SCIENCE

29 September 1967

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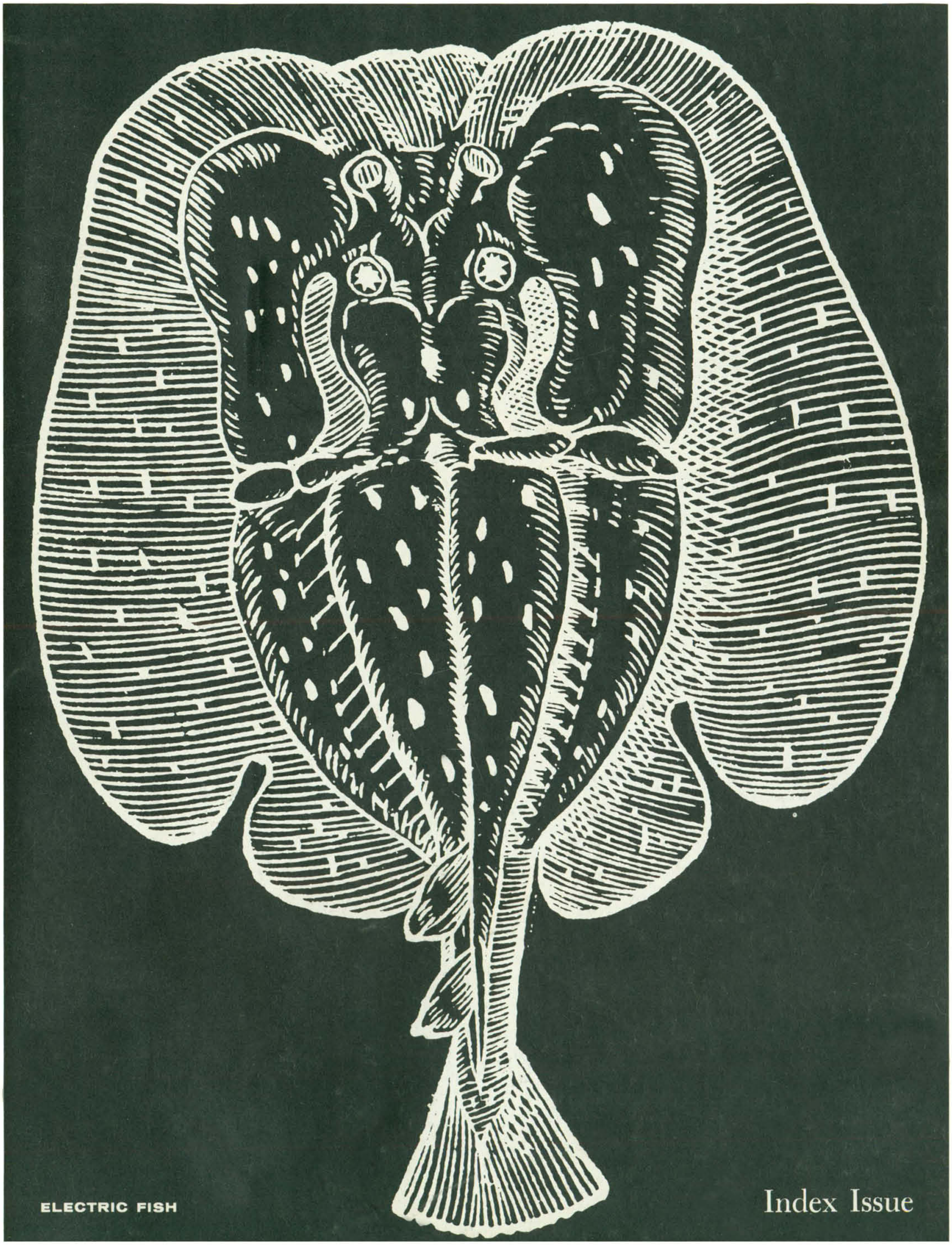
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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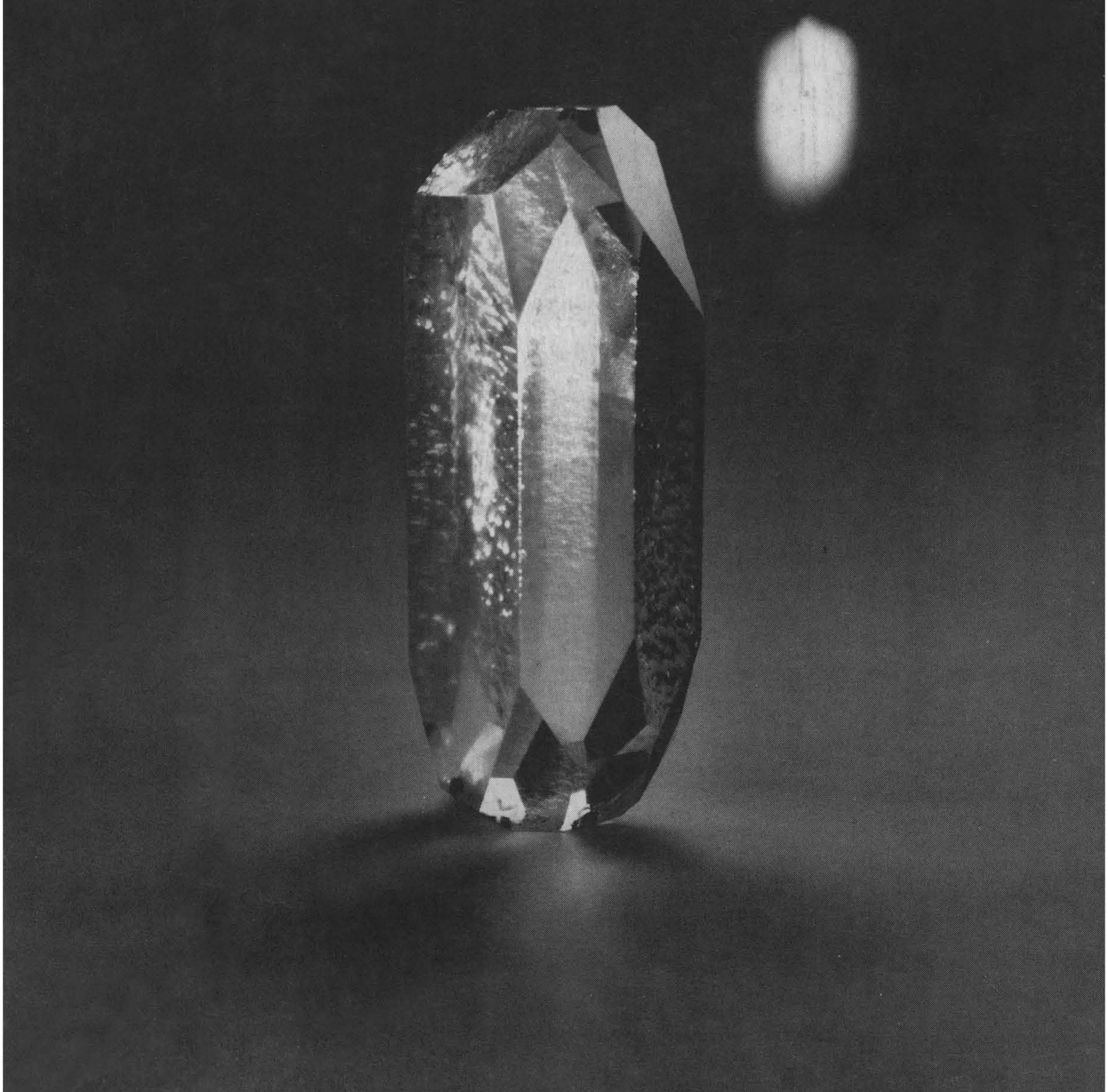

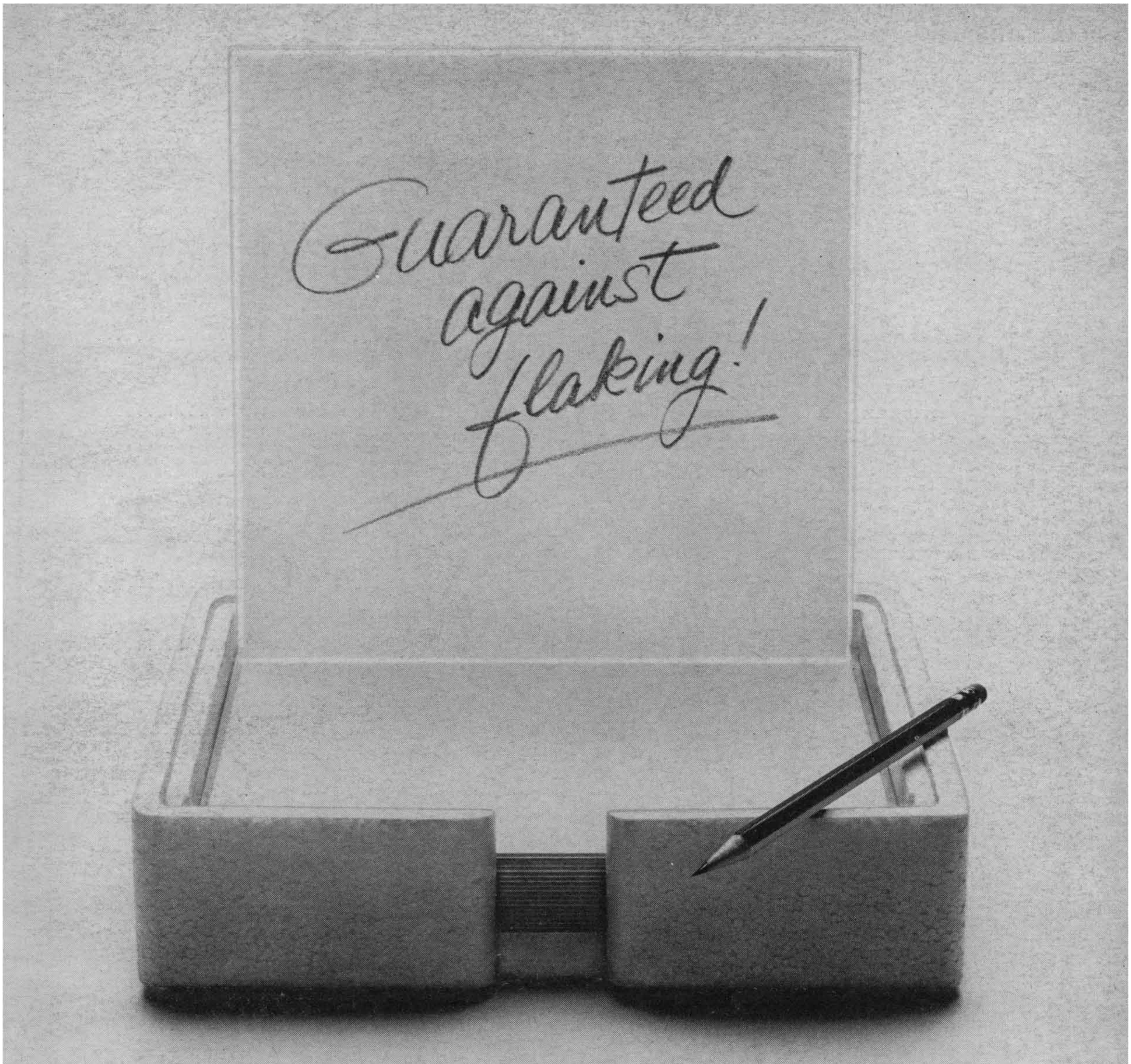

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BRINKMANN INSTRUMENTS

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SCIENCE

SCIENCE is published weekly on Friday and on the fourth Tuesday in November by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly**®. Second-class postage paid at Washington, D.C. Annual subscriptions $8.50; foreign postage, $1.50; Canadian postage, 75¢; single copies, 50¢ (back issues, $1), except **Guide to Scientific Instruments**, which is $2. School year subscriptions: 9 months, $7; 10 months, $7.50. Provide 4 weeks' notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature**.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

COVER

Sixteenth-century etching of an electric fish (*Torpedo marmorala* Risso). Electric organs appear as a pair of large lobes on both sides of the head. The elementary electrogenic unit, or electroplax, is well suited for studying electrical and chemical properties of excitable membranes. See page 1579. [Rondelet Guillaume (1507–1566), *Libri de piscibus marinis, in quibus verae piscium effigies expressae sunt* . . . Lugduni 1554–1555.]

cigar is a Smoke" ("The Betrothed").

When cigarettes were first introduced they were regarded as very effeminate —in fact "fag" is an early slang term for cigarette. Real he-men preferred the weed in more rugged form. Thus cigarette manufacturers have felt an urgent need to create and maintain an image of virility.

Perhaps the Surgeon General would get better results from his campaign against smoking if he were to emphasize the anaphrodisiac, rather than the carcinogenic, effects of the habit!

MACON FRY
1626 Mount Eagle Place,
Alexandria, Virginia 22302

Reference

1. R. Magnus, "Nicotiana, Nicotin," *Real Encyclopädie der Gesamten Heilkunde*, vol. 10, ed. 4 (1911), p. 651.

Project Hindsight

The commentaries on Project Hindsight (18 Nov. 1966, p. 872; 2 Dec. 1966, p. 1123; 23 June, p. 1571) are a valuable contribution to the discussion of "directed" and "undirected" research. In the advocacy of basic versus applied research, or science versus invention and engineering, the proponents of any one segment of the continuum of research, development, testing, and engineering are in competition for funds, and usually are also expressing managerial preferences. What is so disheartening in this continuing controversy is the popular assumption that the end product of *all* scientific and productive efforts are measurable in terms of an "end item—a piece of equipment, a process, or an operational procedure" (*1*). The profitability of transportation systems can be compared very effectively by using numbers, mileage, tonnage, and dollars. However, no matter how effectively funds are spent for prevention of pollution, or a more healthy environment, it is not possible to present comparable figures. The benefits from prevention of sickness, the prevention of wars, the cost of "undirected" science can be measured, but not in terms of technology—medicines, military hardware, or scientific instrumentation. Quite the contrary, the less medicine, military and scientific hardware or money you have to use, the more effective the campaign.

It is self-evident that the systems studied in Project Hindsight, Polaris, Minuteman, Lance TBM, radar, navigation aids, nuclear warheads, and so on resulted or benefited greatly from the advances of "undirected" science. Credits simply have not been given to preceding concepts and ideas. In a subsequent report, one may anticipate that the military applications of masers and lasers will be attributed to teams of weapon systems engineers, although these truly revolutionary tools, offering order of magnitude differences in ways of doing things, received generous and "undirected" Department of Defense support.

Sherwin and Isenson find that "Despite the very applied nature of the work leading to the innovations, 5 or 10 years often elapsed before an Event was used" (*1*, p. 1575). They apparently had the layman's misconception that research ideas are quickly transformed into consumer goods or weapon systems. Historically, it often takes many years to make new things practical: witness the airplane or Goddard's rockets . . . .

There are two very good reasons to include fundamental research in mission-oriented programs. The first is that such research attracts many outstanding scientists and young investigators to important problem areas. Second, for practical agencies to be receptive to new concepts, approaches and solutions to problems and thereby speed innovation, there have to be people within the agencies who are aware and eager to translate and introduce new ways of doing things to the technologist who may argue against risk and that present solutions are good enough. There is the real question of how one measures the productivity of "undirected" research programs aside from the publication of new knowledge. Perhaps productivity can also be judged by the rate at which technological innovations are incorporated into practice with resulting social improvement. From this standpoint, the shorter time period now between the attainment of new knowledge and its use in many fields, including new systems for which no conceivable requirement existed even 10 years ago (that "scientific toy" satellite), indicates that emphasis on basic research has been healthy.

LEE LEISERSON
4307 Ambler Drive,
Kensington, Maryland 20795

Reference

1. C. W. Sherwin and R. S. Isenson, *Science* **156**, 1571 (1967).

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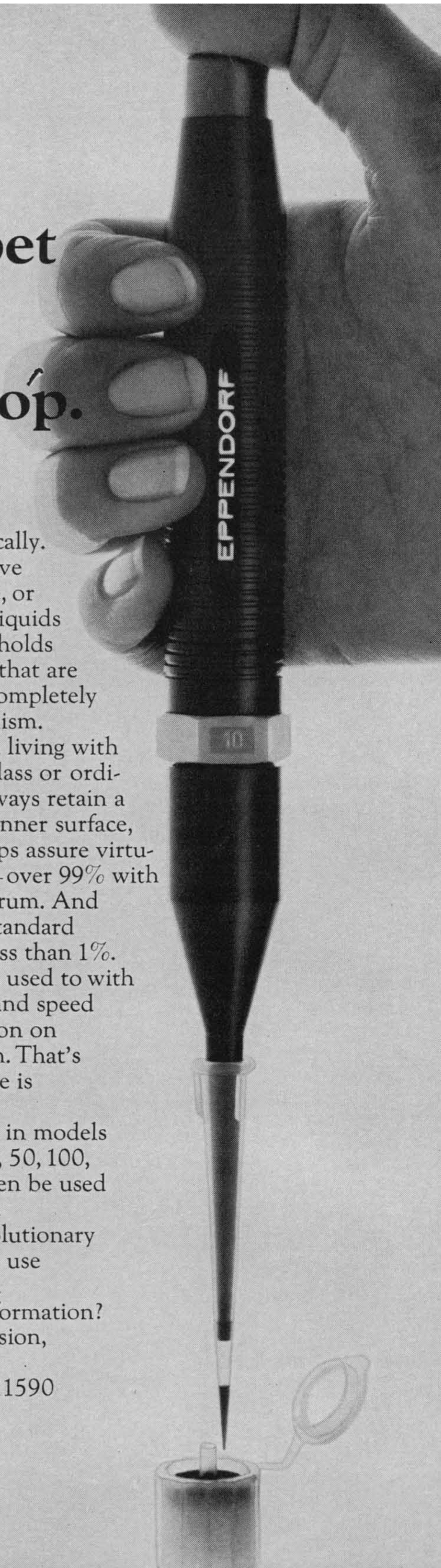

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29 September 1967, Volume 157, Number 3796

SCIENCE

The Need for Selective Service Policy

Unless the current disagreements on basic policy and operational procedures of the Selective Service System are resolved soon, 1968 will bring serious difficulties for the Army, for universities, and for graduate students.

The basic policy of the Selective Service System has been to allocate men where they could serve best. Thus some men have been drafted (or allowed to volunteer when draft seemed imminent); others have been deferred because they were engaged in critical occupations; and still others have been deferred because they would be of greater military or civilian value after further training or education. The system sometimes worked quite imperfectly, but its intent was clear: young men were to be used where they could best serve the national interest. An advisory panel appointed by the House Committee on Armed Services recommended a number of specific changes but advocated continuation of this basic policy.

Another commission, appointed by the President, proposed that equality of risk for military duty, regardless of wealth, color, status, or ability, become the fundamental policy. Accordingly, it recommended abolition of most deferments and use of a lottery to select from among 19- and 20-year-olds.

Congress did not accept the recommendations of the President and his advisory commission, but did make some changes. Undergraduate deferments will be easy to secure, but the student will pay a high price in later and long-continued draft liability. Graduate-student deferments will probably be substantially curtailed. The practice of drafting the oldest eligible men first may be reversed, so that younger ones will be called first. The President is still expected to submit plans for a lottery to replace selection through the discretion of the draft boards.

Depending on what agreements are reached next year, the services may, in the years beyond 1968, either (i) continue to induct a majority of young men and a minority of more mature and better educated ones, or (ii) secure only 19- and 20-year-olds from the Selective Service System and develop other means of finding the necessary number of junior officers, medical and health specialists, and men for other technical specialties. (The President's commission recognized that their proposal might require double jeopardy or double service for some men, at age 19 to 20 and again after college.)

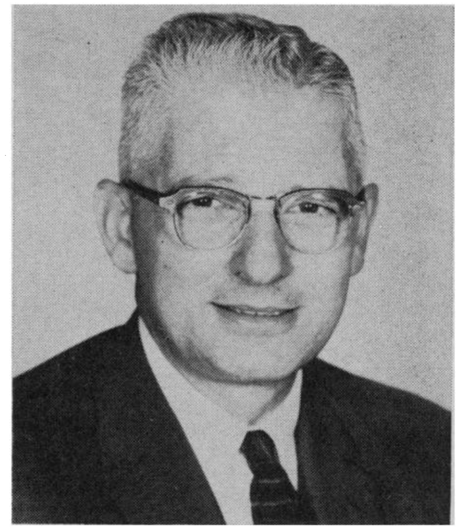
However these questions may be answered for the future, the immediate problem is what to do about the summer of 1968. According to existing regulations, college graduates of next June and students who entered graduate school this fall will go into the draft-eligible pool in June. Under the existing practice of calling the oldest eligible men first, the services would suddenly get a group of men who are older than they want and better educated than any group they have ever had. Graduate students and prospective graduate students obviously want to know whether this is in fact to be the situation. Younger men of draft age are also concerned, for they want to be able to estimate their prospects. The colleges and universities must know what the policies will be if they are to plan in any sensible fashion on the size of graduate enrollments in the fall of 1968. The armed services also need to have decisions made so they can make their plans.

The time for deciding what should be done is limited. The President is not expected to submit new recommendations before Congress reconvenes in January. Quick decisions will then be necessary if those concerned are to have reasonable time for planning. Only the next 3 or 4 months are available for thoughtful consideration of what the new rules ought to be. —DAEL WOLFLE

1958–63; lecturer in political science, Massachusetts Institute of Technology, 1963–66, associate professor, in charge of Science and Public Policy Program, 1966–; visiting lecturer, Fletcher School of Law and Diplomacy, Tufts University, 1965–; Research Advisory Committee, Agency for International Development, 1963–67; consultant, Department of State, 1963–, Agency for International Development, 1963–67, Office of Science and Technology, 1963–, Ford Foundation, 1964–66, Organization for Economic Cooperation and Development, 1965–66, Institute for Defense Analyses, 1966; secretary, Study Group on Science and the National Interest, Council of Foreign Relations, 1965–; Pugwash Committee on Science and Economic Development, 1966–; professional engineer (District of Columbia), 1956–; patent: hybrid circuits, 1950; author of *Science, Technology and American Foreign Policy*, 1967.

AAAS activities: secretary, Section on Social and Economic Sciences (K), 1966–; Council, 1966–; AAAS Socio-Psychological Prize Committee, 1966–.

Edward Wenk, Jr.



Edward Wenk, Jr.

Edward Wenk, Jr., 47 (mechanics), ship structural designer, Boston Navy Shipyard, 1941–42; supervisor, Turret Test Section, David Taylor Model Basin, U.S. Navy Department, 1942–45, superintendent, Structural Dynamics Section, 1945–48, Submarine Structural Branch, 1948–50, head, Structural Division, 1950–56; chairman, Department of Engineering Mechanics, Southwest Research Institute, 1956–59; senior specialist in science and technology, Legislative Reference Service, Library of Congress, 1959–61; technical assistant to the President's Science Adviser, 1961; executive secretary, Federal Council for Science and Technology, Office of Science and Technology, 1962–64; head, Science Policy Research Division, Legislative Reference Service, and special adviser to the Librarian in science and engineering, Library of Congress, 1964–66; executive secretary, National Council on Marine Resources and Engineering Development, 1966–; consultant, British Admiralty, Swedish Government; Executive Committee, Mechanics Division, American Society of Civil Engineers; Welding Research Council: Executive Board, Pressure Vessel Research Committee, and chairman, Design Division, 1953–59; consultant, Committee on Undersea Warfare, National Academy of Sciences, 1957–58; Society for Experimental Stress Analysis: president, 1957–58, Murray lecturer, 1966; Sigma Xi national lecturer, 1966; reviewing editor, *Experimental Mechanics* and *Engineering Mechanics Journal*; author of *A Guide for the Analysis of Ship Structures* (with others), 1959; Meritorious Civilian Service Award, U.S. Navy, 1946.

AAAS activities: Council, 1966–.

Calendar of Events—October

National Meetings

1–4. **Neurosurgical** Soc. of America, New York, N.Y. (C. H. Davis, Jr., Bowman Gray School of Medicine, Winston-Salem, N.C. 27103)

1–4. Society of **Petroleum Engineers**, Houston, Tex. (J. B. Alford, 6200 North Central Expressway, Dallas, Tex. 75206)

2–4. **Stochastic Optimization and Control** Procedures, mtg., Madison, Wis. (H. F. Karreman, Mathematics Research Center, Univ. of Wisconsin, Madison)

2–5. American **Petroleum** Inst., Div. of Refining, fall mtg., Dallas, Tex. (API, 1271 Avenue of the Americas, New York 10020)

2–5. American Soc. of **Photogrammetry**/Cong. on **Surveying and Mapping**, conv., St. Louis, Mo. (C. E. Palmer, 105 N. Virginia Ave., Falls Church, Va. 22046)

2–5. **Research Equipment and Instrument** Symp., 17th annual, Bethesda, Md. (J. B. Davis, Chief, SMB, NIH, Bldg. 12A, Room 4003, Bethesda 20014)

2–6. American College of **Surgeons**, Chicago, Ill. (J. P. North, 55 Erie St., Chicago 60611)

2–6. **Animal Care** Panel, 18th annual, Washington, D.C. (J. J. Garvey, Box 1028, Joliet, Ill. 60434)

2–6. National **Aeronautic and Space**

Engineering and Manufacturing mtg., Los Angeles, Calif. (W. I. Marble, SAE, 485 Lexington Ave., New York 10017)

4–6. **Nuclear Metallurgy** Conf., Phoenix, Ariz. (K. E. Horton, Fuels and Materials Branch, Div. of Reactor Development and Technology, U.S. Atomic Energy Commission, Washington, D.C. 20545)

5–7. American **Ceramic** Soc., Bedford, Pa. (ACS, 4055 N. High St., Columbus, Ohio 43214)

8–13. **Electrochemical** Soc., fall mtg., Chicago, Ill. (E. G. Enck, 30 E. 42 St., New York 10017)

8–13. **Water Pollution Control** Federation, 40th annual conf., New York, N.Y. (R. E. Fuhrman, 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

9–11. **Single-Cell Protein** Conf., Cambridge, Mass. (c/o Room 16-325 Massachusetts Inst. of Technology, Cambridge 02139)

9–11. Society of **Aerospace Material and Process Engineers**, 12th natl. symp., Orange County, Calif. (R. O. Burton, 12742 Elizabeth Way, Tustin, Calif.)

9–12. Association of Official **Analytical Chemists**, annual mtg., Washington, D.C. (L. G. Ensminger, Box 540, Benjamin Franklin Station, Washington 20044)

10–11. **Industrial Hygiene** Foundation, 32nd annual mtg., Pittsburgh, Pa. (R. T. de Treville, 4400 Fifth Ave., Pittsburgh 15213)

11–13. **Optical** Soc. of America, annual mtg., Detroit, Mich. (M. E. Warga, 1155 16th St., NW, Washington, D.C. 20036)

15–18. American **Oil Chemists** Soc., Chicago, Ill. (D. E. Weber, 35 E. Wacker Dr., Chicago 60601)

15–19. American Assoc. of **Medical Record Librarians**, annual mtg., Los Angeles, Calif. (M. Waterstraat, 211 E. Chicago Ave., Chicago, Ill. 60611)

16–17. **Systems Science and Cybernetics**, conf., Boston, Mass. (M. D. Rubin, Mitre Corp., Bedford, Mass.)

16–18. **Aerospace and Electronic** Systems, conv., Washington, D.C. (M. N. Abramovich, Washington Technical Consultants, 422 Washington Bldg., Washington 20005)

16–19. **Molecular Dynamics and Structure of Solids**, Gaithersburg, Md. (R. S. Carter, Inst. for Materials Research, National Bureau of Standards, Washington, D.C. 20234)

16–20. **Metallurgical** Soc., fall mtg., Cleveland, Ohio. (J. V. Richard, 345 E. 47 St., New York 10017)

16–20. American Soc. of **Civil Engineers**, annual mtg., and **Water Resources**, engineering conf., New York, N.Y. (W. H. Wisely, ASCE, 345 E. 47 St., New York 10017)

16–20. American Soc. for **Metals**, Cleveland, Ohio. (Meetings Manager, Metals Park, Ohio)

16–20. Society for **Non-Destructive Testing**, Cleveland, Ohio. (SN-DT, 914 Chicago Ave., Evanston, Ill. 60202)

18–20. **Exploding Wire Phenomenon**, 4th conf., Boston, Mass. (W. G. Chase, Air Force Cambridge Research Labs., L. G. Hanscom Field, Bedford, Mass. 01730)

18–22. American Soc. of **Clinical Hypnosis**, 10th annual scientific mtg., New York, N.Y. (F. D. Nowlin, 800 Washing-