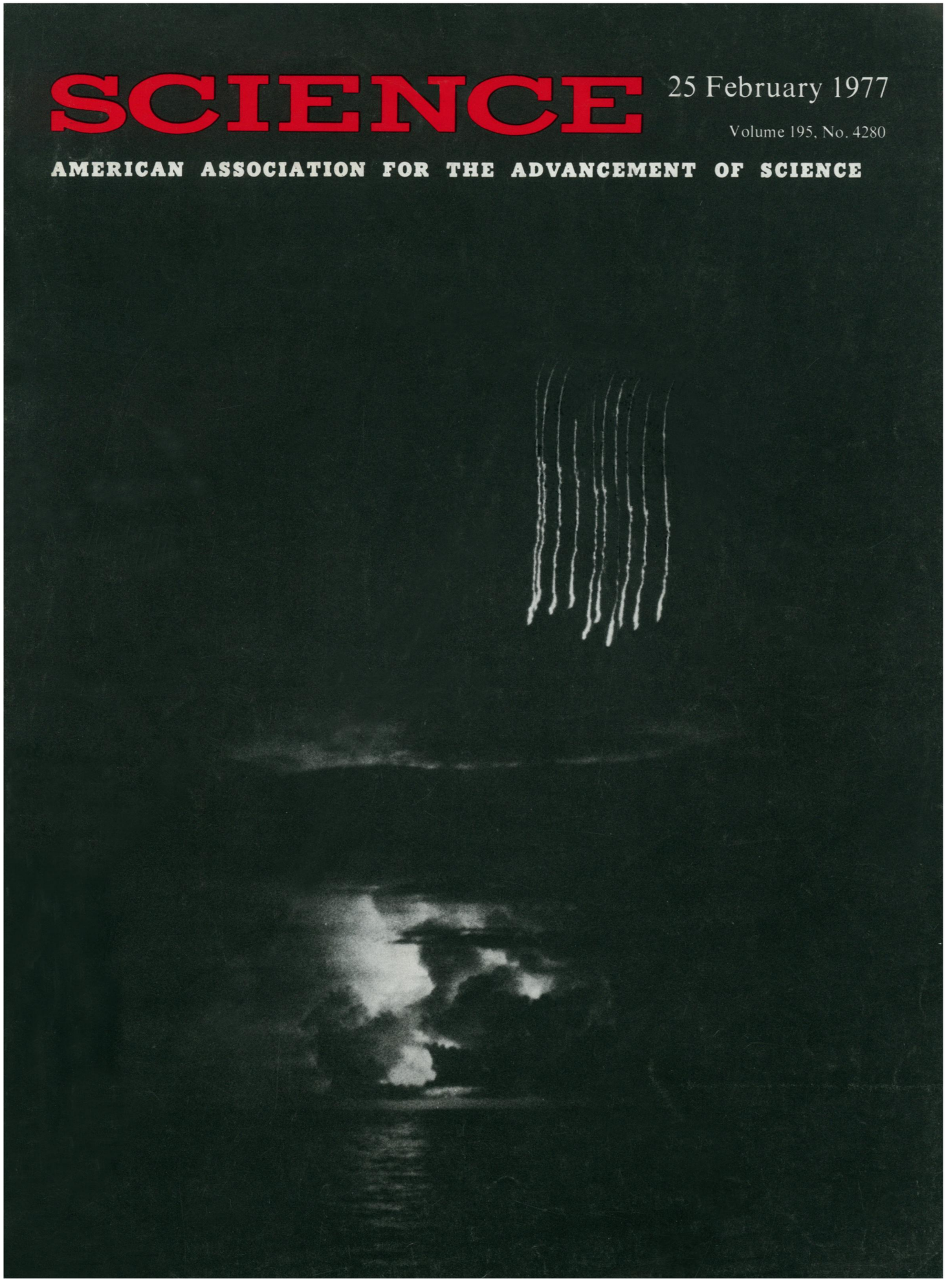
SCIENCE

25 February 1977

Volume 195, No. 4280

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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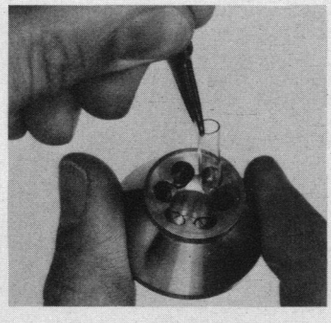

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INSERM CONFERENCES INSERM CONFERENCES INSERM CONFERENCES INSERM CONFERENCES INSERM CONFE

The French Institute of Health and Medical Research (Institut National de la Santé et de la Recherche Médicale) is organizing a series of meetings on advanced research topics in various biomedical fields. The meetings which will be held annually as of November 1977, will be known as the INSERM CONFERENCES.

The aims of the conferences are:
— to foster the exchange of ideas, to evaluate new methods and new lines of investigation;
— to bring together scientists, mostly from European countries, working in universities and public or private research institutions. The meetings will be held under the direct responsibility of a chairman and a co-chairman who will be chosen each year with the agreement of the Conference participants.

The INSERM CONFERENCES will have the following special features:
— only highly topical subjects will be dealt with;
— if possible, the data presented should not have been the subject of any earlier complete publication, a condition which therefore excludes general reviews;
— the Conferences will not publish proceedings or any other material, even in a summarized form;
— the chairman of each INSERM Conference will invite 15 to 20 scientists to give a report in line with the above conditions. The number of contributions will be limited to three or four per session and, at the discretion of the chairman, at least one third of the time will be given over to discussion and brief informal communications.

In addition to the invited speakers, at least fifty participants will attend the meeting, and efforts will be made to select young scientists. Experienced research workers from fields other than those relating to the Conference will also be welcome to attend. Participants will be chosen in such a way as to enable those engaged in all types of scientific research to establish personal contacts, exchange information and find new ways of working together.

PRACTICAL ARRANGEMENTS

The INSERM CONFERENCES will be held at the Domaine de Seillac, near Blois, during the month of November 1977 (full address: Domaine de Seillac, 41150 Seillac, France - 180 km from Paris). Each conference will last three and a half days, from Sunday evening (departure from Paris), to Thursday afternoon. Working sessions will be held from 9 a.m. to 12.30 p.m. and from 5.30 p.m. to 8 p.m. On free afternoons, participants will have a wide choice of leisure activities at the Domaine de Seillac and in the surrounding area.
During May 1977, the final programme for each INSERM Conference, along with the registration form will be published in this journal. Those wishing to receive additional information as of now, should complete and forward the enclosed form.

REGISTRATION FEE AND SPECIAL FUND

Participants whose applications are accepted but who are not invited speakers, will be asked to pay their registration fee and board (1000 FF). A special fund will be made available to the chairman of each Conference, enabling him to pay part of the expenses of some participants requesting such assistance.

PROGRAMME FOR 1977

The first year of INSERM CONFERENCES will include three meetings as follows:

1977 ENDOCRINOLOGY

November 7 - 10

Chairman: Jacques HANOUNE
Co-Chairman: Etienne BAULIEU

Presentations will concern the following fields of interest:
1) Recent methodological advances and new biological systems;
2) Hormonal regulation of the intermediary metabolism;
3) Membranes and transduction of hormonal information.

1977 IMMUNOLOGY

November 14 - 17

Chairman: François KOURILSKY
Co-Chairman: J.-F. BACH

Presentations will concern the following fields of interest:
1) Nature and specificity of T-cell receptors - Relationships with the major histocompatibility complex;
2) T-cell mediated cytotoxicity.

1977 NEUROBIOLOGY

November 21 - 24

Chairman: Jacques GLOWINSKI
Co-Chairman: J.-P. CHANGEUX

Presentations will concern the following fields of interest:
1) Neurotransmitters - Identification; synthesis and release processes;
2) Receptors - Characterization; isolation; molecular properties and regulation.

Additional information about INSERM CONFERENCES, along with the registration forms and conference programmes, may be requested by completing the enclosed reply form and forwarding it before April Ist to **INSERM CONFERENCES, Institut National de la Santé et de la Recherche Médicale, 101, rue de Tolbiac - 75645 PARIS CEDEX 13, France** - Tél. : 584.14.41.

REQUEST FOR ADDITIONAL INFORMATION

NAME, TITLE and POSITION: _____

_____

INSTITUTION (with address and phone number): _____

_____ S1

☐ ENDOCRINOLOGY
November 7 - 10, 1977

☐ IMMUNOLOGY
November 14 - 17, 1977

☐ NEUROBIOLOGY
November 21 - 24, 1977.

25 February 1977

Volume 195, No. 4280

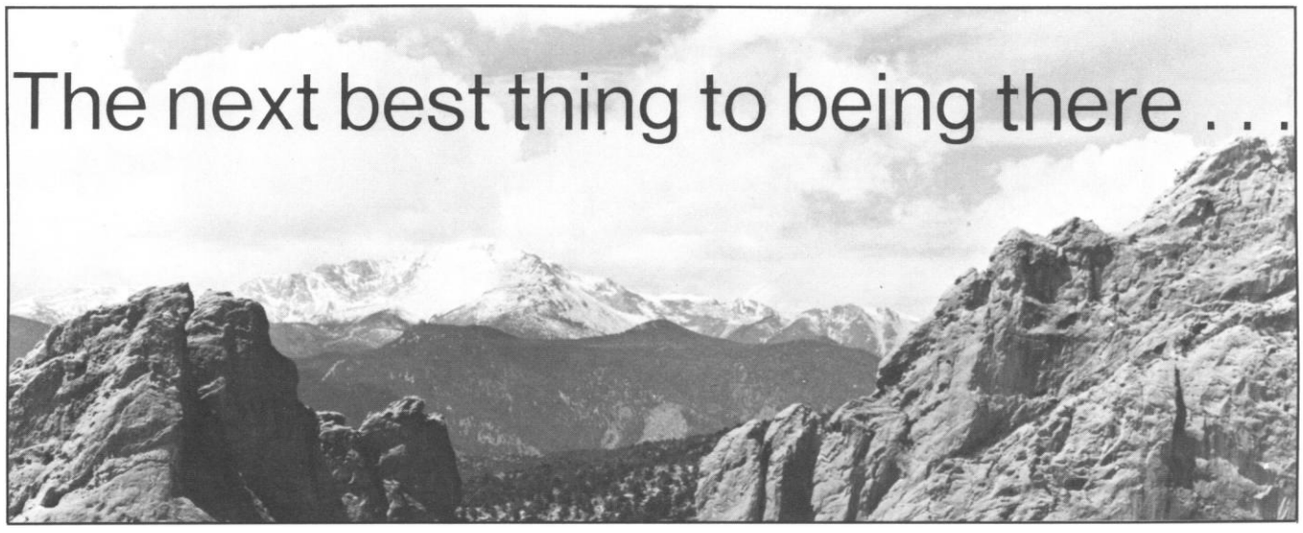
SCIENCE

SCIENCE is published weekly, except the last week in December, but with an extra issue 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., and additional entry. Member rates on request. Annual subscriptions $60; foreign postage: Canada $10; other surface $13; air-surface via Amsterdam $30. Single copies $2 (back issues $3) except **Guide to Scientific Instruments** $6. School year subscriptions: 9 months $45; 10 months $50. Provide 6 weeks' notice for change of address, giving new and old addresses and postal codes. Send a recent address label, including your 7-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.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Time exposure showing the burn of ten silver iodide pyrotechnics ejected from a DC-6 airplane at an altitude of 6 kilometers on 28 May 1975 east of Key Biscayne, Florida. Lightning in the background is associated with a distant convective system not associated with the flare test. See page 735. [Ronald L. Holle, National Hurricane and Experimental Meteorology Laboratory, National Oceanic and Atmospheric Administration, Coral Gables, Florida]



If you couldn't make it to the 1977 AAAS Annual Meeting in Denver, we've arranged to bring the meeting to you. This year, like last year, we've taped some sessions (both presentations and question-and-answer sessions) so you won't miss much.

These high quality tapes are on handy cassettes—useful for classroom, library, or personal use—and at a reasonable price.

We can't list all the audiotape titles on one page, but the sampling below will give some idea of the diversity of topics available.

Medicine and Health
Scientific Information and Public Policy: Regulating the Use of Psychotropic Drugs (77T-332)

Anthropology
An Account of the Visual Mode: Man versus Ape (77T-298)
Frontiers of Folklore (77T-337)

Technological Implications
Beyond Gutenberg: Communication Without Paper? (77T-317)
Political and Social Aspects of Remote Sensing from Space (77T-348)

Behavioral Science
Families Across the Life Cycle: Issues and Perspectives (77T-331)
Individual Differences, Cognition, and Learning (77T-307)
Violence at Home and at School (77T-343)

Economic and Social Sciences
National and International Cooperation: The Institutional Limits to Growth (77T-308)

Science and Public Policy
Emerging National and International Policy on Information (77T-309)

History and Philosophy of Science
Contemporary Religious Movements in America: Religious Minorities in a Secular Society (77T-305)

Agriculture and Ecology
Biology and Agriculture in the People's Republic of China (77T-301)

General Interest
The Frontiers of the Natural Sciences (77T-333)
The Right to Die (77T-341)

Physical and Mathematical Sciences
The New Solar Physics (77T-303)
The Promise of High Energy Physics (77T-296)

Energy
Wind-Energy Conversion Systems (77T-312)
Renewable Energy Resources and Rural Life in the Developing World (77T-323)

Resource Policy
Energy from the Rockies: Fueling the Nation or Fouling the States? (77T-321)

Biological Science
Physiological Reactions in Plants Initiated by Environmental Stress (77T-304)

Arid Lands
American Droughts (77T-294)

Environment
How Well Are We Equipped to Cope With Environmental Problems? (77T-299)
The Measurement of Air Pollution (77T-322)

For a complete list of both 1976 and 1977 AAAS Annual Meeting audiotapes, with prices and ordering information, write to: AAAS Cassettes, c/o CEBAR Productions, 2550 Green Bay Road, Evanston, Illinois 60201.

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TYPE 668
New Polacolor 2 daylight film, balanced for electronic flash. Finished color prints in 60 seconds.

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Polaroid now offers three ways to better instant pictures—three pack films manufactured specifically for professionals who want something extra in instant pictures. All three can be used in Polaroid pack film cameras and all professional cameras and instruments that take Polaroid instant pack films.

Type 668 is a new color film particularly suited for use with electronic flash. This makes it ideal for Polaroid and other instant ID systems and Polaroid's Special Events camera. Because of its unique metallized dyes, Type 668 color is extremely stable and fade-resistant.

Type 667's print requires no coating after development, thus offering time-saving and convenience. It's suitable for just about any purpose.

Type 665 (formerly Type 105) produces a superb quality black and white print and negative in just 30 seconds. The resolution and grain of the negative allow for professional enlargements with excellent detail.

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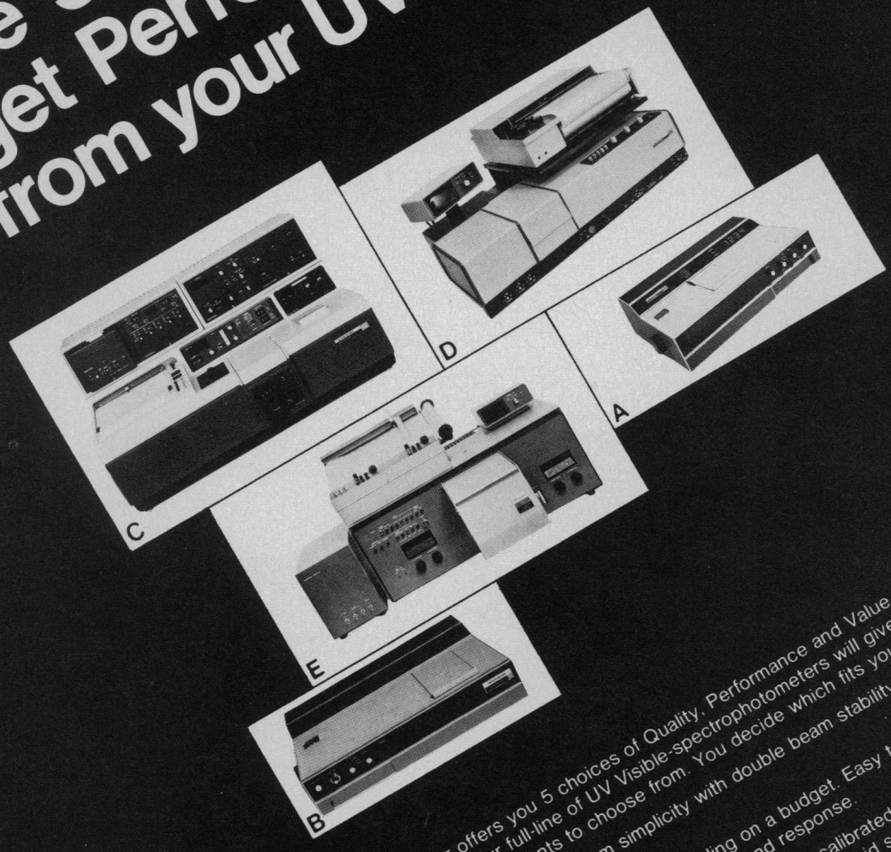

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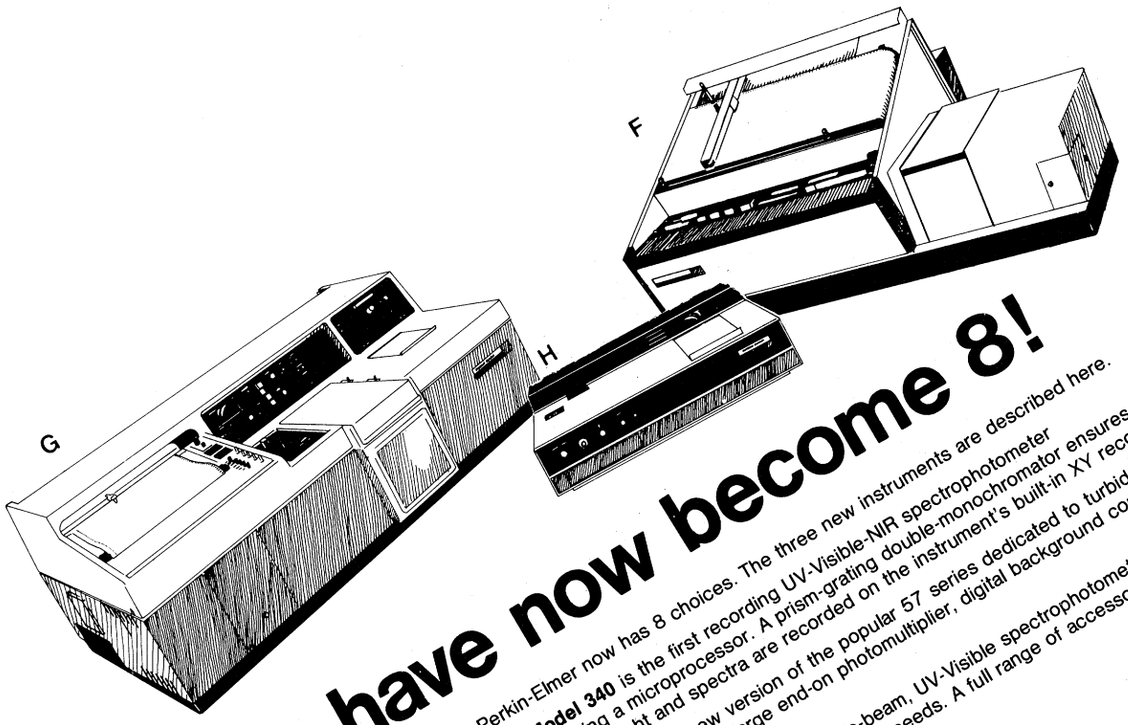

. . . have now become 8!

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G. **Model 576** A new version of the popular 57 series dedicated to turbid, scattering samples with large end-on photomultiplier, digital background correction and repetitive scanning.

H. **Model 551** is a multi-slit, double-beam, UV-Visible spectrophotometer with variable response times and scanning speeds. A full range of accessories is available.

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LETTERS

TVA and *The Valley So Wild*

In her article "Critical TVA scholarship hard to come by" (News and Comment, 21 Jan., p. 274), Deborah Shapley says:

> . . . TVA [the Tennessee Valley Authority] engaged Carson Brewer, a reporter for the Knoxville *News-Sentinel*, to write a book on the Little Tennessee River Valley. While Brewer and his wife held a $10,000 contract for the book, Brewer was also covering TVA for the paper—a conflict of interest situation. . . .

I encountered absolutely no conflict of interest in that situation.

TVA first asked my wife Alberta whether she would be interested in writing the book. She declined. Then TVA asked if she and I would write the book as co-authors. Because the Little Tennessee Valley is one of my favorite regions, I voted to accept. Alberta agreed. But we weren't immediately able to agree with TVA on the money. It is my understanding that TVA then searched for other possible authors. I don't know the details of that search. At any rate, several months later TVA approached us again, and we agreed on $10,000, a sum we later realized was ridiculously small for the work involved. (If you wonder why these details are relevant, they are to show that TVA's purpose was to hire someone to write a book, not—as some reading the article might suspect—to use a book contract as a cover for paying a reporter for favored news treatment.)

When TVA approached us, I had not been on the *News-Sentinel*'s TVA beat for several years. I was not on it during any of the discussions about the contract. However, several months after we signed the contract and started research for the book, the reporter covering TVA left the paper. The city editor (then, Don Ferguson) asked me to take the beat. I reminded him that Alberta and I were writing a book for TVA.

"That wouldn't make any difference in your coverage, would it?" he asked.

"No, it wouldn't," I replied.

And it didn't.

Though this is something we didn't discuss beyond the two-sentence conversation quoted above, I am certain there was no thought in the minds of my editors and TVA officials that the book contract would have any effect favorable to TVA on stories I wrote for the *News-Sentinel*. Nobody in TVA ever sought, directly or indirectly, favored treatment in stories.

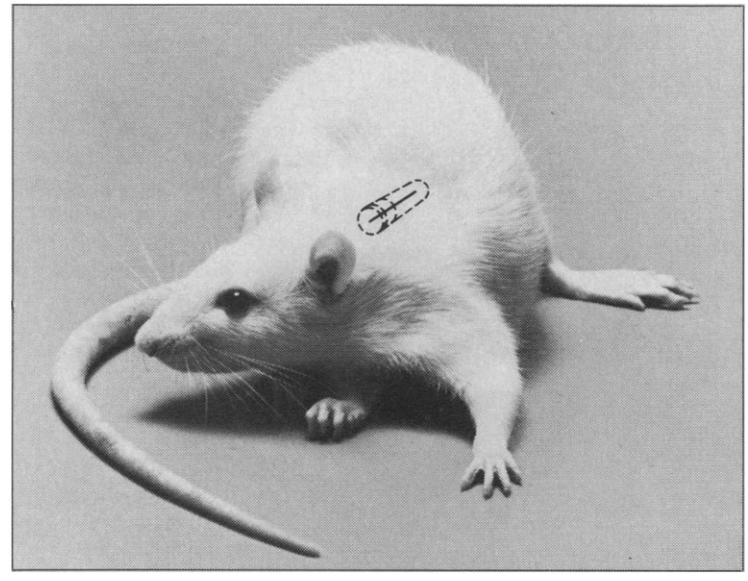
Paul Evans, then the TVA information

NEW ADVANCED METHOD OF DRUG DELIVERY

Alzet™ Osmotic Minipump The first implantable self-powered pump

Continuous pumping into unrestrained animals

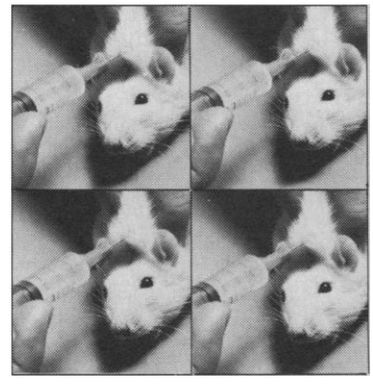
The ALZET™ Osmotic Minipump delivers solutions continuously for a period of up to one week in animals as small as mice, without the need for external connections or frequent handling of the animals. This implantable Minipump has been used successfully in experimental studies of the effects of continuous administration of cancer chemotherapeutic agents, addictive drugs, hormones, and antigens. During its functional lifetime, the Minipump acts as a constant source of drug within an animal's body.



Conventional drug delivery methods

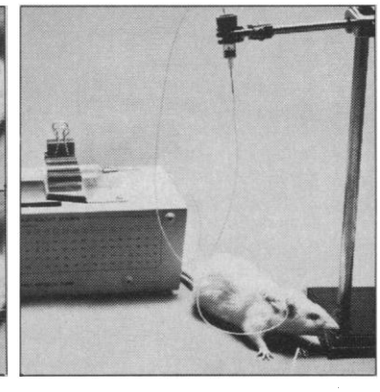
Multiple injections

Solutions must be injected several times a day to maintain adequate drug levels. This leads to periods of over- and under-medication and requires frequent animal handling.



Infusion pump/catheterization

Cumbersome, difficult to set up and maintain, requiring external connections and restraints. This method produces an artificial environment for the animal, hampering normal behavior.



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officer and the official who dealt with us on the book, expressed some concern about the "appearance" of the situation when I went on the TVA beat. We discussed it only briefly, for we both knew the book job was secondary to my career with the *News-Sentinel* and should not interfere with any assignment the editors might give me.

Within a few months after we began our research, Alberta and I realized this kind of book was going to require much more time than we'd guessed when we agreed to do it for $10,000. We sometimes joked about the painful fact that we were the only people working for TVA paid less per hour than the janitors. (We now estimate we devoted 6000 to 8000 man-hours to the project.) We consoled ourselves that most of the work was interesting, and we determined to make the book that would bear our names a good one.

Incidently, it's not a book that glorifies TVA. Only two of the 38 chapters deal very much with TVA. These two are about TVA building Fontana Dam.

The author makes a point of the fact that the current Tellico Dam controversy is not mentioned in the book. Our manuscript contained two chapters on Tellico, but the publisher, the East Tennessee Historical Society, decided to omit them, on the theory it should not be involved in current controversy.

The book *Valley So Wild* was published late in the fall of 1975. So far, 5000 copies have been sold, and the society has recently ordered 3000 more. I'm told this is exceptionally good for a regional book. Many have praised it, and among these have been several who oppose Tellico Dam. In what I took to be a kind of testimonial to the book's accuracy, the lawyer who represents the group now involved in the lawsuit against the dam said he cited information from it in a recent property condemnation case, and that the opposing TVA lawyer cited another portion of it in support of a point he was making.

CARSON BREWER
The Knoxville News-Sentinel,
208 West Church Avenue,
Knoxville, Tennessee 37901

Vaccination: An Acceptable Risk?

The article by Philip M. Boffey, "Guillain-Barré: Rare disease paralyses swine flu campaign" (14 Jan., p. 155) was a useful and timely review of an unfortunate situation. It is distressing that the lay press and public in general do not have (or make use of) the facts and reasoned interpretations of scientific and medical events as presented therein. There is, however, another and related public health conundrum that desperately needs discussion and widespread recognition, and we in preventive medicine have a grave responsibility that is not yet being met.

Three phenomena in our society, because they are inconsistent, lead to confusion, controversy, and the ineffectiveness of public health programs. This triad consists of (i) the availability of a highly effective epidemiological surveillance system; (ii) the presence of a vigorous, effective, and rapid news gathering and dissemination system; and (iii) the absence of general public recognition of and a social consensus on the balance of benefits and risks in disease preventive programs.

The United States is one of few countries in the world where the detection and systematic investigation of rare medical events is likely to be done rapidly and comprehensively. With the leadership and coordination of the Center for Disease Control, and effective public health organizations in many states, we learn about problems that would simply be missed in many other places.

Little need be said about the effectiveness of our news media; we are fortunate they work well in reporting events. But, with few exceptions, reporters and commentators are far less effective in *interpreting* medical events for the public, partly because they don't seek expert assistance often enough and partly because we don't offer it or make ourselves available often enough.

The third component of our problem creates a dilemma. The public has been led to expect that doctors do "good," and when they don't, it is because of personal negligence or bad practice. The public (and even much of the medical profession) has not been sufficiently educated to realize that there is some measurable risk in every medical intervention, and when that risk is spread over thousands or millions of persons subject to the intervention, it results in countable numbers of individuals paying the whole price for the benefit provided to the larger population.

After recognition of the phenomenon of risk, there must be a social consensus, informed consent if you will, that the risk is acceptable. Is our society willing to substitute several hundred cases of Guillain-Barré syndrome, caused by an act of man (assuming the still-unproved causal relationship), for the potential tens of thousands of deaths from influenza, an act of God? Or the one case of vaccine-induced paralytic disease per million of

polio vaccinees instead of 5000 paralytic cases (estimated lifetime risk per million before a vaccine was developed)? Equivalent risk-benefit balances could also be calculated for preventive interventions for other than infectious diseases, although the "risk" might be measured by social or economic factors rather than illnesses or deaths.

As part of the development of that consensus, our society would presumably want to address the issue of an equitable sharing of the damage caused by preventive programs. It would not be unreasonable for those protected to bear at least the financial burden of those unavoidably injured, by providing appropriate, tax-based support to the victims or their families.

Since few would wish to solve this problem by abolishing our medical intelligence system, or by censoring the publication of medical news, we must undertake the arduous task of developing a social philosophy on public health risks and benefits. Failure to do so will permit the acceleration of a beginning breakdown in public health programming.

HENRY M. GELFAND
Epidemiology Program, School of Public Health, University of Illinois at the Medical Center, Chicago, 60680

Clever Lawyers

Luther J. Carter, in his article (News and Comment, 14 Jan., p. 162) describing the 10-year struggle in Michigan to license and build the Midland nuclear station (to supply electricity to Consumers Power Company and steam to the Dow Chemical Company) concludes—correctly—that "the nuclear enterprise is one of agonizing uncertainty."

Carter further says that partners in a nuclear venture need, in addition to strong faith and good luck, "clever lawyers to write the contracts [between the partners] so as to make the uncertainty bearable." Lawyers may strive for clarity in contracts, but they have little chance to alleviate the growing anxiety suffered by their clients in today's uncertain regulatory climate.

In 1967 was any lawyer clever enough to foresee the regulatory chaos of 1977? If there was, and he then so advised his client, his vision would probably have been taken as insane hallucination, and a less clever lawyer would have been retained in his stead.

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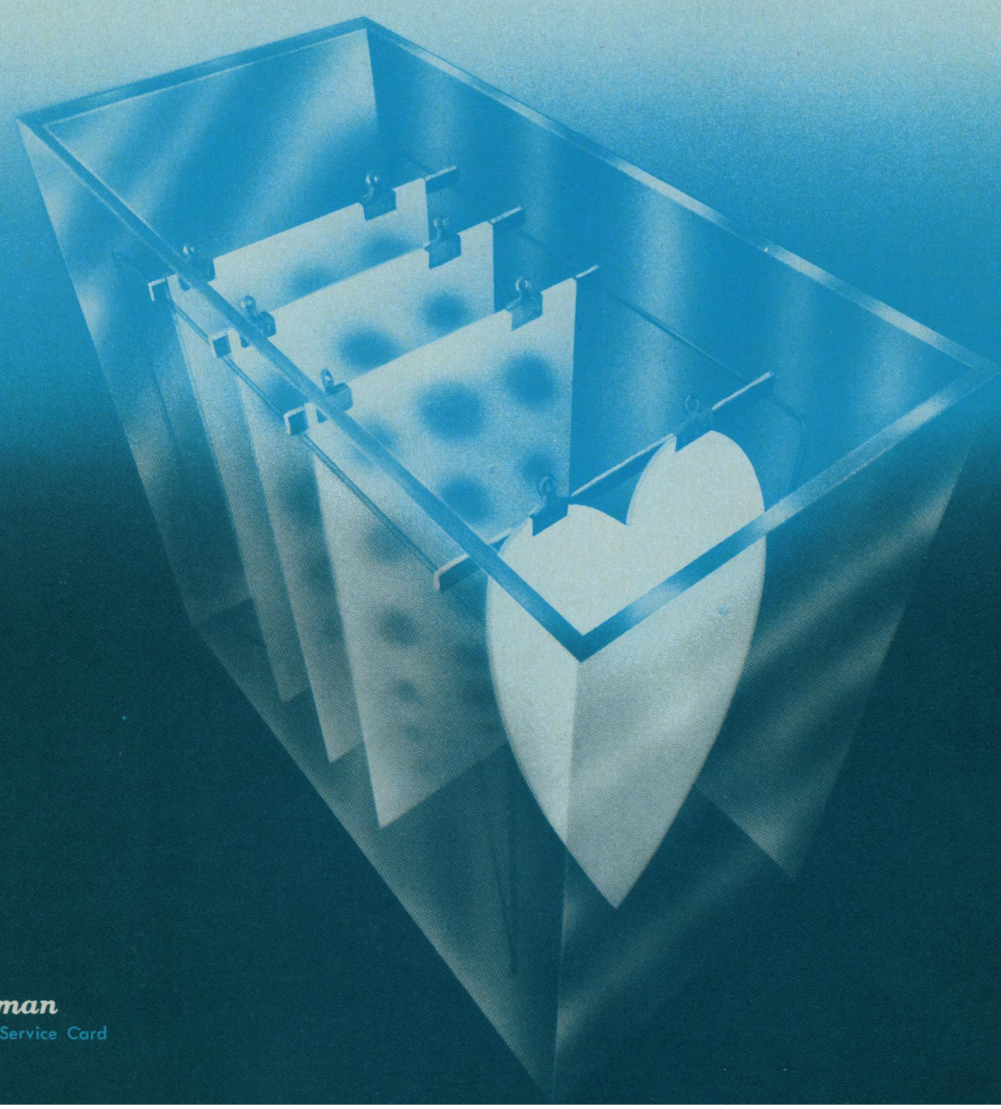

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25 February 1977, Volume 195, Number 4280 **SCIENCE**

Learning About Energy the Hard Way

For more than a decade it has been obvious that the United States is destined to face enormous adjustments in its use of energy. The difficulties and costs of finding new oil and natural gas have been climbing rapidly and it is clear that potential discoveries are limited. The embargo of 1973–1974 should have led to vigorous action, but it was quickly ignored.

By mid-March the acute stage of the current energy shortage will have passed. Because supplies of foreign petroleum are available, a major disaster has been avoided. A huge shortfall has been in part made good by record imports of oil. The United States is fortunate in another aspect. Although generating equipment was taxed to the utmost, the electrical utilities were able to avoid massive power shutdowns.

And so, although domestic sources of oil and gas continue to decline, the United States will luck through another energy crisis. But other crises will come, and will probably be more severe, for even with action now, many years must elapse before the gap between domestic production and consumption of energy can be made to decrease substantially.

In principle, conservation is the solution, with a goal of reducing energy consumption to half its present level. However, the record of the past 3 years provides little basis for hope that energy consumption can easily be cut. Industry has already made most of the simple moves such as fixing steam leaks. Those homeowners who are willing to turn down the thermostat have already done so. To achieve really substantial economies will require investment of as much as a thousand billion dollars or more. Even were major changes to begin now, a decade or more would have to pass before their effects would be largely felt. Still a beginning must be made, but that will evidently require more incentives than have hitherto been supplied. The people must come to understand and believe that the various forms of energy—especially those based on oil and natural gas—are going to become steadily more scarce and much more expensive. Examples of incentives would be huge taxes on gasoline and heavy autos. Conversations with people in industry indicate that new energy-saving installations would be built if funds were available at low interest rates. Such construction would employ many workers.

Much of the energy that is consumed by industry is utilized for process heat. In principle coal rather than oil or natural gas could be used, and this substitution could be the fastest means for freeing supplies of natural gas and oil. However, in general, capital expenditures would be involved, and again financial incentives would speed the process.

Overall, the amount of energy moved in gas pipelines is about three times that transmitted electrically. For home heating there is no easy domestic substitute for natural gas. To replace methane by electricity in homes alone would require an investment in generating plants and heat pumps amounting to several hundreds of billions of dollars. Solar heating would also involve enormous investment.

Domestic supplies of both oil and gas could be increased. For example, additional amounts of methane might be obtained from fermentation of biomass, from disposal of organic matter in sanitary landfills, from gases associated with coal, from brown shales of the Appalachian Basin and elsewhere, from the low-porosity rocks of the Uinta and other western basins, from the geopressured zones of the Gulf Coast, and from Alaska. At some time in the future there will be synthetic methane from coal. Probably most practical is natural gas to be discovered by conventional drilling. Methane from all of these sources will be expensive.

The United States apparently learned nothing from the 1973–1974 embargo. Perhaps a second lesson will be more effective. If not, other lessons will come and they will be more harsh.—PHILIP H. ABELSON

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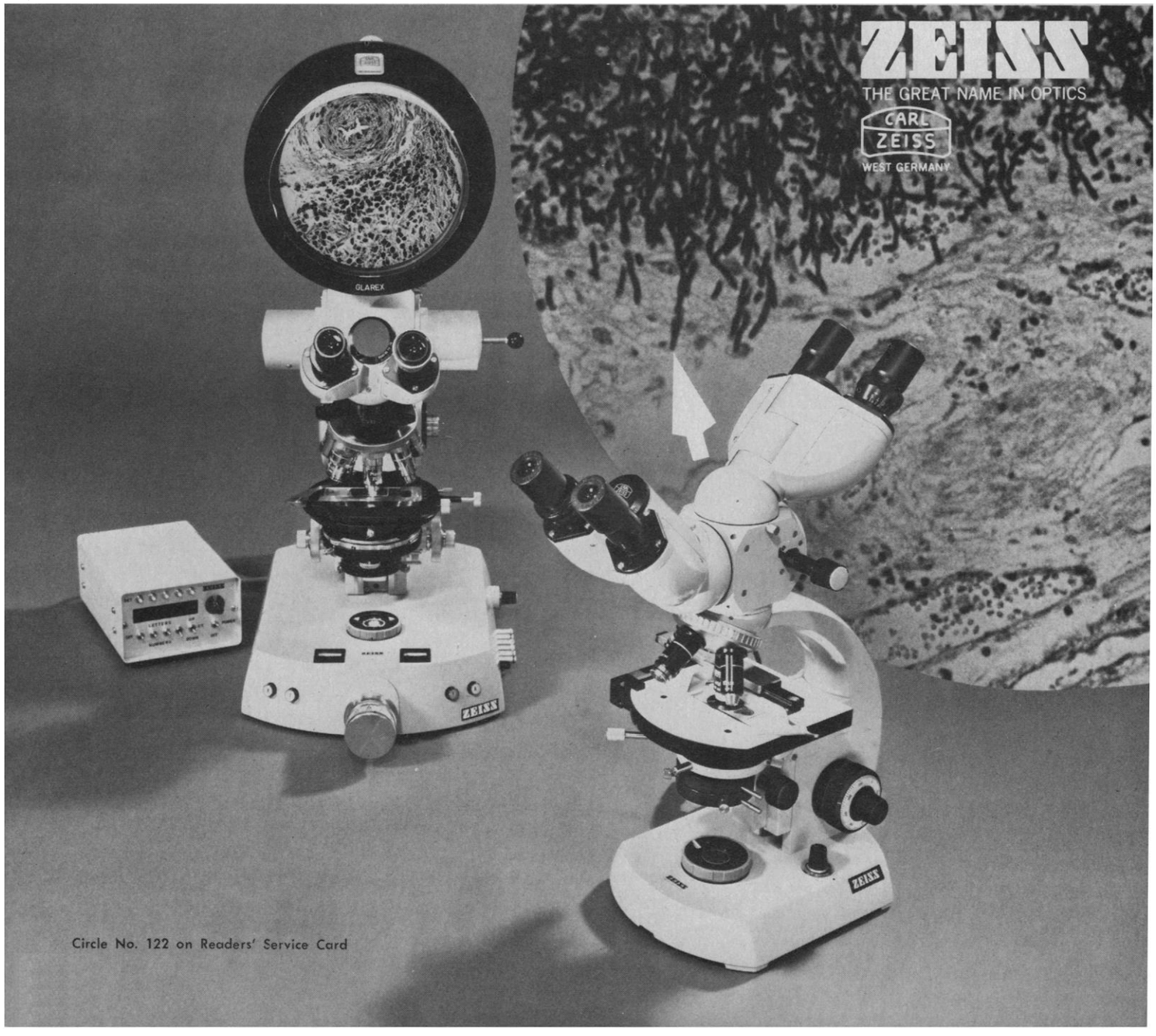

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New Rules for AAAS–Newcomb Cleveland Prize

The AAAS–Newcomb Cleveland Prize, which previously honored research papers presented at AAAS annual meetings, will henceforth be awarded annually to the author of an outstanding paper published from September through August in the Reports section of *Science*. The first competition year under the new rules starts with the 3 September 1976 issue of *Science* and ends with that of 26 August 1977. The value of the prize has been raised from $2000 to $5000; the winner also receives a bronze medal.

To be eligible, a paper must be a first-time presentation (other than to a departmental seminar or colloquium) of previously unpublished results of the author's own research. 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 section. Nominations must be typed, and the following information provided: the title of the paper, issue in which it is published, author's name, and a brief statement of justification for nomination. Nominations should be submitted to the AAAS–Newcomb Cleveland Prize, AAAS, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. Final selection will rest with a panel of scientists appointed by the Board of Directors.

The award will be presented at a session of the annual meeting at which the winner will be invited to present a scientific paper reviewing the field related to the prize-winning research. The review paper will subsequently be published in *Science*. In cases of multiple authorship, the prize will be divided equally between or among the authors; the senior author will be invited to speak at the annual meeting.

Reports

Migrating Birds Respond to Project Seafarer's Electromagnetic Field

Abstract. *Radar tracking of individual migrating birds flying over a large alternating-current antenna system showed that the birds turned or changed altitude more frequently when the antenna system was operating than when it was not. These results suggest that birds sense low-intensity alternating-current electromagnetic fields during nocturnal migratory flight.*

Orientation to d-c magnetic fields whose strengths are comparable to that of the earth (about 40 microteslas) has been reported in honeybees (*1*) and birds (*2*). Attempts to condition birds to magnetic stimuli in the laboratory have rarely been successful, even under conditions sufficient to demonstrate other unexpected sensory capabilities (*3*); however, positive effects have been obtained with birds engaged in homing or "migratory restlessness" (*2*). Little evidence is available bearing on the nature of postulated magnetic receptors in birds, their sensitivities, or the conditions under which birds might use magnetic orientation.

By contrast, a-c fields have been much less well investigated. Southern (*4*) recently reported that orientation in ring-billed gull chicks (*Larus delawarensis*) confined directly above a portion of the antenna buried at a depth of 1 m at the U.S. Navy Wisconsin Test Facility (WTF) was disrupted by the a-c fields generated by the antenna. In the course of investigating environmental effects of the suspended antenna of the Navy's Project Seafarer (*5*) at the WTF, we found evidence that migrating birds reacted to the low-frequency a-c magnetic field as they flew over the antenna; these results imply that birds can detect magnetic stimuli fairly rapidly, that their sensitivity to a-c fields is much greater than the sensitivity that would be required to detect the earth's d-c field, and that they may use magnetic information during the course of nocturnal migration.

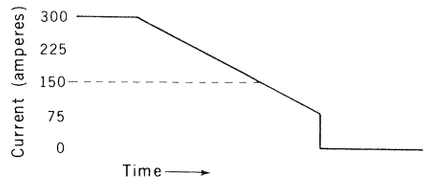

Fig. 1. Antenna current as a function of time during a transition from "on" to "off." Current decreased linearly from 300 amp (solid line) or 150 amp (dashed line) to 75 amp and was then shunted abruptly to a load resistor. The duration of the ramping of the current from 300 to 75 amp was 100 to 110 seconds; the duration of the ramping from 150 to 75 amp was 45 to 52 seconds. (The reverse sequence obtained during a transition from "off" to "on.") When both antennas were changing state, the current transitions from 75 to 0 amp were nearly simultaneous.

The study reported here was conducted at the WTF for Project Seafarer from 21 April to 10 May 1975 (*6*). The WTF consists of an oscillator which emits a sinusoidal signal at 72 to 80 hertz (*7*) and which connects to the earth in two orthogonal dipole antennas, oriented approximately north-south and east-west. The antennas, each 22.6 km long, form a cross and are suspended about 8 m above the surface of the ground. Currents in the antennas could be varied from 75 to 300 amp at 1800 volts or could be shut off by means of a shunt through a load resistor. The two antennas could be operated independently, and signals in them were phase-independent. At distances of 100 to 400 m, the electric field generated by the antenna is calculated to be about 0.07 volt/m in air. The calculated magnetic field at these distances ranges from about 0.1 to 0.5 microtesla, less than 1 percent of the earth's magnetic field (*8*). During the experiment, the current in one or both antennas was changed every 15 minutes (*9*), and as a result there were five experimental conditions: (i) north-south antenna on (NS), (ii) east-west antenna on (EW), (iii) both antennas on (NS+EW), (iv) both antennas off ("off"), and (v) either single antenna or the pair of antennas changing (Δ). The condition Δ involved current changes from 0 to 75 amp or from 75 to 0 amp (Fig. 1) (*10*). The condition "on" signifies that NS+EW, NS, or EW was on.

A low-power tracking radar (*11, 12*) used to follow individual migrating birds was situated 81 m from the intersection of the antennas. Because the intensity of the a-c magnetic field near the WTF decreases linearly with distance from the antennas, we tracked birds flying over the WTF at low altitudes (80 to 300 m above the ground). At short ranges, the radar provided plots of the birds' posi-

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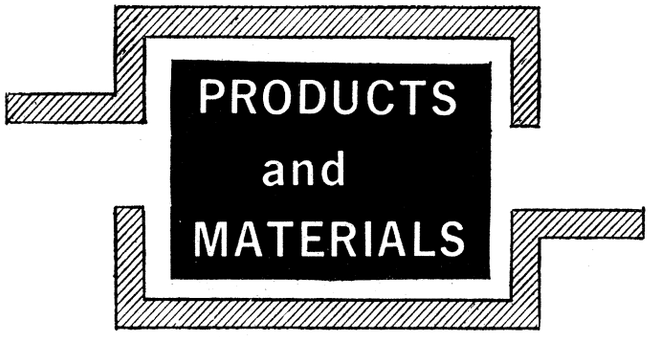

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Hematology System

The HS/90 performs large-volume analyses to provide differential, CBC, platelet counts, and fully prepared slides. Over 90 percent of the routine hematologic analyses are performed at a single station, with a single sample, and with reports on a single form. Analyses may be performed at a rate of 90 samples per hour. Components of the system include the D/90 automated 10,000-cell differential counter that uses whole blood specimens and the 8/90 that acts as an automated analyzer in the performance of six routine tests. The D/90 incorporates the Auto-Slide to produce a blood smear that is stained and labeled for later review. Technicon. Circle 722.

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Readers' Service Card (on pages 734A and 798A) and placing it in the mailbox. Postage is free.

—RICHARD G. SOMMER

Ultraviolet-Visible Spectrometer

Junior III employs a quartz iodine source that increases the signal-to-noise ratio to the extent that bandpass is reduced to 8 nanometers. Stray light is reduced to less than 0.1 percent of that transmitted. The device is designed to function as a low-cost, general-purpose spectrometer. Electronics consist of a single plug-in printed circuit board that is easily interchangeable. Accessories include a semiautomatic flow cell. Perkin-Elmer, Coleman Instruments. Circle 704.

Radiochromatogram Scanner System

The model 930/950 radiochromatogram scanner system includes digital integration, 30-inch multiple thin-layer tray assembly, selectable scan speeds, collimation, sensitivity, and automatic operation. The system is designed for use with assays of activity of technetium-99m, iodine-125 and -131, tritium, and carbon-14. Results are available in digital display and in output from a strip-chart recorder. Vangard Systems. Circle 715.

Cardiotocogram Recorder

Model 8032A repeater/recorder receives signals from a bedside monitor and records the fetal heart rate and labor activity of one patient at a time. The same information is shown on digital displays while lamps indicate which monitoring methods are being used. The dual-channel recorder may be used alone or incorporated into large central monitoring stations. The user selects recording standards with paper speeds of 1 and 2 centimeters per minute and fetal heart rate scale from 50 to 210 beats per minute or paper speeds of 1 and 3 centimeters per minute and fetal heart rate scale from 30 to 240 beats per minute. Hewlett-Packard, Medical Products Group. Circle 718.

Antibiotic Zone-of-Inhibition Reader

Relative effectiveness of antibiotics may be determined with the zone reader which measures the diameter of the zone of inhibition produced by an antibiotic. Petri dishes are inoculated with bacteria and disks with antibiotic substances are placed in the dish. After incubation, the bacteria cover the surface of the medium in the dish except for a circular zone around the disk. The diameter of this zone is a function of the effectiveness of the antibiotic against that particular bacterial species or strain. The zone reader measures the diameter from 0 to 35 millimeters in 0.02-millimeter increments. National Instrument. Circle 719.

Clinical Microscope

The FITC microscope uses a 12-volt, 100-watt halogen illuminator. It is equipped with a high-transmission interference filter, barrier filters, and a dark-field condenser for fluorescence studies of antibody-antigen. An improved ventilation and thermal isolation system make it possible to place the light source very close to the condenser to enhance the intensity of the illumination. Accessories are available for bright-field, dark-field, and phase-contrast microscopy. Nikon Instrument Division/EPOI. Circle 716.

Ultrasonic Blood Flow Meters

Model 1012 is designed for laboratory and clinical applications and model 1013 is for surgical, hemodialytic, and industrial-medical use. Both offer adjustable range controls for maximum resolution and use filter capability to display the pulsatile wave shape. Other features include zero-flow measurement without vessel occlusion, accuracy to within 1 percent, crystal-controlled exciter, and simultaneous display of pulsatile and mean directional flow. L & M Electronic Labs. Circle 720.

Cardiac Output Computer

Model SP1425 uses a thermodilution technique to measure and display cardiac output. The device measures temperatures of pulmonary artery and injectate continuously and automatically. Temperatures of the injectate may range from 0° to 25°C and volumes may range from 2 to 10 cubic centimeters. If volume or temperature is too great or too small, the operator is alerted and an electrical

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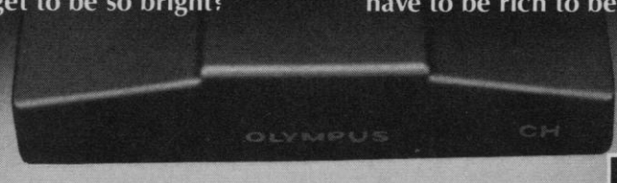

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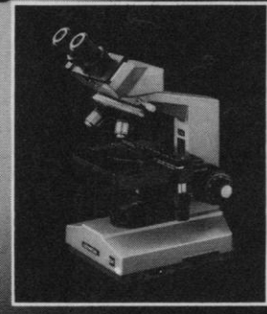

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signal indicates whether the catheter is faulty. Operation requires three steps: user selects injectate volume, presses a "Start Compute" button, and injects the thermal bolus at the sound of a tone. Calculations and operation are automatic. Gould, Measurement Systems Division. Circle 721.

Blood Gas Analyzer

Model 165/2 has improved electronics to protect the instrument from changes in the line voltage. The temperature meter may be calibrated by pushing a button. The waste bottle holds 500 milliliters. Model 165/2 measures *p*H; partial pressure of oxygen and of carbon dioxide; and calculates total carbon dioxide, bicarbonate, and base excess within 90 seconds of sample insertion. Corning Medical, Corning Glass Works. Circle 717.

Literature

Infrared Instruments for Temperature Measurement and Control describes apparatus and techniques for measurement when physical contact with the object is impossible, dangerous, or undesirable. Barnes Engineering. Circle 723.

Data Acquisition System is devoted to the Digitem 2000 system which is based on microcomputers. Input, output, and system options are fully explained. FX Systems. Circle 724.

Worthwhile Facts about Fluorescence Microscopy gives many valuable tips and supports them with photographs, curves, and illustrations. Carl Zeiss. Circle 725.

Atomic Absorption/Emission Spectrometers describes the IL 51 series including a table of wavelengths, lamp currents, sensitivities, and detection limits for 67 elements. Instrumentation Laboratory. Circle 727.

Instruments and Reagents Catalog includes chemistry analyzers and instruments for hematology as well as reagents. Hycel. Circle 728.

Temperature Feedback is devoted to the Thermal J42 biofeedback device. Cyborg. Circle 729.

Mass Spectrometer Accessories are catalogued by application and function. Vacumetrics. Circle 712.

Polariscope System describes the model 401 for photoelastic measurement of stress. Photolastic. Circle 713.

Scanning Electron Microscopes includes two new research models. International Scientific Instruments. Circle 714.

BOOKS RECEIVED AND BOOK ORDER SERVICE

(Continued from page 776)

verse Books, New York, 1976. 144 pp., illus. $12.50.

Body Awareness in Action. A Study of the Alexander Technique. Frank Pierce Jones. Schocken, New York, 1976. xvi, 176 pp., illus. $9.95.

Boundaries of Analysis. An Inquiry into the Tocks Island Dam Controversy. Harold A. Feiveson, Frank W. Sinden, and Robert H. Socolow, Eds. Published for the American Academy of Arts and Sciences by Ballinger (Lippincott), Cambridge, Mass., 1976. xviii, 420 pp., illus. $17.50.

Calculus. An Intuitive and Physical Approach. Morris Kline. Wiley, New York, ed. 2, 1977. xvi, 944 pp., illus. $18.95. *To order this book circle No. 434 on Readers' Service Card.*

The Causes of Profound Deafness in Childhood. A Study of 3,535 Individuals with Severe Hearing Loss Present at Birth or of Childhood Onset. George R. Fraser. Johns Hopkins University Press, Baltimore, 1976. xvi, 410 pp., illus. $22.50.

Chemical Carcinogens. Charles E. Searle, Ed. American Chemical Society, Washington, D.C., 1976. xxviii, 788 pp., illus. $67.50. ACS Monograph 173. *To order this book circle No. 435 on Readers' Service Card.*

The Complexity of Computing. John E. Savage. Wiley-Interscience, New York, 1976. xvi, 392 pp., illus. $22.95. *To order this book circle No. 436 on Readers' Service Card.*

A Dictionary of Electrochemistry. C. W. Davies and A. M. James. Halsted (Wiley), New York, 1976. x, 246 pp., illus. $19.75. *To order this book circle No. 437 on Readers' Service Card.*

Digital Picture Analysis. A. Rosenfeld, Ed. Springer-Verlag, New York, 1976. xiv, 352 pp., illus. $29.60. Topics in Applied Physics, vol. 11. *To order this book circle No. 438 on Readers' Service Card.*

Economic Growth in the Future. The Growth Debate in National and Global Perspective. Edison Electric Institute Committee on Economic Growth, Pricing and Energy Use. McGraw-Hill, New York, 1976. xiv, 424 pp., illus. + index. $26.50. *To order this book circle No. 439 on Readers' Service Card.*

Evolution and the Diversity of Life. Selected Essays. Ernst Mayr. Belknap Press of Harvard University Press, Cambridge, Mass., 1976. xii, 722 pp., illus. $20. *To order this book circle No. 440 on Readers' Service Card.*

Fear in the Countryside. The Control of Agricultural Resources in the Poor Countries by Nonpeasant Elites. E. G. Vallianatos. Ballinger (Lippincott), Cambridge, Mass., 1976. xx, 182 pp. $14.

Fists and Flowers. A Social Psychological Interpretation of Student Dissent. Alice Ross Gold, Richard Christie, and Lucy Norman Friedman. Academic Press, New York, 1976. xii, 204 pp., illus. $11.50. Social Psychology.

Fossil Animal Remains. Their Preparation and Conservation. A. E. Rixon. Athlone Press, London, 1976 (U.S. distributor, Humanities Press, Atlantic Highlands, N.J.). viii, 304 pp., illus. Paper, $12.

Learning to Use Extrasensory Perception. Charles T. Tart. University of Chicago Press, Chicago, 1976. xii, 170 pp., illus. Cloth, $12.50; paper, $3.95.

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