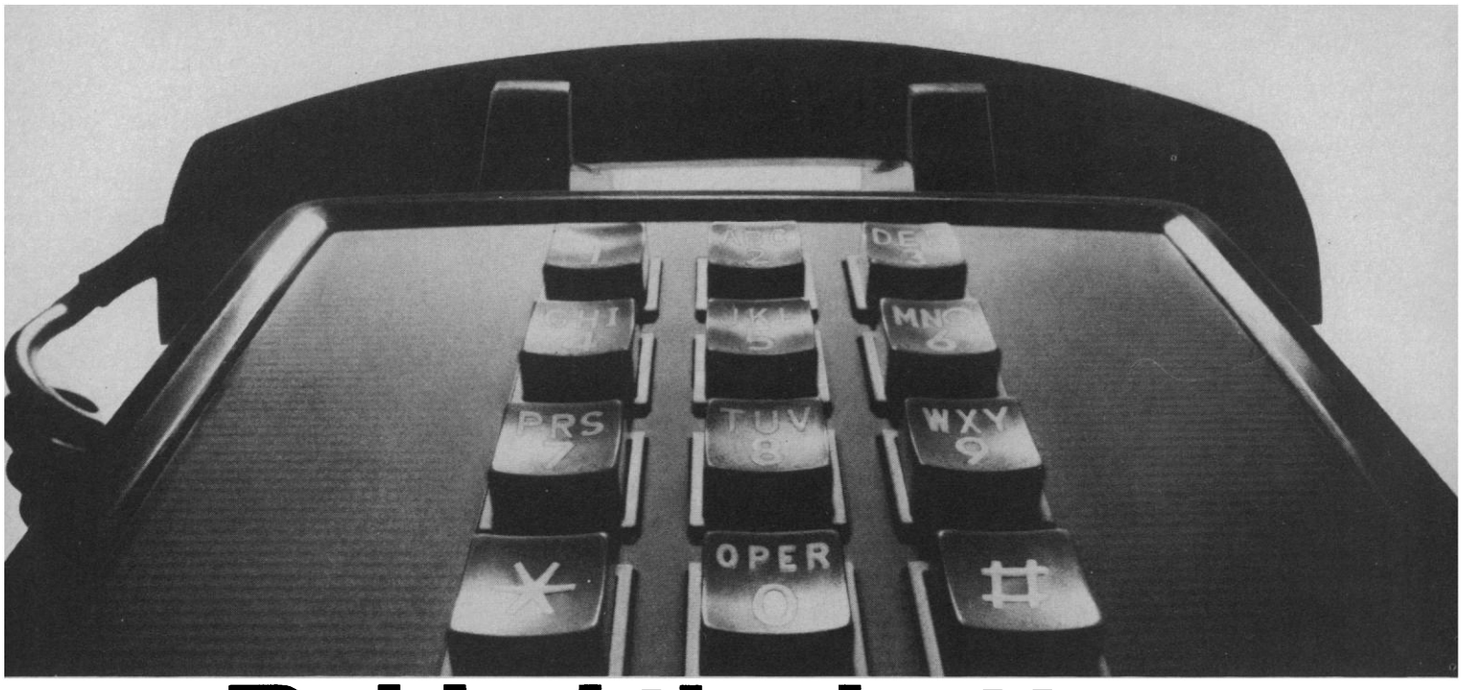

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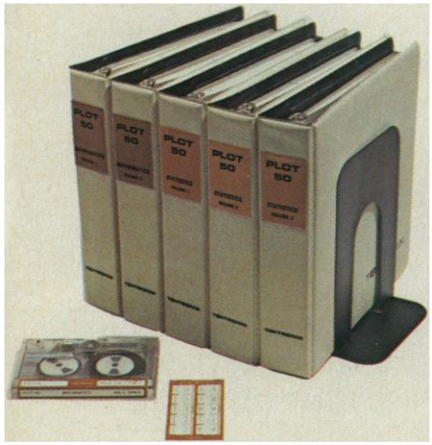

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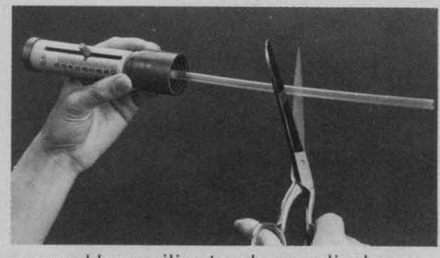

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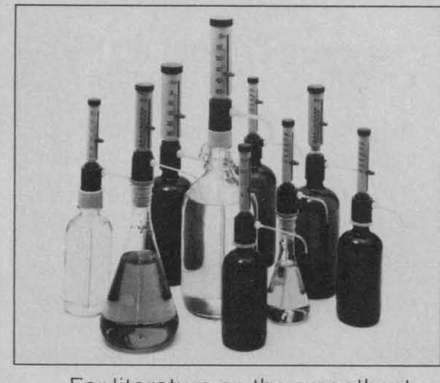

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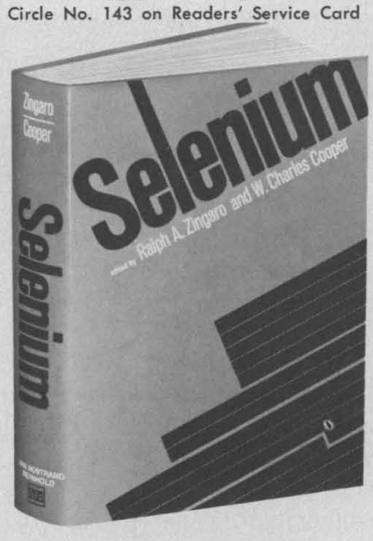

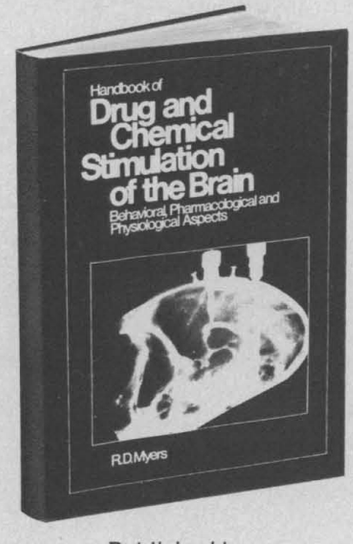

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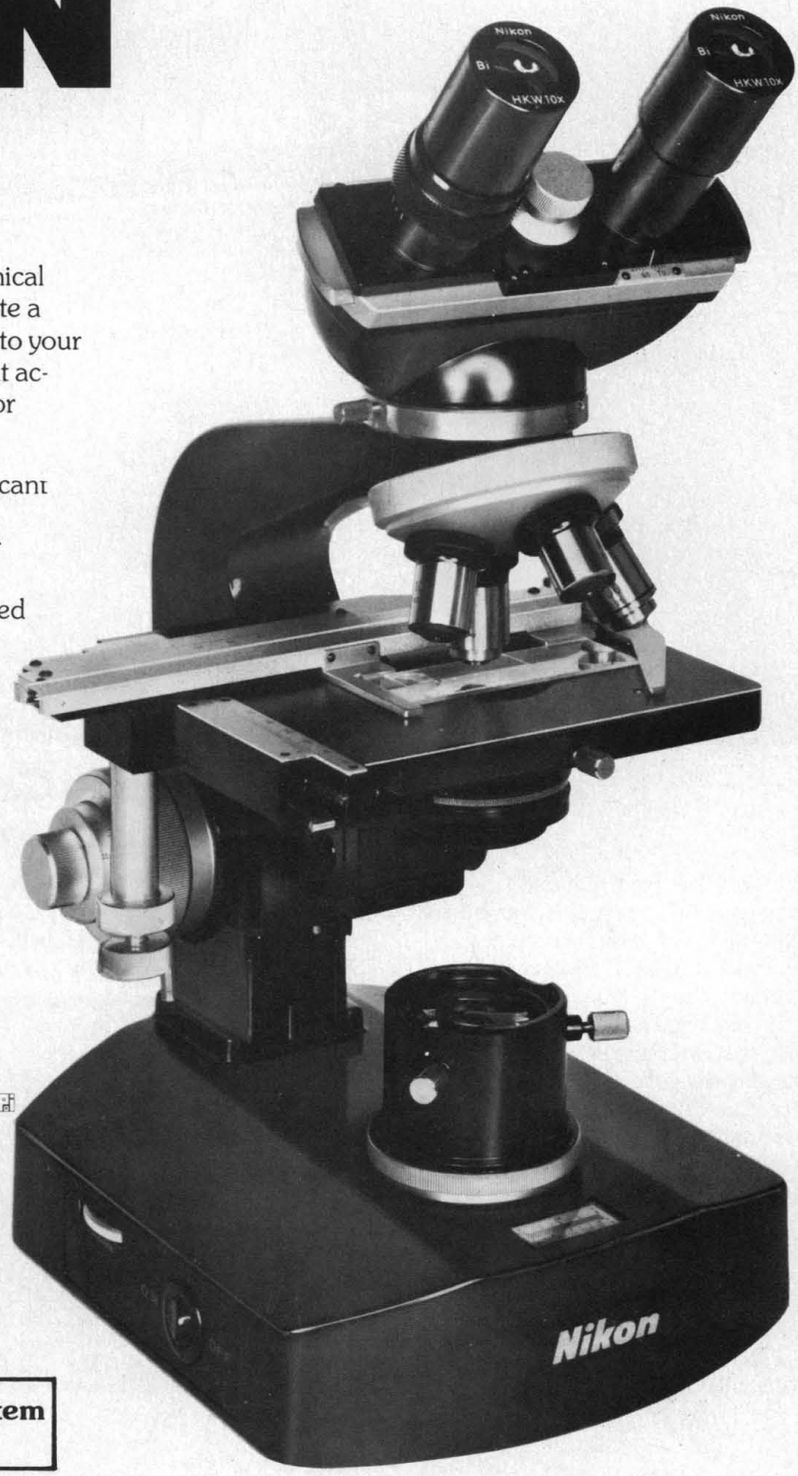

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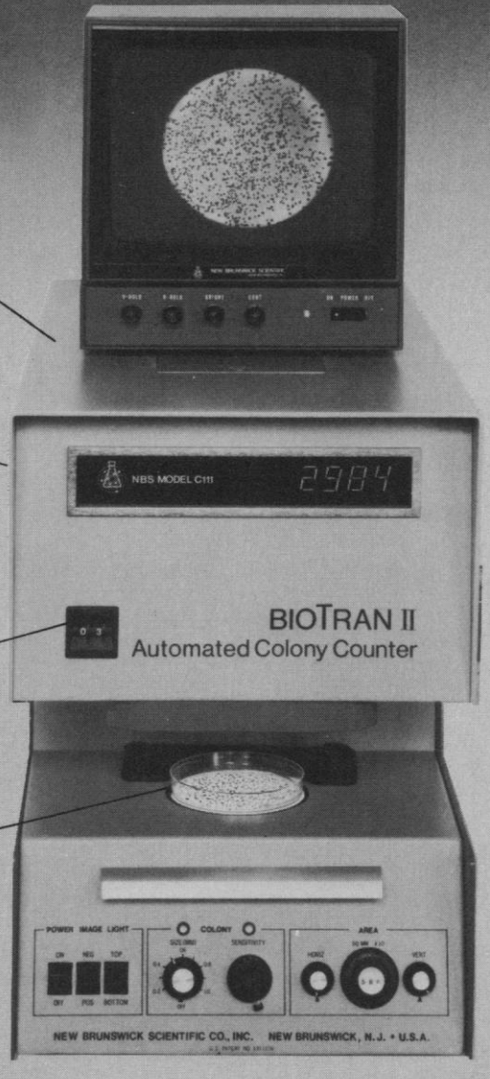

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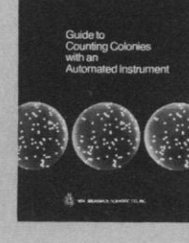

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LETTERS

Advice on Project Seafarer

The article "State scientific advisers: The effort in Michigan" (News and Comment, 26 Nov. 1976, p. 923) features William C. Taylor, science adviser to the governor of Michigan, and his role in the evaluation of Project Seafarer; but deficiencies in the structuring and performance of this role were not mentioned.

The panel on Project Seafarer included several members from academic departments already engaged in sponsored research on Project Seafarer or in direct contact with the Navy to obtain funding for such research. The information used to assess possible environmental problems came almost exclusively from the Navy, and the panel was briefed by the Navy. No attempt was made to contact personnel from the state of Wisconsin, who had previously examined such questions, and no attempt was made to involve the public before a recommendation was made. No public hearings sponsored by the state government were held in the Upper Peninsula until a year later, when they were forced by public pressure. The panel met once for a couple of hours before recommending that the Navy prepare an environmental impact statement.

The timetable for the environmental impact statement was apparently established for the convenience of the Navy and in accordance with the Navy's plans for a public relations campaign in the summer of 1976. This has been postponed until the summer of 1977, again for reasons apparently related to Navy public relations requirements rather than the need to answer questions raised by affected residents. The elaborate procedures involve several agencies with administrative, rather than scientific, competence in many of the areas involved. There is little evidence of any serious effort to have an in-depth review made by qualified scientists appointed for the purpose. The National Academy of Sciences study was included at the request of the Navy after opposition to Project Seafarer developed.

The emphasis given by Taylor to the environmental impact statement ignores questions raised by Congressman Philip E. Ruppe (R–Mich.) and others concerning land use and legal easements as well as many other concerns raised in public discussions.

Taylor's statements that science advisers should adopt "more of an advocacy position" and that a referendum is an unfortunate political commitment represent political advice which discredits the

role of the science adviser. These statements are untenable in view of the fact that eight counties in the immediate area of the antenna system have already voted by more than a four to one margin that they are opposed to locating Project Seafarer in Michigan. The continued effort to call for public opinion polls or a second referendum involving counties outside the proposed area has resulted in a loss of confidence in both the science adviser and the governor.

There are lessons to be learned by other states considering uses of a science adviser. The science adviser needs to operate within a system of checks and balances and to be constrained by some form of public accountability. A one-man operation that is political as well as scientific is unlikely to result in good scientific advice or a gaining of public confidence. Certainly the office of science adviser must be structured so that the adviser does not appear to serve primarily to sell government programs. In Michigan, the congressman for the district involved, the new senator, both houses of the state legislature, and major newspapers have called upon the governor to "veto" Project Seafarer. President-elect Carter has stated that Project Seafarer would not be built in Michigan against the wishes of the people and has noted that referenda have been held. The office of science adviser, by locking its operations in inflexible procedures requiring at least 2 years before involving the public in any significant way, has failed to provide information in the continuing debate and has left the governor standing alone.

DONALD G. YERG
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Animals and Ethics

The letters from Aronson and Cooper and from Sachs (19 Nov. 1976, pp. 784 and 786) take exception to several statements in Wade's article (8 Oct. 1976, p. 162) on the cat experiments at the American Museum of Natural History. The letters are, unfortunately, in no way unusual in their failure to face squarely the broader ethical issues involved in animal experimentation. Speaking of Henry Spira, one of the leaders of the action against the museum, Aronson and Cooper remark: "In none of his articles does Spira acknowledge that any animal should ever be used for any experiment, no matter how crucial it may be judged for human welfare or survival." If it is true that Spira has deliberately evaded the problem, this is a valid criticism. By the same token, it is incumbent on scientists not to deserve the converse criticism: "In none of their writings do they acknowledge that any experiment should not be done, regardless of how much suffering it entails for the animals used."

Aronson and Cooper refer to the "simplistic, reductionist idea that 'alternatives to live animals' . . . can be substituted for animal experiments. . . ." and to the "quasi-moralistic claim that animals have 'rights' equal to the sociopolitical rights of women and minorities." They complain that Wade does not indicate that "many see such statements as being antiscience." I would like to point out that most of the "alternatives to live animals" (many of which are used very successfully in some areas) were developed for purely pragmatic, not humane, reasons; that evaluating the "rights" of living things, far from being an obvious and simple decision, is a difficult philosophical problem; and that raising moral questions is not "antiscience."

Sachs states that "The public's right to challenge the ethics and economics of animal research is unquestioned." He then goes on to say: "The present peer review system, as fallible as it may be, has been largely successful in curbing unethical excesses and in fitting research priorities to available funds." The peer review system, to my knowledge, is devoted almost exclusively to determining the scientific merit of a proposal and the capability of an investigator to carry it out. The "economics" (funding) of the proposal is considered also. But the review committees, regrettably, do not include members designated specifically as spokesmen for the experimental animals, to "challenge the ethics . . ." of the proposed research.

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Recombinant DNA Research

According to the National Environmental Policy Act (NEPA) of 1969, alternative policies for recombinant DNA technology were supposed to be under consideration last fall. Despite this requirement, it is widely believed that this technology will inevitably proliferate and that the real policy decisions have already been made. An article in *Science* (News and Comment, 15 Oct. 1976, p. 303) reflects the prevailing view: "The nuclear genie is now out of the bottle for good or ill, and the crucial time of grace for instituting control over the recombinant DNA technique is probably over."

How has this sense of inevitability been generated? If we look back on the course of events, we find that a policy of proliferation was never formally adopted. Rather, at major decision-making junctures, it was simply assumed that these techniques would be exploited on a wide scale. The "moratorium" of July 1974, while it suspended work on two classes of experiment, merely advised caution on a third class—the insertion of animal genes into bacteria—with the result that work in this area went ahead. At the Asilomar conference, the moratorium was lifted and replaced by broad guidelines for all experiments except those judged to be of highest risk. The members of the National Institutes of Health (NIH) committee which drafted the guidelines released in June worked long and hard on methods for containment of the novel microbes to be manufactured but did not weigh the need to continue research and development—possibly an equally significant factor in the risk equation.

The situation is troubling because, in principle, two mechanisms should have ensured a more careful approach to formation of policy for genetic manipulation. First, the original charge to the NIH guidelines committee required that research aimed at defining the risks precede the development of guidelines (*1*):

> The goal of the Committee is to investigate the current state of knowledge and technology regarding DNA recombinants, their survival in nature, and transferability to other organisms; to recommend programs of research to assess the possibility of spread of specific DNA recombinants and the possible hazards to public health and the environment; and to recommend guidelines on the basis of the research results.

In fact, the reverse procedure has occurred. Guidelines have appeared, but research directed specifically toward assessment of hazards is in its infancy.

Second, the application of NEPA should have ensured consideration of alternative policies for research and development. Before a government agency takes any "major action significantly affecting the quality of the human environment," NEPA requires the circulation to the public and to other government agencies of a "detailed statement" which describes the environmental impact of the proposed action and of alternatives to it. But NIH reversed this order of procedure thereby sanctioning a policy of proliferation prior to formal consideration of that policy under the laws. Guidelines were released in June, before publication of the impact statement in September. This premature release of guidelines prior to the impact statement which is required by law to precede them has been justified on the grounds that their "development was in large part tantamount to conducting an Environmental Impact Assessment" (*2*).

NEPA also requires consideration of "all reasonable courses of action, particularly those that might avoid adverse environmental effects." This wise safeguard against premature or ill-considered adoption of actions which pose significant environmental hazards has, by accident or design, been circumvented in the process by which the guidelines have been formulated and released.

If recombinant DNA techniques prove as powerful as expected and human nature and hardware as unreliable as they have always been, proliferation is almost certain to have disastrous consequences eventually. But to establish a policy of proliferation by default is not only to uncork the genetic genie in a manner likely to bring about disaster: it is also to deny the public its right to make an informed decision on a matter which vitally affects its interests. In my view, the only way to protect that right is to require an immediate and full moratorium until policy options have been carefully considered and chosen through democratic procedures developed for the purpose. No doubt this course of action would be frustrating to scientists who see the problem in terms of technical solutions to short-term risks or who, in the name of freedom of inquiry, defend their freedom to manufacture novel and potentially harmful organisms. But only in this way can we ensure that a decision to set off down the one-way road of proliferation is not made by default.

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References

1. *Fed. Reg.* **39**, 39306 (6 November 1974).
2. D. S. Fredrickson, *Science* **193**, 1192 (1976).

The recent enactment of the Toxic Substances Control Act (Public Law 94–469) may have implications for certain kinds of research on recombinant DNA. In the debate over the risks and benefits of such research, some scientists have stressed that important practical applications, for example, the creation of bacteriological "factories" to produce needed quantities of somatotropin or insulin, could be quickly realized.

The definitions section of the new law may encompass the use of recombinant DNA techniques to produce quantities of these and other important chemicals. According to the law, if the administrator of the Environmental Protection Agency finds that the manufacture of a chemical substance "may present an unreason-

able risk of injury to health or to the environment" and that there are insufficient data to determine the risks, he can require that those who intend to manufacture the substance complete extensive tests to determine the safety of their proposal.

PHILIP REILLY

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Those debating the issue of recombinant DNA experiments might do well to consider what *can* be done along with what *should* be done. While I enjoy reading the arguments concerning freedom to do research and the questionable benefit of additional knowledge, I do not find these arguments of much use in plotting a course of action.

More specifically, how do opponents of recombinant DNA experiments propose to enforce a ban on them, and how do proponents of general guidelines expect to achieve adherence to such guidelines? Certainly legislative action cannot be relied upon, and it is obvious that consensus is unlikely. Federal funding policies can influence only the pace at which such experiments are conducted.

Monitoring recombinant DNA research then becomes the crucial issue. One approach for federal surveillance is put forth by Clifford Grobstein (10 Dec. 1976, p. 1133). I suggest, for discussion, an alternative, two-point proposal:

1) Establish a small number (three to five) of "centers for recombinant DNA research," each with an independent control board comprised of members from both the scientific and nonscientific communities and charged with the responsibility of setting, publishing, and reviewing guidelines for experiments. In addition to a permanent staff, each center would provide for a visiting scientist program. Federal funding for recombinant DNA research would be confined to these few centers.

2) Establish a single, independent review board consisting of the director of each center, three members (not associated with biological research) of the National Academy of Sciences, and two members from the scientific press. This board would periodically review the work of each investigator, issue press releases, screen all material submitted for publication, and publish an annual report in language comparable to that in the Research News section of *Science*.

If we can't stop the research, let's attempt to keep abreast of the new knowledge.

PAUL SCHEIE

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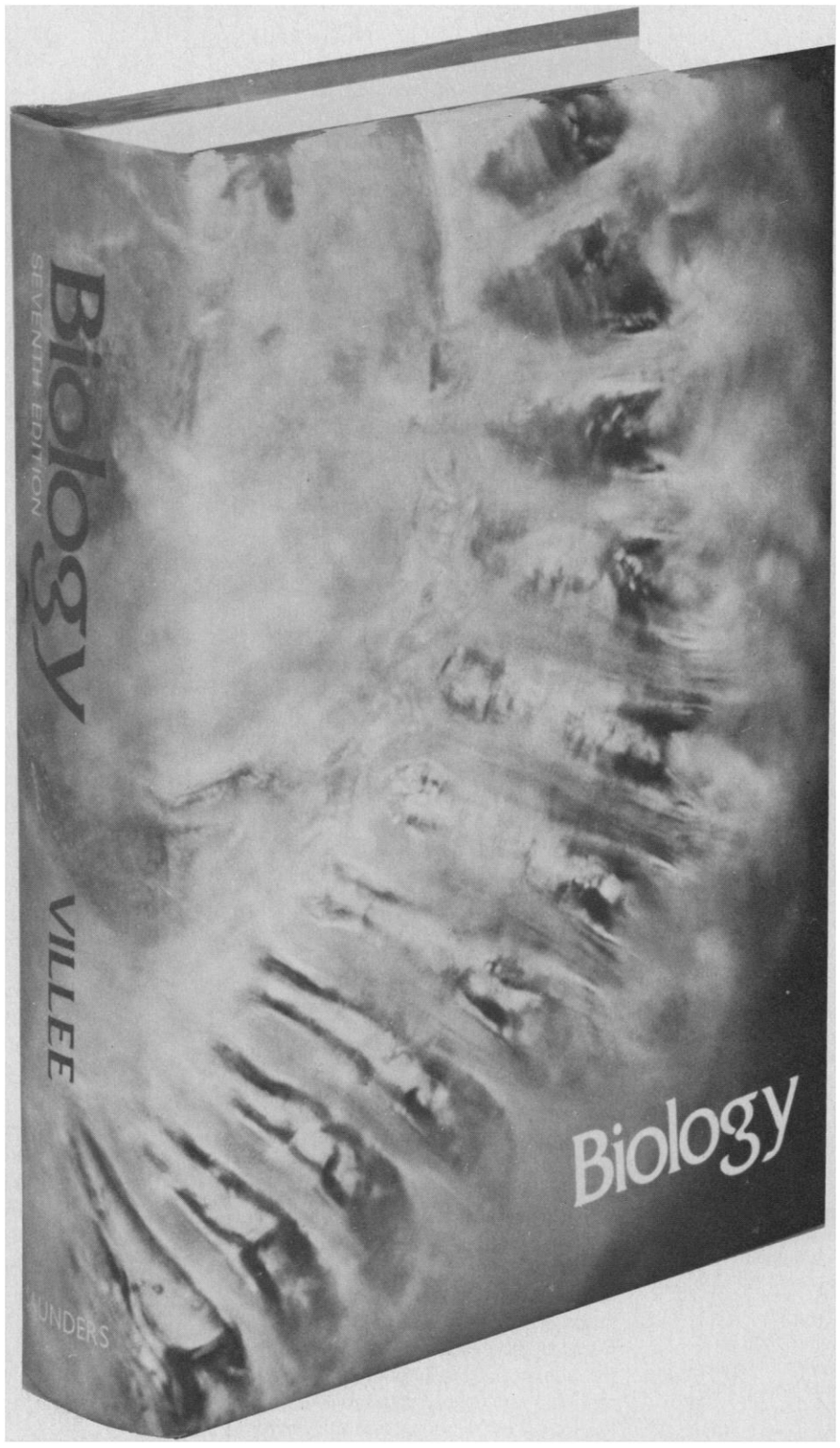
Texas Lutheran College, Seguin 78155

Some things just get better with age . . .



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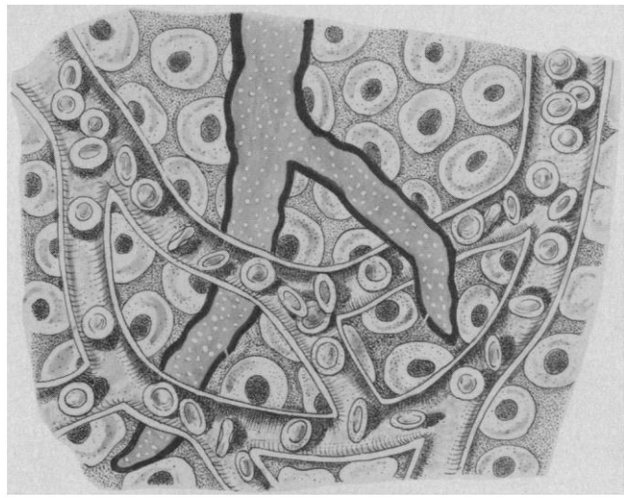

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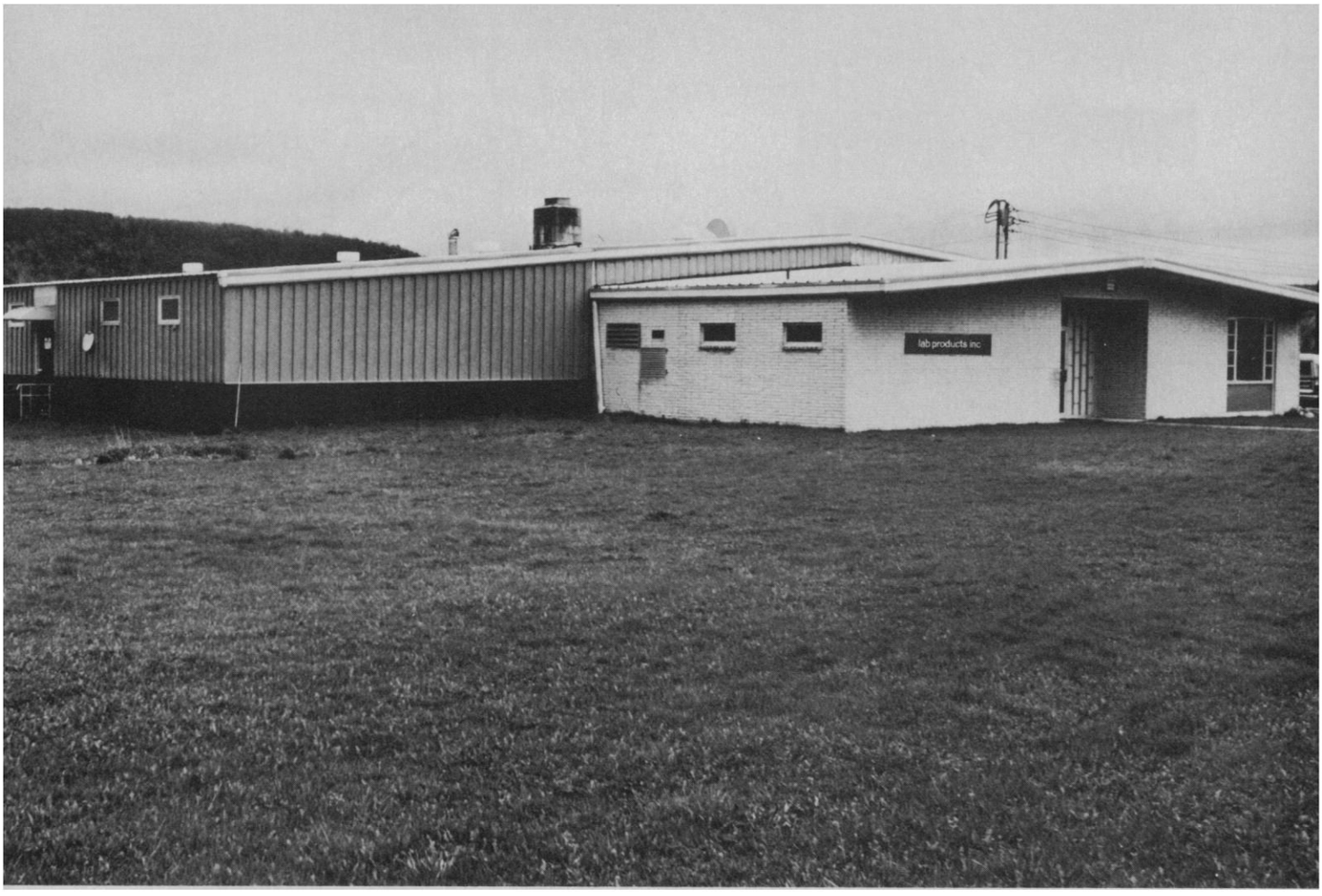

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14 January 1977, Volume 195, Number 4274 **SCIENCE**

Oil Spills

The grounding and gradual subsequent destruction of the ship *Argo Merchant* off Nantucket Island released most of a cargo of 28,000 metric tons of number 6 fuel oil. The circumstances furnished ingredients for a series of exciting news stories. On the air and in print there was liberal use of the terms disaster, ecological catastrophe, and destruction of fisheries.

Journalists might have provided a better perspective on the event. A considerable body of information about oil spills now exists. During the past decade ten incidents have occurred, each involving greater tonnages than that off Nantucket. An excellent source of information on the fate of spills is the comprehensive report *Petroleum in the Maritime Environment* issued by the National Academy of Sciences.*

When an oil spill occurs a series of dissipative mechanisms begin to operate. These are not effective in a confined or anaerobic environment. However, on the open seas with high winds, events move rapidly. First the spill spreads, and the 20,000-km^2 area mentioned in recent news accounts is in line with those seen in other spills after 2 weeks. The spreading is not uniform—part of the area has a thickness of a few millimeters, most has a thickness of about 10^{-4} cm. In any event, the circumstances favor evaporation of hydrocarbons. Substances with a molecular weight of 300 or less are volatilized quickly. Simultaneously the remaining material is subject to oxidative processes, especially in sunlight. The thin film of petroleum absorbs ultraviolet light and activated molecules react readily with oxygen to form more soluble, more surfactant products. In stormy seas yet another dissipative process is effective—removal via sea spray. Tiny drops containing hydrocarbons may be carried by winds as far as 100 km.

A wide variety of animals and microorganisms metabolize or detoxify hydrocarbons; the straight-chain molecules are particularly easily handled and can be the sole carbon source for some microorganisms. Hydrocarbons containing naphthenic or aromatic rings are slowly attacked. In contrast to some other lipid-soluble substances such as chlorinated hydrocarbons, petroleum compounds are not concentrated in food chains.

With removal of some of the constituents, the remaining hydrocarbons of the thicker patches of the present spill came to have the consistency of a thick pudding. With continued wave action the patches will break up, forming tar balls. These balls will have a density close to 1.0 g/cm^3 and when denser particulate matter is added may slowly sink. One mechanism for increasing the density involves copepods. These small sea grazers ingest particulate matter including small tar balls and later excrete the tar unchanged as part of a dense feces. Part of the tar balls will remain at the surface. At the various levels, currents with different velocities will dissipate the spill further. In the aerobic environment oxidation continues slowly. The probable lifetime of a tar ball is about 1 year.

The Academy report provides estimates of the major sources of hydrocarbons in the marine environment. In much of the sea and sea bottom biogenic processes are the principal sources of the hydrocarbons present. Estimates of annual biosynthetic production range from 3 to 10 million tons. A comparable amount, 6.1 million tons, was contributed by petroleum sources in 1971. Of the total, 2.1 million tons was lost during transportation. A nearly equal amount was derived from river and urban runoff.

Obviously, when 28,000 tons of heavy oil are released to the environment damage must result. Already there has been loss of some sea birds. Later, part of the tar balls may reach land, where they will be a nuisance. Incidents of this kind should be avoided and the perpetrators should be forced to pay for any demonstrable damage. But talk of an ecological catastrophe thus far is only talk. It has no factual basis.—PHILIP H. ABELSON

*Ocean Affairs Board, *Petroleum in the Maritime Environment* (National Academy of Sciences, Washington, D.C., 1975).

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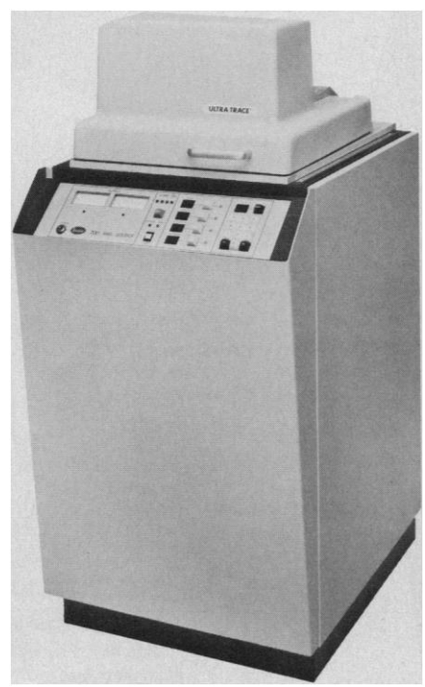

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Literature

Microscopy from the Very Beginning is a 65-page exposition by an expert that details basic design and operation of microscopes, the behavior of light in optical systems, and the kind of accessories available for today's instruments. $1.50 per copy. Carl Zeiss. Circle 675.

Laboratory Products is a catalog of items for filtration and chemical separation with information about applications. Whatman. Circle 676.

Vacuum Fittings includes flanges, clamps, centering rings, reducing rings, hose nipples, and others in standard, reducing, and tapering configurations. Alcatel Vacuum Products. Circle 677.

Amino Acid Analysis describes the results achieved in 30 minutes with the D-500 analyzer. Durrum Instrument. Circle 678.

Environmental Rooms details a line of prefabricated, modular, walk-in models for control of temperature, humidity, and light. Hotpack. Circle 679.

Spectrophotometers lists the Super-Scan series of five ultraviolet-visible light instruments. Accessories are included for the design of analytical systems around the devices. Varian Instrument Division. Circle 680.

Mass Spectrometer is devoted to a unit for the analysis of the composition of gases in vacuum systems. The Quadrupole gas analyzer with a one-piece ceramic mass separator. Leybold-Heraeus. Circle 681.

Microcomputer Product Catalog includes software, development systems, and hardware items and peripheral apparatus. Control Logic. Circle 682.

Chemical Terms, Sanyo's Trilingual Glossary offers English, Japanese, and Chinese lists with formulas where appropriate. Sadtler Research Laboratories. Circle 683.

Biochemicals includes approximately six dozen new products among an extensive inventory of items previously offered. ICN Pharmaceuticals, Life Sciences Group. Circle 684.

Applications Invited for AAAS Congressional Science Fellowships

The American Association for the Advancement of Science invites applications for the fifth year of its Congressional Science and Engineering Fellow Program. (See *Science*, 7 January 1977, page 55)

The Program selects postdoctoral level to midcareer scientists and engineers to spend one year working in some area of Congress. In the past four years, 19 AAAS Fellows have been in positions in the House and Senate and the Office of Technology Assessment. Each Program year includes AAAS Fellows as well as several other Fellows selected by six or more cooperating affiliated professional societies.

The award is $16,000 for the period of one year, beginning 1 September 1977, and includes an additional $1000 for moving and travel expenses. Interested applicants requiring a higher stipend are encouraged to discuss their situation with the program director. The AAAS provides a two-week orientation. Each Fellow chooses his or her own assignment with guidance from the AAAS.

Candidates may apply from any physical, biological or behavioral science or field of engineering, as well as from the system sciences, public health, and other technical professional areas. Candidates must be members of the AAAS or concurrently applying for membership.

Information on the selection criteria, application procedure, and program details are available from **Dr. Richard A. Scribner, Director, AAAS Congressional Science Fellow Program, AAAS, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036.** The deadline for application is 31 March 1977. Announcement of the awards will be made before 15 May 1977.

BOOKS RECEIVED

(Continued from page 170)

Cliffs, N.J., 1976. vii, 215 pp. Paper, $4.50. A Spectrum Book.

The Patronage of Science in the Nineteenth Century. R. Fox, J. B. Morrell, D. S. L. Cardwell, R. M. MacLeod, and W. H. Brock. G. L'E. Turner, Ed. Noordhoff, Leyden, The Netherlands, 1976. vi, 218 pp. Dfl. 55.

Photoionization and Other Probes of Many-Electron Interactions. Proceedings of a NATO Advanced Study Institute, Carry-le-Rouet, France, Aug. 1975. F. J. Wuilleumier, Ed. Plenum, New York, 1976. xvi, 472 pp., illus. $45.

Piaget and His School. A Reader in Developmental Psychology. Bärbel Inhelder, Harold H. Chipman, and Charles Zwingmann, Eds. Springer-Verlag, New York, 1976. xiv, 302 pp. Paper, $14.80. Springer Study Edition.

Polyhedra. A Visual Approach. Anthony Pugh. University of California Press, Berkeley, 1976. x, 118 pp., illus. Paper, $4.95.

Postbuckling Behavior of Structures. M. Esslinger and B. Geier. Springer-Verlag, New York, 1975. 280 pp., illus. Paper, $7.40. International Centre for Mechanical Sciences Courses and Lectures, No. 236.

Programming Electronic Switching Systems. Real-Time Aspects and Their Language Implications. M. T. Hills and S. Kano. Published for the Institution of Electrical Engineers by Peregrinus, Stevenage, England, 1976 (U.S. distributor, International Scholarly Book Services, Forest Grove, Ore.). viii, 208 pp., illus. $22.50. IEE Telecommunications Series 3.

Progress in Allergy. Vol. 20. Paul Kallós, Byron H. Waksman, and Alain de Weck, Eds. Karger, Basel, 1976. xii, 340 pp. $51.75.

Quantum Biochemistry and Specific Interactions. Zeno Simon. Translated from the Romanian edition (Bucharest, 1973). Abacus Press, Tunbridge Wells, Kent, England, 1976 (U.S. distributor, International Scholarly Book Services, Forest Grove, Ore.). 252 pp., illus. $30.

The Radio Amateur's Handbook. A Frederick Collins. Revised by Robert Hertzberg. Crowell, New York, ed. 13, 1976. vi, 378 pp., illus. $8.95.

RNA Polymerase. R. Losick and M. Chamberlin, Eds. Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y., 1976. x, 900 pp., illus. $38. Cold Spring Harbor Monograph Series.

Safety. Concepts and Instruction. Alton L. Thygerson. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1976. xii, 130 pp., illus. Paper, $4.95.

Scientist as Subject. The Psychological Imperative. Michael J. Mahoney. Ballinger (Lippincott), Cambridge, Mass., 1976. xiv, 250 pp. $13.50

Secrets of the Deep. Stephen Spotte. Drawings by Gordy Allen. Scribner, New York, 1976. x, 146 pp. $7.95.

Sex Education in Medicine. Proceedings of a conference, Airlie House, Va., Apr. 1974. Harold I. Lief and Arno Karlen, Eds. Spectrum, New York, 1976 (distributor, Halsted [Wiley], New York). xviii, 156 pp. $12.95.

Social Behavior in Vertebrates. Anthony Payne. Heinemann, London, 1976 (U.S. distributor, Humanities Press, Atlantic Highlands, N.J.). vi, 146 pp., illus. $6.75. The Scholarship Series in Biology.

Social Limits to Growth. Fred Hirsch. Harvard University Press, Cambridge, Mass.,

1976. xii, 208 pp. $10. A Twentieth Century Fund Study.

Specifications for the Identity and Purity of Some Food Colours, Flavour Enhancers, Thickening Agents and Certain Other Food Additives. Food and Agriculture Organization of the United Nations, Rome, 1975 (U.S. distributor, Unipub, New York). 216 pp., illus. Paper, $7.

Sperm Action. Proceedings of a seminar, Brussels, May 1975. P. O. Hubinont, M. L'Hermite, and J. Schwers, Eds. Karger, Basel, 1976. xii, 314 pp., illus. $40.75. Progress in Reproductive Biology, vol. 1.

Xth International Symposium on Fruit Tree Virus Diseases. Heidelberg, Sept. 1976. Biologische Bundesanstalt für Land- und Forstwirkschaft, Berlin-Dahlem, 1976. 122 pp. Paper, DM 15.80. Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirkshaft, Heft 170.

Theoretical Inorganic Chemistry II. Springer-Verlag, New York, 1976. iv, 154 pp., illus. $22.20. Topics in Current Chemistry 65.

A Theory of Elasticity with Microstructure for Directionally Reinforced Composites. J. D. Achenbach. Springer-Verlag, New York, 1975. 140 pp., illus. Paper, $12.30. International Centre for Mechanical Sciences Courses and Lectures, No. 167.

Toughness and Brittleness of Plastics. Papers from a symposium, Atlantic City, N.J., Sept. 1974. Rudolph D. Deanin and Aldo M. Crugnola, Eds. American Chemical Society, Washington, D.C., 1976. xii, 412 pp., illus. $38. Advances in Chemistry Series, 154.

Tropical Pasture Seed Production. L. R. Humphreys. Food and Agriculture Organization of the United Nations, Rome, 1976 (U.S. distributor, Unipub, New York). x, 116 pp., illus. Paper, $4.

Turbulence. P. Bradshaw, Ed. Springer-Verlag, New York, 1976. xii, 336 pp., illus. $39.80. Topics in Applied Physics, vol. 12.

UFOlogy. James M. McCampbell. Celestial Arts, Millbrae, Calif., 1976. xvi, 188 pp. Paper, $4.95.

Untersuchungen über die morphologische und biologische Differenzierung in der Fusarium-Sektion Liseola. Helgard Nirenberg. Biologische Bundesanstalt für Land- und Forstwirtschaft, Berlin-Dahlem, 1976. vi, 118 pp., illus. Paper, DM 16.90. Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft, Heft 169.

U.S. Observatories. A Directory and Travel Guide. H. T. Kirby-Smith. Van Nostrand Reinhold, New York, 1976. 174 pp., illus. Cloth, $11.95; paper, $6.95.

Violence in Animal and Human Societies. Arthur G. Neal, Ed. Nelson Hall, Chicago, 1976. viii, 232 pp. $11.

Water Publications of State Agencies. First Supplement, 1971–1974. A Bibliography of Publications on Water Resources and Their Management Published by the States of the United States. Gerald J. Giefer and David K. Todd, Eds. Water Information Center, Huntington, N.Y., 1976. xx, 190 pp. $23.

What We Really Know about Child Rearing. Science in Support of Effective Parenting. Seymour Fisher and Rhoda L. Fisher. Basic, New York, 1976. x, 262 pp. $12.50.

The World's Cats. Vol. 3. No. 2, Contributions to Biology, Ecology, Behavior and Evolution. Proceedings of a symposium, Apr. 1974. Randall L. Eaton, Ed. Carnivore Research Institute, Burke Museum, University of Washington, Seattle, 1976. vi, 178 pp. Paper, $8.

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Algebra, Topology, and Category Theory. A Collection of Papers in Honor of Samuel Eilenberg. Papers from a conference, New York, May 1974. Alex Heller and Myles Tierney, Eds. Academic Press, New York, 1976. xii, 226 pp. $26.50. *To order this book circle No. 351 on Readers' Service Card*

Animal, Plant, and Microbial Toxins. Vol. 1, Biochemistry. Proceedings of a symposium, Tokyo, Sept. 1974. Akira Ohsaka, Kyozo Hayashi, Yoshio Sawai, Ryosuke Murata, Masaru Funatsu, and Nobuo Tamiya, Eds. Plenum, New York, 1976. xxvi, 556 pp., illus. $59. *To order this book circle No. 352 on Readers' Service Card*

Animal Virology. Papers from a symposium. David Baltimore, Alice S. Huang, and C. Fred Fox, Eds. Academic Press, New York, 1976. xiv, 824 pp., illus. $29.50. *To order this book circle No. 361 on Readers' Service Card*

Annual Reports on NMR Spectroscopy. Vol. 6B. E. F. Mooney, Ed. Academic Press, New York, 1976. viii, 240 pp., illus. $23.75. *To order this book circle No. 353 on Readers' Service Card*

Biochemical Interaction between Plants and Insects. Proceedings of a meeting, Tampa, Fla., Aug. 1975. James W. Wallace and Richard L. Mansell, Eds. Plenum, New York, 1976. xii, 426 pp. $35. Recent Advances in Phytochemistry, vol. 10. *To order this book circle No. 354 on Readers' Service Card*

The Bilingual Child. Research and Analysis of Existing Educational Themes. António Simões, Jr., Ed. Academic Press, New York, 1976. xvi, 272 pp. $16.50. Educational Psychology. *To order this book circle No. 364 on Readers' Service Card*

Chemical Microbiology. An Introduction to Microbial Physiology. Anthony H. Rose. Plenum, New York, ed. 3, 1976. x, 470 pp., illus. $29.50. *To order this book circle No. 355 on Readers' Service Card*

The Chemistry of Nonaqueous Solvents. Vol. 4, Solution Phenomena and Aprotic Solvents. J. J. Lagowski, Ed. Academic Press, New York, 1976. xiv, 312 pp., illus. $31.50. *To order this book circle No. 365 on Readers' Service Card*

Contamination Control in Trace Element Analysis. Morris Zief and James W. Mitchell. Wiley-Interscience, New York, 1976. xvi, 262 pp., illus. $22.50. Chemical Analysis, vol. 47. *To order this book circle No. 366 on Readers' Service Card*

Critical Stability. Vol. 4, Inorganic Complexes. Robert M. Smith and Arthur E. Martell. Plenum, New York, 1976. xiv, 258 pp. $29.50. *To order this book circle No. 356 on Readers' Service Card*

Ergodic Theory and Topological Dynamics. James R. Brown. Academic Press, New York, 1976. x, 190 pp. $19.50. Pure and Applied Mathematics. *To order this book circle No. 367 on Readers' Service Card*

Essentials of Medicinal Chemistry. Andrejus Korolkovas and Joseph H. Burckhalter. Wiley-Interscience, New York, 1976. vi, 698 pp., illus. $22.50. *To order this book circle No. 368 on Readers' Service Card*

Filariata of Animals and Man and Diseases Caused by Them. Part 2, Diplotriaenoidea. M. D. Sonin. Translated from the Russian edition (Moscow, 1968). Israel Program for Scientific Translations, Jerusalem, 1975 (distributor, Halsted [Wiley], New York). iv, 412 pp., illus. $41. Essentials of Nematodology, vol. 21. *To order this book circle No. 369 on Readers' Service Card*

Handbook of Medical Acupuncture. Frank Z. Warren. Van Nostrand Reinhold, New York, 1976. xii, 274 pp., illus. $15. *To order this book circle No. 370 on Readers' Service Card*

Ion Cyclotron Resonance Spectrometry. Thomas A. Lehman and Maurice M. Bursey. Wiley-Interscience, New York, 1976. xiv, 230 pp., illus. $21.50. *To order this book circle No. 371 on Readers' Service Card*

Iron and Copper Proteins. Proceedings of a symposium, Honolulu, Dec. 1975. Kerry T. Yasunobu, Howard F. Mower, and Osamu Hayaishi, Eds. Plenum, New York, 1976. xii, 596 pp., illus. $49.50. Advances in Experimental Medicine and Biology, vol. 74. *To order this book circle No. 357 on Readers' Service Card*

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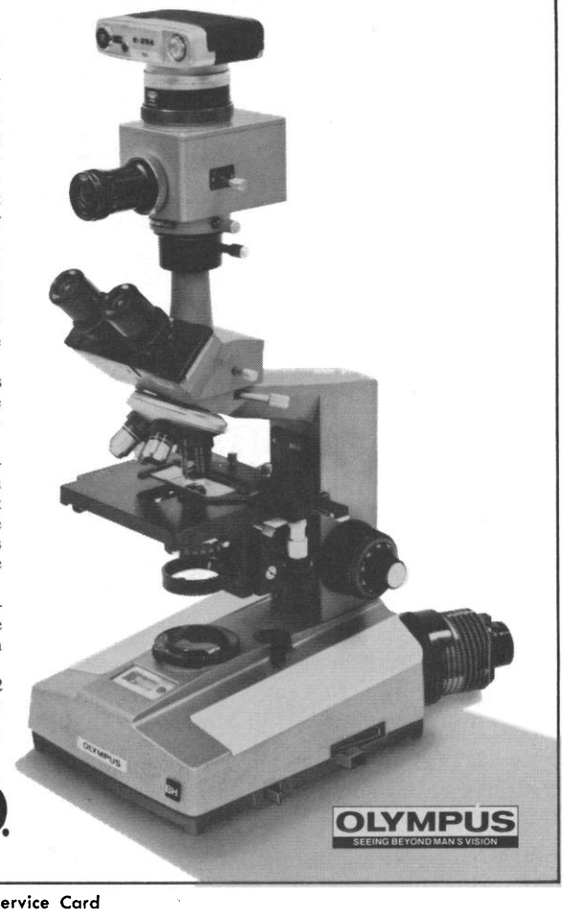

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Neutral Current Sheets in Plasmas. N. G. Basov, Ed. Translated from the Russian edition (Moscow, 1974) by Dave Parsons. Consultants Bureau (Plenum), New York, 1976. vii, 164 pp., illus. Paper, $39.50. *To order this book circle No. 359 on Readers' Service Card*

New-Town Planning. Principles and Practice. Gideon Golany. Wiley-Interscience, New York, 1976. xxiv, 390 pp., illus. $25. *To order this book circle No. 360 on Readers' Service Card*

Optics of the Atmosphere. Scattering by Molecules and Particles. Earl J. McCartney. Wiley, New York, 1976. xviii, 408 pp., illus. $24.95. Wiley Series in Pure and Applied Optics. *To order this book circle No. 372 on Readers' Service Card*

Peptide Synthesis. Miklos Bodanszky, Yakir S. Klausner, and Miguel A. Ondetti. Wiley-Interscience, New York, ed. 2, 1976. xvi, 208 pp., illus. $19.50. Interscience Monographs on Organic Chemistry. *To order this book circle No. 373 on Readers' Service Card*

Petrologic Phase Equilibria. W. G. Ernst. Freeman, San Francisco, 1976. x, 334 pp., illus. $22.50. A Series of Books in Geology. *To order this book circle No. 375 on Readers' Service Card*

Physical Chemistry of Surfaces. Arthur W. Adamson. Wiley-Interscience, New York, ed. 3, 1976. xviii, 698 pp., illus. $24.95. *To order this book circle No. 374 on Readers' Service Card*

Physics of Computer Memory Devices. S. Middelhoek, P. K. George, and P. Dekker. Academic Press, New York, 1976. x, 402 pp., illus. $31.50. *To order this book circle No. 376 on Readers' Service Card*

Physics of Structurally Disordered Solids. Proceedings of a NATO Advanced Study Institute, Kingston, R.I., Aug. 1974. Shashanka S. Mitra, Ed. Plenum, New York, 1976. xii, 792 pp., illus. $69.50. NATO Advanced Study Institutes Series B, vol. 20. *To order this book circle No. 377 on Readers' Service Card*

Simpler Networks and Behavior. John C. Fentress, Ed. Sinauer, Sunderland, Mass., 1976. x, 404 pp., illus. $17.50. *To order this book circle No. 378 on Readers' Service Card*

Solubility of Gases and Liquids. A Graphic Approach. Data—Causes—Prediction. W. Gerrard. Plenum, New York, 1976. x, 276 pp., illus. $39.50. *To order this book circle No. 379 on Readers' Service Card*

Sound Reception in Fishes. William N. Tavolga, Ed. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1976 (distributor, Halsted [Wiley], New York). xiv, 318 pp., illus. $25. Benchmark Papers in Animal Behavior, vol. 7. *To order this book circle No. 381 on Readers' Service Card*

Specificity in Plant Diseases. Papers from a NATO Advanced Study Institute, Porto Conte, Italy, May 1975. R. K. S. Wood and A. Graniti, Eds. Plenum, New York, 1976. x, 354 pp., illus. $35. NATO Advanced Study Institutes Series A, vol. 10. *To order this book circle No. 380 on Readers' Service Card*

Treatise on Analytical Chemistry. Part 1, Theory and Practice. Vol. 12, Index: Volumes 1 to 11. I. M. Kolthoff and Philip J. Elving, Eds. Interscience (Wiley), New York, 1976. xviii pp. + pp. 7235–7428. $22.50. *To order this book circle No. 382 on Readers' Service Card*

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