American Association for the Advancement of Science

SCIENCE

2 SEPTEMBER 1988 $3.00
VOL. 241 ■ PAGES 1133–1264

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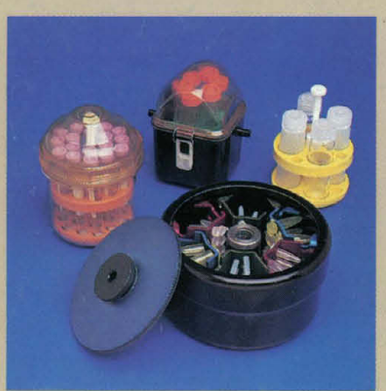

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SCIENCE

ISSN 0036-8075
2 SEPTEMBER 1988
VOLUME 241
NUMBER 4870

■ **SCIENCE is published weekly on Friday, except the last week in December, and with an extra issue in February by the American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC 20005.** Second-class postage (publication No. 484460) paid at Washington, DC, and at an additional entry. Now combined with **The Scientific Monthly®** Domestic individual membership and subscription (51 issues): $70. Domestic institutional subscription (51 issues): $110. Foreign postage extra: Canada $32, other (surface mail) $32, air-surface via Amsterdam $85. First class, airmail, school-year, and student rates on request. Single copies $3.00; back issues $5.00; Biotechnology issue, $5.50 ($6 by mail); classroom rates on request; Guide to Biotechnology Products and Instruments $16 ($17 by mail). **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. **Postmaster:** Send Form 3579 to *Science*, 1333 H Street, NW, Washington, DC 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

■ 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 foster scientific freedom and responsibility, 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 Looking south at the Aral Sea, a large, saline lake in the Soviet Union, from the Space Shuttle (6 August 1985). Sea level fell 11.5 meters between 1960 and 1985, exposing extensive salt-covered areas that appear white. The Amu Dar'ya Delta (light blue) is at top. A salt cloud rises from the sea's southeast coast (upper left). See page 1170. [Photograph courtesy of Michael Helfert, NASA-JSC, mission 51F(24), roll 36, frame 59]

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This Week in
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Desiccation of the Aral Sea

THE Aral Sea was once the fourth largest lake in the world, but today it is shrinking (cover) (page 1170). This sea is located in the south-central deserts of the Soviet Union, where the people (about 40 million Muslims) depend heavily on irrigation for agriculture; use of the lake and inflowing river waters by mankind has been going on for about 3000 years. Both the size and the depth of the Aral have fluctuated before in geologic time as climates and inflow patterns changed; although a dry period has contributed to the current recession, in large measure the desiccation is the result of anthropogenic factors—the diversion of river water for use in irrigation. The total area of the sea has already dropped by 40% compared with what it was just a quarter century ago, its salinity has almost tripled, and dust and salt storms are frequent. Micklin discusses the current status of the Aral Sea and the consequences of desiccation to native human, animal, and plant populations, the local climate, and the wider ecosystems; he addresses the possibility that the Soviet government may have to reevaluate a controversial project to divert water from Siberia to the Aral basin to preserve the sea.

Clocking chemistry in real time

CHEMICAL bonds break and form at times so short that they have previously been considered unmeasurable. Yet, with state-of-the-art laser techniques, Rosker *et al.* have now clocked the breaking of the chemical bond of the compound cyanogen iodide (ICN) in real time (page 1200). Gas-phase ICN was excited by a fast femtosecond (10^{-15} second) optical pulse. After photon absorption but before the actual breakage, the bond persisted briefly on the order of 10^{-13} second. This "pause" (during which the dynamically important transition states form) and the subsequent generation of the noninteracting reaction products were observed and clocked spectroscopically. With these techniques it should now be possible to watch chemistry happen as chemical bonds break or fragments come together to form new bonds.

Hepatitis viruses in lymphocytes

THE eastern woodchuck that is chronically infected with the hepatitis virus is a useful model for hepatitis B virus infections in humans; in both, hepatocellular carcinomas and lymphatic infections occur. The peripheral blood lymphocytes (PBLs) of such individuals are known to contain viral genomes in a nonreplicating state; now Korba *et al.* show that, upon induction by the common mitogen lipopolysaccharide, the woodchuck PBLs released, within a week, intact hepatitis virus particles (page 1213). Although these viruses primarily infect liver tissue, the lymphoid cells may be important in maintaining the chronically infected state, serving as reservoirs of latent viruses and as sites for viral amplification. Some of the early events in hepatitis virus reactivation can be examined in this system and external stimuli that induce viral reactivation can be identified. Other diseases (two of which are AIDS and a measles-related infection) have lymphoid phases in which the lymphoid cells could also be playing a role as a reservoir for latent viruses.

Accounting for husky plants

THE phenomenon of hybrid vigor, in which a hybrid "outperforms" both of its inbred parents, is well known among both plants and animals. For example, hybrid maize plants have longer leaf sheafs and longer blades than do inbred plants, and the dry weights of the shoots and the leaf areas are greater in the hybrids. One important contributor to hybrid vigor in maize is the availability of the plant hormones gibberellins (GAs). Rood *et al.* found that the growth of inbred plants could be accelerated by applying GAs to them and, thereafter, the shoot growth of the inbreds approached that of the hybrids (page 1216). Measurements of endogenous GAs and GA precursors by gas chromatography–mass spectrometry showed that in fact the natural levels of GAs in the hybrids were higher than those in the inbreds. Thus, the slower growth in inbreds is associated with a relative GA deficiency and, conversely, the vigorous shoot growth in hybrids is apparently a result of optimal GA concentrations. Because shoot growth is positively correlated with grain yield, GA content has a direct economic impact.

Circadian period genetics

THE natural circadian locomotor rhythm of a golden hamster can be dramatically altered by a single genetic mutation. Ralph and Menaker found a male hamster that had a rhythm with a markedly shortened period, 22 hours instead of the normal 24 (page 1225). In a series of breeding experiments, the truncated period was shown to be the result of a single semidominant genetic mutation. The crosses yielded three types of progeny: putative wild-type animals whose free-running periods (their natural period as measured in constant darkness) were about 24 hours, putative heterozygotes with 22-hour periods, and putative homozygotes with 20-hour periods. The number of progeny falling into each category was as expected for an inherited trait controlled by a single autosomal locus. When exposed to a regular light:dark cycle, the animals with a 24-hour free-running period adjusted their locomotor cycles to the light:dark cycle, but those with shorter periods were unable to "entrain" or showed abnormal entrainment. Genetic mutations of this sort have previously been identified in invertebrates, but this is the first report of such a mutation affecting the circadian period of a vertebrate. In this case a single gene is implicated, and the product of this gene may be one of the crucial elements in the regulation of this circadian period.

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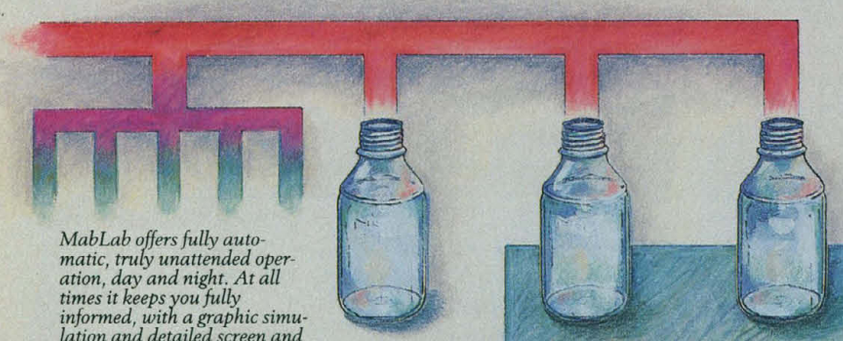

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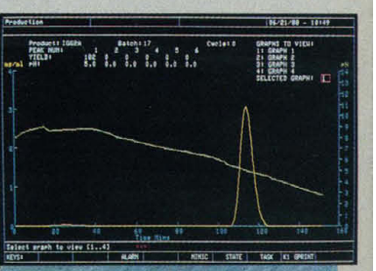

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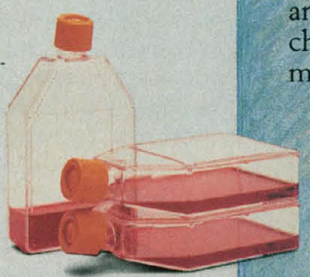

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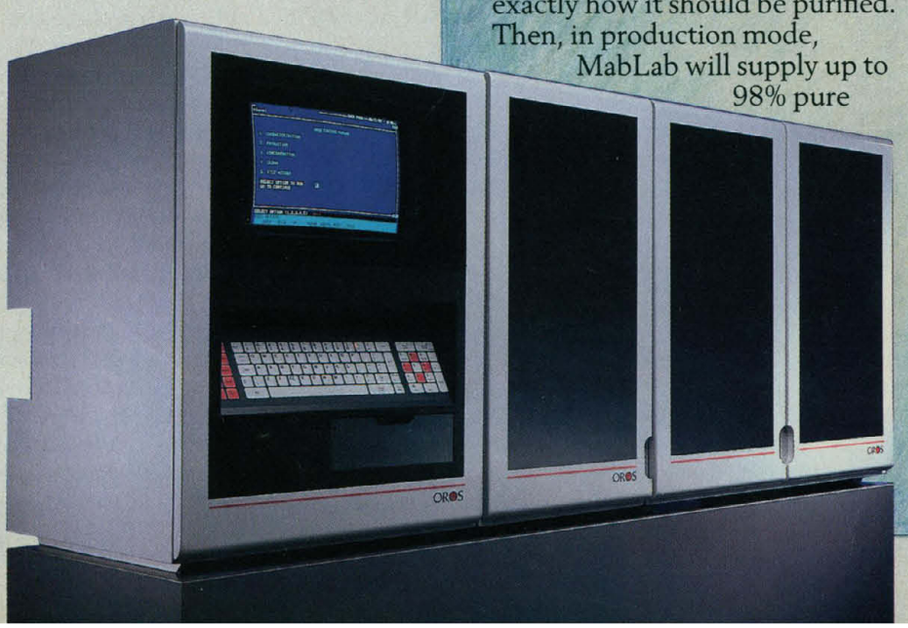

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SCIENCE

2 SEPTEMBER 1988
VOLUME 241
NUMBER 4870

The AAAS Observer

A birth is always an event of excitement and anticipation. With this issue of *Science* an infant publication is born, *The AAAS Observer*. Conceived by AAAS Executive Officer Alvin Trivelpiece and edited by Tabitha Powledge, the new publication is designed to bring members into more intimate contact with the activities of their association and other professional and policy issues.

The AAAS is involved in many activities of great benefit to the scientific community, but to many members of the AAAS, *Science* is their only contact with the association. That publication, which had been founded by Thomas Edison as a primary scientific journal, became the official journal of the AAAS in 1900. Over the years, particularly during the editorship of Philip Abelson, *Science* expanded its coverage of news and policy to become both a magazine and a journal and in the process acquired wide circulation. Although this is an asset, it places financial limitations on the magazine's size. *Science* fulfills a major role in an association devoted to science, but that is only one of the organization's functions. In its lifetime, the AAAS has engaged in many other activities that advance the cause of science.

One of its projects is devoted to helping women, minorities, and handicapped individuals toward greater representation in the sciences. As these groups account for a growing fraction of the country's work force, these efforts will make an increasingly valuable contribution toward scientific efficiency in the future.

Another continuing AAAS interest is the education of scientists. Project 2061 is the current project in that area. The decreasing number of young people interested in science must be one of the first concerns of all scientists, and the deterioration of training in science at the elementary and high school levels must be reversed, and rapidly.

Other commitments to the advancement of science involve policy issues, such as arms control, freedom and responsibility, help to countries with arid climates, communication with the national organizations of other countries, publication of books and films, sponsorship of colloquiums on public understanding of science, and many more. In addition, the executive officer and members of the AAAS Board act as spokespersons in Washington, D.C., for many activities in which science needs to be represented before congressional and executive committees. Another major feature of the AAAS is its annual meeting, distinctive in the span of scientific activities it covers and also significant in its emphasis on policy issues, as well as primary scientific publication.

These are a few of the many activities of a society devoted to the advancement of science that are not immediately obvious. *The AAAS Observer* is designed to communicate about these activities with the members of the association and to keep them informed in related areas that advance science. One could ask why all such topics might not be addressed in the pages of *Science*, and the answer relates both to the financial limitations of a wide-circulation journal and the subject matter that is appropriate to that journal. A number of years ago AAAS decided that *Science* should be a scholarly journal in which the advocacy position was minimal and the objectivity maximal. Thus *Science* reports on policy matters from different points of view and describes technological advances that pose hazards as well as benefits to society. In the long run this shows enormous confidence that the advancement of science, like the advancement of democracy, will be best served if the whole truth is presented.

But there is a legitimate place for the passionate advocates; the advancement of science can also be achieved by those who perceive areas in need of improvement and become strong advocates of policy alternatives. *The AAAS Observer* will help, therefore, in implementing the organization's mandate to participate in scientific advancement and to inform the members of what their society is doing. *The AAAS Observer* is not designed as a scholarly journal. It is an informal magazine. It contains no technical articles, no news of breakthroughs. Its "Observations" department is home to a variety of opinion pieces on issues of concern to scientists. The new publication also provides members with a forum for commenting on association activities and will take up policy and professional concerns that are not now being pursued by AAAS programs. Its columns stress the human side of scientific activity. *The AAAS Observer* will take its first breath when removed from its plastic wrapper, with a figuratively friendly spank from an older relative. We wish it well.

—DANIEL E. KOSHLAND, JR.

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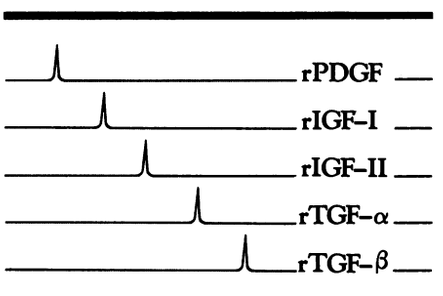

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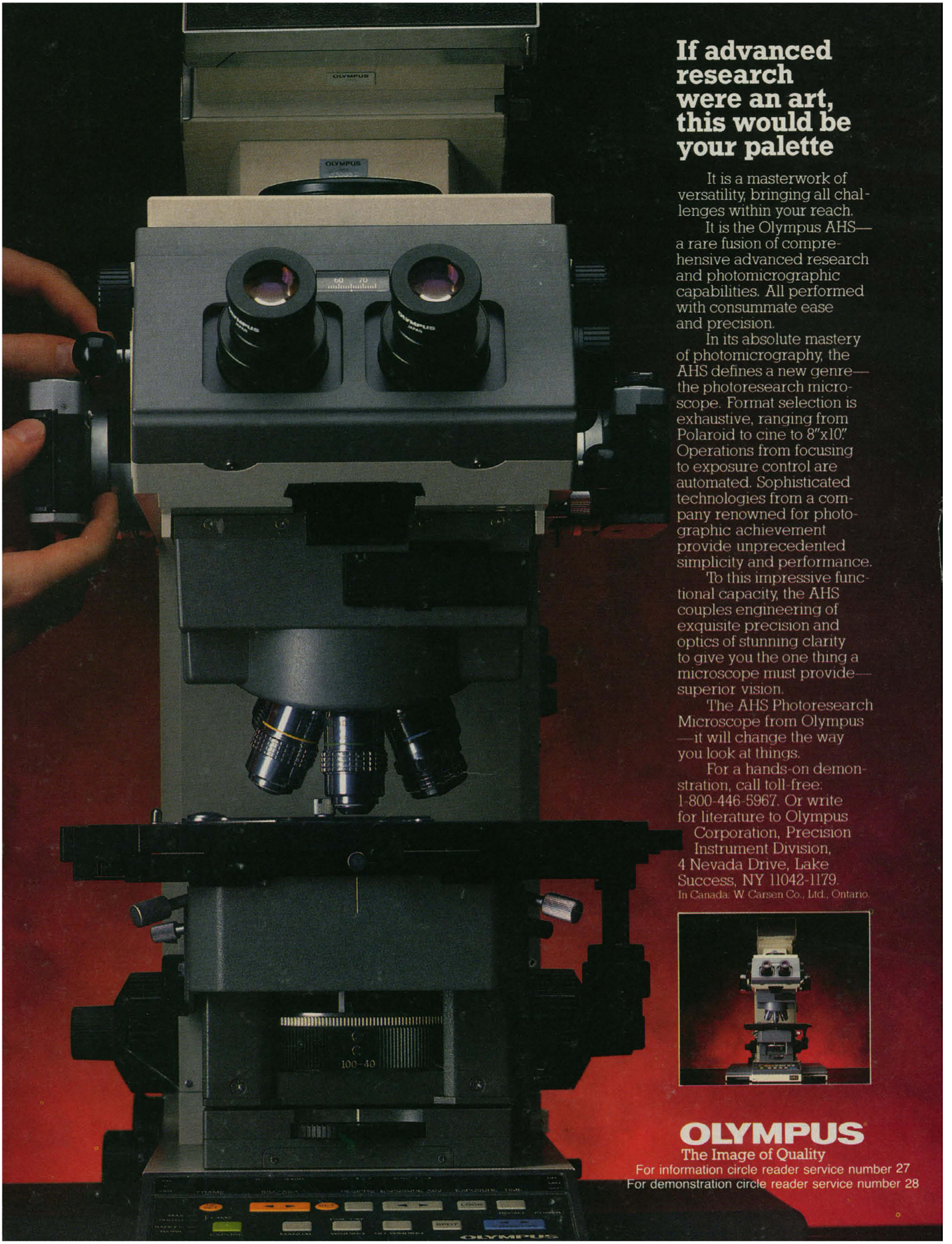

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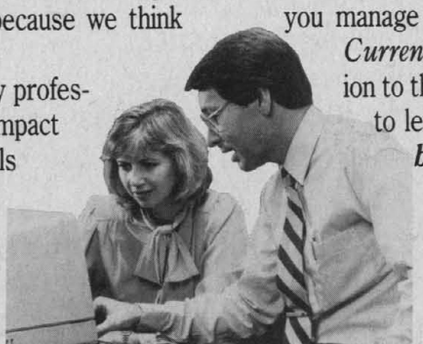

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The 1988 Awards will be presented at the National Association of Science Writers' banquet during the Annual Meeting of the American Association for the Advancement of Science in San Francisco, January 14–19, 1989.

The Awards are administered by the American Association for the Advancement of Science under a grant from the Westinghouse Educational Foundation.

For further information and entry forms, contact the AAAS Office of Communications, 1333 H Street, N.W., Washington, D.C. 20005, or call (202) 326–6440.

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January 9 -

Session I **Experimental Studies of Protein Conformation**

C.B. Anfinsen; R.L. Baldwin; F. Schmid; G. Petsko; M. Clore; K. Wuthrich; L. Gierasch; W. Eaton; F.M. Richards; R.F. Salemme.

Session II **Theoretical Approaches to Protein Folding**

C.M. Chothia; G. Rose; J.A. Schellman; K.A. Dill; R. Jernigan; J. Hermans; I.D. Kuntz; C. Levinthal; M.R. Pincus; G. Nemethy; H. Scheraga.

Session III **Protein Dynamics**

M. Karplus; N. Go; H. Frauenfelder; L.W. Jelinski; J. Hajdu.

Session IV **Solvent Interactions in Proteins**

B. Lee; M.M. Teeter; D.L. Beveridge; E. Clementi; W.L. Jorgenson.

Session V **Biologically Active Peptides and Drug Design**

M. Goodman; W.F. DeGrado; E.T. Kaiser; T.L. Blundell; J. Greer; G. Maggiora; A.R. Fersht; S.J. Benkovic; R.F. Sauer; D.R. Shortle.

Session VI **Viral Proteins**

S. Harrison; J. Hogle.

Session VII **Membrane Proteins**

E. Miles; D. Davies; H.K. Schachman.

The Conference will be followed by a workshop sponsored by NIDDK on "Molecular Dynamics Algorithms and Applications" to be held at the Cloister (Bldg. 60), National Institutes of Health, January 13-17, 1989. This workshop offers hands-on training in the field of macro-molecular simulation, to a limited number of participants. It includes lectures by experts in specific areas and laboratory demonstrations and experiments. Chairman: Cyrus Levinthal, Columbia University; assisted by Bernard Brooks, NIH.

Commercial hardware and software will be furnished by manufacturers.

For applications to attend the workshop, contact:
Dr. Nancy Lamontagne
NIDDK, NIH
Rm. 607, Westwood Bldg.
5333 Westbard Ave.
Bethesda, MD 20892
Telephone (301) 496-7997

Persons who wish to attend this conference should contact:
Mrs. Nancy Shapiro
Fogarty International Center
National Institutes of Health
Bethesda, MD 20892
Telephone (301) 496-2517

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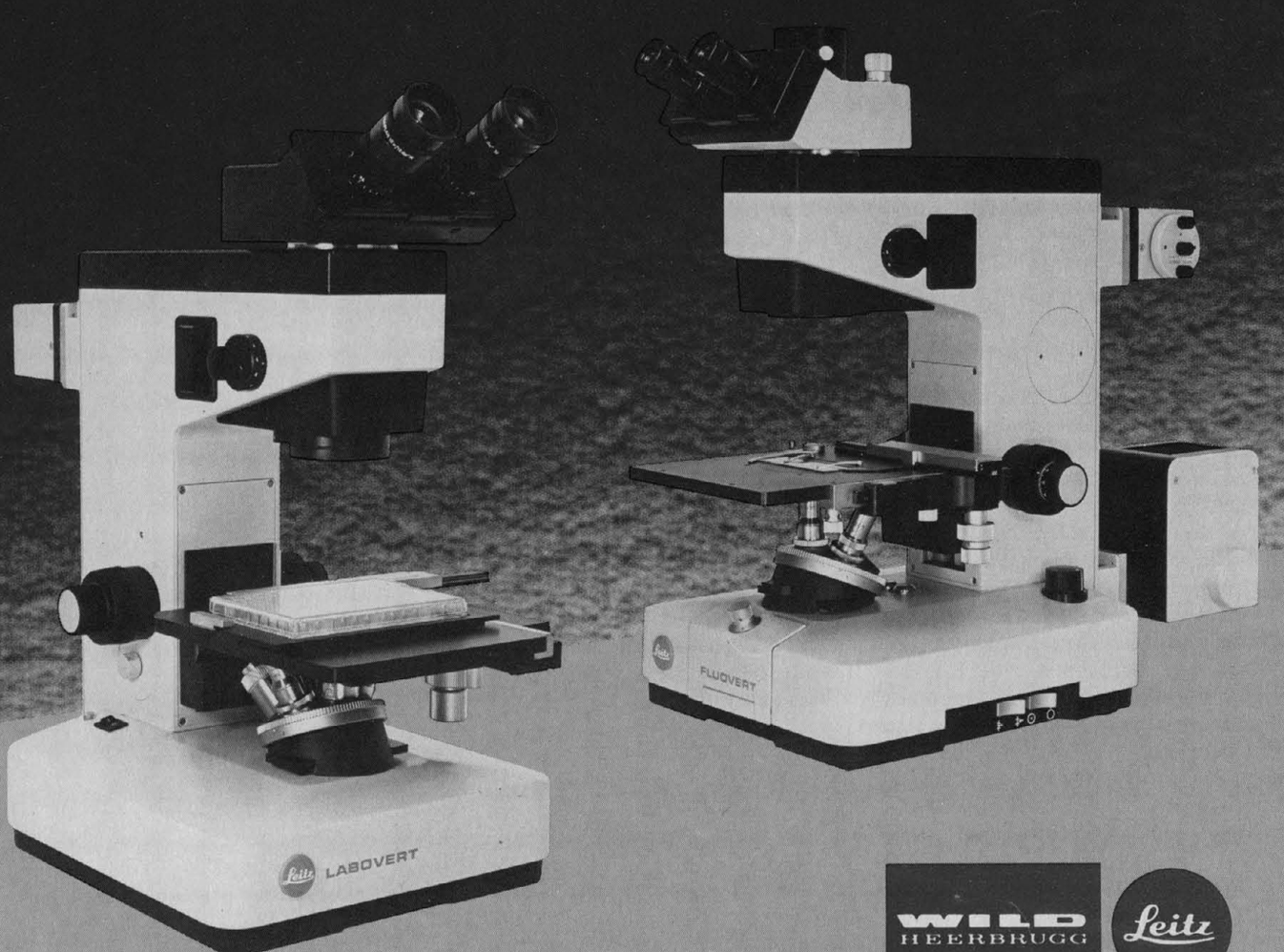

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4th Annual AAAS Forum for School Science

Science Teaching
Making the System Work

7–8 October 1988
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Get involved in the future of science teaching in America. Join the discussion as nationally recognized leaders in education, government, business, and the sciences meet to explore ways of promoting quality science education at the elementary and secondary levels.

Important issues to be addressed:

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- What type of school environment would enhance quality teaching?
- Should the state's role in science education be restructured?
- How should teacher quality be assessed?

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Angelo Collins, *Assistant Professor of Education, Stanford University; Co-Director, The Teacher Assessment Project*

Linda Darling-Hammond, *Director, Center for the Study of the Teaching Profession, RAND Corporation*

Franklyn G. Jenifer, *Chancellor, Massachusetts Board of Regents of Higher Education*

Frank Newman, *President, Education Commission of the States*

Claire Pelton, *Supervisor of Curriculum, San Jose Unified School District; Vice Chair, National Board for Professional Teaching Standards*

Cecile Springer, *Director of Contributions and Community Affairs, Westinghouse Corporation*

Irene Thorman, *Teacher, Withrow High School, Cincinnati; member, National Board for Professional Teaching Standards*

Sidney Topol, *Chairman of the Board, Scientific Atlanta Incorporated; member, Council on Competitiveness*

David Wright, *Majority Policy Chairman, Pennsylvania House of Representatives*

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The AAAS Forum for School Science is supported in part by a grant from the Carnegie Corporation of New York.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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AAAS Forum '88: Science Teaching

7–8 October 1988 ✦ Twin Bridges Marriott, Arlington, VA

(Near National Airport, Washington, DC)

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Lunch, Fri. (7 Oct.)	$ 17	_____
Lunch, Sat. (8 Oct.)	$ 17	_____
TOTAL AMOUNT:		$ _____

*Student rates apply only to full-time undergraduate and graduate students and retirees.

■ **15 September Deadline:** Registrants will receive a badge, program, and *This Year in School Science 1988: Science Teaching*. Registration is limited. Late registrants' materials will be held at the AAAS registration desk at the Twin Bridges Marriott. ■ Refund requests for registration fees and meal tickets must be made by letter or telegram to the AAAS address by 22 September and will be honored after the Forum.
No refunds will be made for cancellations received after 22 September.

Mail top half (registration form) to:
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AAAS Forum '88 ✦ 7–8 October 1988

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Please list definite arrival and departure dates and times. Check-in time is 4:00 p.m.; check-out time is 1:00 p.m. Reservations will be held until 6 p.m. only unless guaranteed by one of the credit cards below or one night's deposit is received. Failure to cancel 24 hrs. prior will result in one night's charges.

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