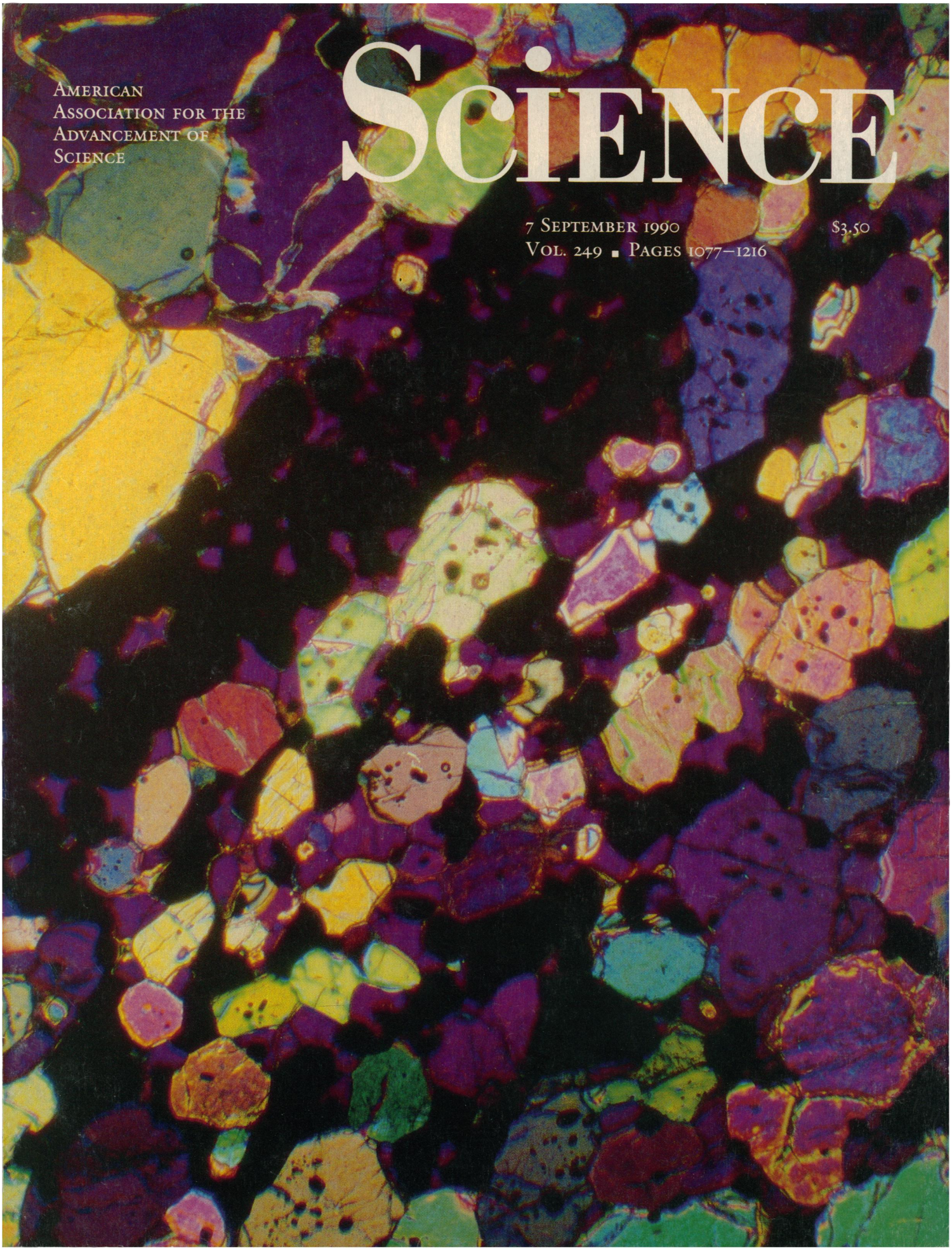
American Association for the Advancement of Science

SCIENCE

7 September 1990 $3.50
Vol. 249 ■ Pages 1077–1216



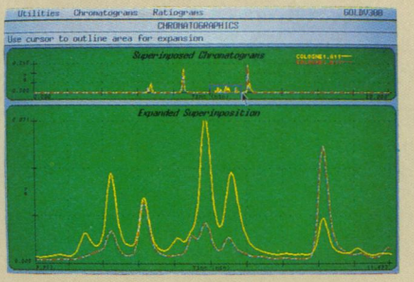
There's nothing hard about our software.

System Gold,™ the Personal™ Chromatograph, teams an advanced HPLC system with a powerful personal computer* to make balancing many LC functions a lot easier.

The software is what makes it so easy. A mouse, drop down menus, truly helpful help screens and enhanced graphics give you the easiest control of your data ever.

All System Gold LC modules are fully programmable, and linked on a bi-directional digital network. So you control and monitor the entire system from a single point.

Superior integration algorithms always give you accurate, reproducible results. Stunning post-run graphics make data comparison and spectral analysis especially easy. Because of multi-tasking, you can even review data while the system is doing another run.



And it's easy to configure System Gold for any application — methods development, QC, analysis of amino acids, proteins, peptides and more.

Contact your Beckman HPLC Representative at 800/742-2345. Or Beckman Instruments, Inc., Altex Division, 2350 Camino Ramon, P.O. Box 5101, San Ramon, CA 94583. Offices in major cities worldwide.

There's nothing hard about it.

*IBM Personal System/2, PC-AT, PC-XT or NEC portable.

BECKMAN

Circle 164 Send Representative & Literature
Circle 165 Send Literature Only

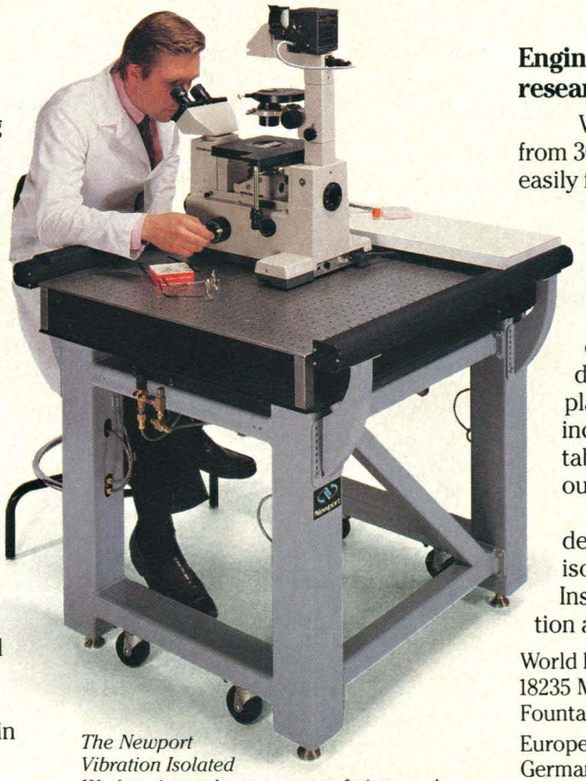
What some companies consider "adequate" vibration isolation is enough to make you jittery

You can't study what you can't see

Most people know that using sensitive optics without adequate isolation from floor vibrations can cause eye strain and headaches. But it's just as important to recognize that poor isolation can also be a significant factor in the success or failure of your experiments. Especially in exacting applications like electrophysiology, microinjection, and cell manipulation.

Unequaled isolation performance

The Newport VW Series Vibration Isolated Workstation, the product of 20 years of design refinement in demanding laser and optics applications, gives you the highest level of performance for enhanced resolution and stability in critical biomedical experiments.



The Newport Vibration Isolated Workstation reduces operator fatigue and frustration by enhancing the resolution of sensitive biomedical measurements

Engineered for biomedical research

With six compact table sizes from 30" x 36", the Workstation easily fits in the most crowded labs.

An ergonomic design features a lower table top height and optional padded armrests and accessory shelves for comfortable long-term operation. Choose from five different stainless-steel and plastic laminate work surfaces, including our spill-proof sealed table top. And, if needed, add our Faraday cage option.

Doesn't your research deserve the very best vibration isolation? Call Newport Bio-Instruments for more information at **(714) 965-4631**.

World Headquarters:
18235 Mt. Baldy Circle
Fountain Valley, California 92708

European Offices:
Germany: Ph. 06151-26116
U.K.: Ph. 05827-69995
Switzerland: Ph. 01-740-2283

Newport
Bio-Instruments

Circle No. 118 on Readers' Service Card

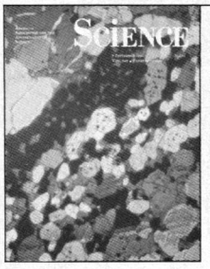
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SCIENCE

ISSN 0036-8075
7 SEPTEMBER 1990
VOLUME 249
NUMBER 4973

■ **SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, 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 additional mailing offices. Domestic individual membership and subscription (51 issues): $80. Domestic institutional subscription (51 issues): $150. Foreign postage extra: Canada $46, other (surface mail) $46, air mail via Amsterdam $85. First class, airmail, school-year, and student rates on request. **Change of address:** allow 6 weeks, giving old and new addresses and 11-digit account number. **Postmaster:** Send change of address to *Science*, P.O. Box 1723, Riverton, NJ 08077. **Single copy sales:** Current issue, $3.50; back issues, $5.00; Biotechnology issue, $6.00 (for postage and handling, add per copy $0.50 U.S., $1.00 all foreign); Guide to Biotechnology Products and Instruments, $20 (for postage and handling add per copy $1.00 U.S., $1.50 Canada, $2.00 other foreign). Bulk rates on request. *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 objectives 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, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.



COVER Photomicrograph of Hawaiian xenolith showing layers of cumulus spinel (black) and olivine (colored) grains, and intercumulus garnet (deep purple) in the spinel layer. This photo was taken with crossed polars and gypsum plate inserted. Vertical field of view is 65 millimeters. See page 1154. [Photograph by Gautam Sen. This xenolith is part of the Dale Jackson Collection (Smithsonian Institution)]

On September 1, 1990, ISI® changed science research forever.

Introducing... *KeyWords Plus.*™

In 1958, ISI introduced citation indexing to the scientific community and, in so doing, made researching the literature easier and less time-consuming than most had thought possible. On September 1, 1990, ISI introduced another revolutionary information retrieval technology: *KeyWords Plus*. And it *too* will change scientific research forever.

Available only to users of *Current Contents on Diskette*™—ISI's computerized article retrieval system—*KeyWords Plus* goes *beyond* title and author-supplied key words to harness the added retrieval power of key words captured from the bibliography and the cited literature itself! It significantly increases the number of relevant "hits" per search, and ensures that you'll retrieve *every* article of interest—including many that would not be captured by traditional tools and techniques. Which is certainly a change for the better.

For more details on ISI's *Current Contents on Diskette* featuring *KeyWords Plus,* call toll free 1-800-336-4474, operator 419.

Institute for Scientific Information®
3501 Market Street, Philadelphia, PA 19104 USA
132 High Street, Uxbridge, Middlesex UB8 1DP UK

Circle No. 53 on Readers' Service Card

Cellular aging

WHAT causes the aging of cells? Why do some cancer cells continue to multiply after the time when a normal cell would die? Goldstein ties together new advances in the study of cellular aging with his overview of the senescence of human diploid fibroblasts (HDFs), cells that appear to count the number of population doublings to a critical limit before they stop dividing. Evidence suggests that HDF senescence involves not only the new expression of genes that inhibit cell reproduction but also the reciprocal extinction of genes that stimulate it (page 1129). Elements that may contribute to the mechanism of senescence include growth factors, tumor suppressor genes and stimulatory genes, and the progressive erosion of telomeres (specialized structures at the ends of linear chromosomes) during population doubling. In any case, replicative senescence has emerged as the norm for cells, while immortalization, apparently an early event in oncogenesis, signifies the rare, random escape of a cell from senescence.

Hole density in superconductors

TO understand how cuprate superconductors work, it is necessary to go down to the atomic level and look at the structural and electronic factors that govern the superconducting transition temperature T_c (the temperature at which resistance of the material goes to zero). One of these factors, the hole density per CuO_2 unit in the CuO_2 layers, varies with the number of electrons removed from the CuO_2 layers. As the hole density increases, the in-plane Cu-O bond length shrinks, and the bond valence sum increases. The length of the in-plane Cu-O bond is also affected by the size of the cations located directly above or below the CuO_2 layers (for example, lanthanum, strontium, or barium). This nonelectronic factor also influences the bond valence sums. Whangbo and Torardi determine that T_c varies in an inverse parabolic fashion with the bond valence sum (page 1143); they further suggest that, for every class or subclass of the superconductors (that is, La-, Sr-, or Ba-classes) T_c is an inverted parabolic function of the hole density. The coupling constant for Cooper pair formation is shown to vary with hole density in the same way; this indicates a condition necessary for the operation of pairing mechanisms in superconductors.

Organic solar cells

ORGANIC polymers that conduct electricity can serve myriad purposes in electronics, optics, and solar energy conversion. Only recently have preparation methods of these polymers resulted in soluble, processible materials; previous attempts yielded unworkable samples, whose shapes precluded any well-defined electronic or optical structures. Sailor *et al.* have made solar cells and other optical and electronic devices by casting thin, transparent films of a polyacetylene-based polymer onto *n*-doped silicon (page 1146). The polymer-based cell produces a much higher open circuit voltage than conventional metal contacts (interfaces between inorganic metals and *n*-doped silicon exhibit poor photovoltaic behavior because chemical reactions at the Si/metal boundary tend toward high recombination rates). In fact, the measured photovoltages are at the maximum allowed for surface-barrier devices like these. These kinds of polymers could lead to low-cost fabrication of energy conversion devices for solar power collection.

Tropical plant ancestors

IN tracing the ancestry of modern plants, we are often stymied by a lack of fossil evidence from flora growing in well-drained areas: most plant fossils have been preserved in peat bogs or alluvial deposits such as riverbeds, flood plains, or deltas. An analysis of a fossil from a site in western Illinois adds to the evidence of the major evolutionary events that occurred in non-swamp areas (page 1152). Leary identifies a specimen of *Lesleya*, previously known only as isolated sterile foliage, with two rows of ovule-bearing receptacles. The fossil was collected from sedimentary rocks dating back to the Pennsylvanian Period, or about 320 million years ago. Taxonomic details suggest that *Lesleya* might be the ancestor of the cycads, which were widespread during the Mesozoic and are now represented by several tropical plants, characterized by short, stout trunks and palm-like foliage up to several meters long. This extends the age of known ancestors of cycads back about 35 million years.

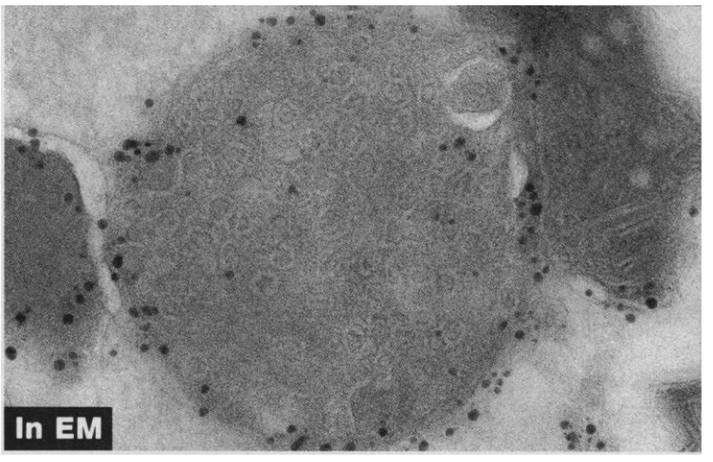
Hawaii's volcanic plumbing

DEEP in the earth, magma often collects in giant chambers on the order of 1000 cubic kilometers in volume; the magma may crystallize in these chambers or be released rapidly, producing volcanic eruptions. As the magma cools, different mineral grains crystallize and collect on the chamber walls and base, in many cases in distinct layers. Such layered rocks are characteristic of crystallization in such a chamber, and we can infer by their mineral composition the depth at which the chamber formed. The deepest magma chambers were thought to have formed at the boundary between the earth's crust and the mantle, which averages about 35 kilometers beneath the continents. Sen and Jones describe a layered rock brought to the surface by a volcanic eruption that provides evidence of a crystallized chamber at great depth in the Hawaiian Islands (page 1154). The presence of garnet in addition to spinel and olivine in the xenolith (cover) indicates that this rock formed at a pressure of at least 30 kilobars, which corresponds to a depth of approximately 90 kilometers, near the base of the lithosphere in the upper mantle beneath Oahu. The presence of chambers at this depth has implications for understanding the evolution of the volcanic plumbing system at Hawaii.

■ PAT JANOWSKI

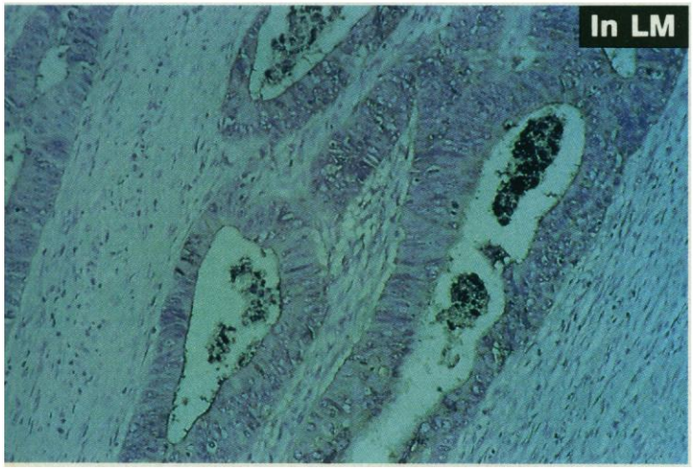
Your results are worth their weight in gold

AuroProbe One The unique ultra small immunogold probe



● **Superior labelling efficiency**
The small probe size offers high density labelling and improved penetration.

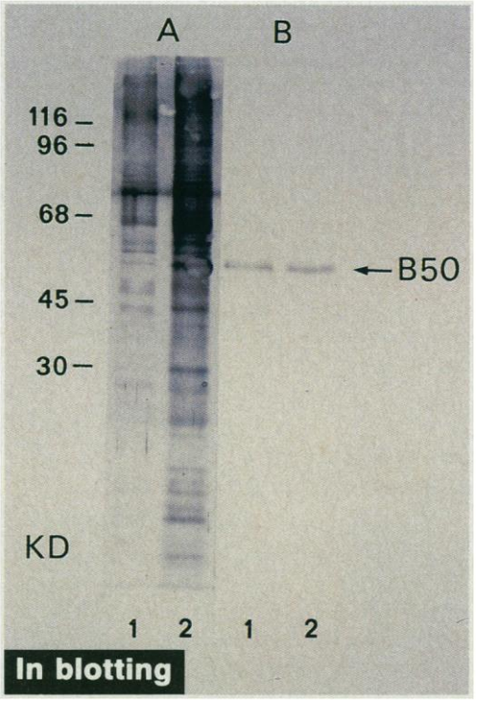
● **Pioneering in gold technology**
The unique properties of AuroProbe One offer the opportunity to enter new fields of application, for example *in situ* hybridization.



Witness the power and efficiency of AuroProbe One in your research.

Contact your local Amersham office for more information.

AuroProbe, IntenSE and Amersham are trademarks of Amersham International plc.



● **Multipurpose for EM, LM and blotting applications.**
Use with IntenSE M for microscopy and IntenSE BL for blotting.

Amersham International plc
Amersham UK

Amersham
Bringing science to life

UK Sales Aylesbury (0296) 395222 **Amersham Australia Pty Ltd** Sydney (02) 888-2288 **Amersham Belgium SA/NV** Brussels (02) 770 0075
Amersham Buchler GmbH & Co KG Braunschweig West Germany (0 53 07) 2 06-0 **Amersham Canada Ltd** Oakville, ONT (416) 847-1166
Amersham Corporation Arlington Heights, IL USA (800) 323-9750 **Amersham Denmark ApS** Birkerød 45-82 02 22 **Amersham France SA** Les Ulis (1) 69 86 53 00
Amity Milan, Italy 2-5097720 **Amersham Japan** Tokyo (03) 816 6161 **Amersham Nederland BV** 's-Hertogenbosch 073-41 82 25
Amersham — Norway branch Gjettum 02-54 63 18 **Amersham Sweden AB** Solna 08-734 08 00

DiATOME

1970-1990
Celebrating 20
Years of Excellence

20

YEARS OF:

Innovation
Leadership
Dedication

in Diamond Knife Technology

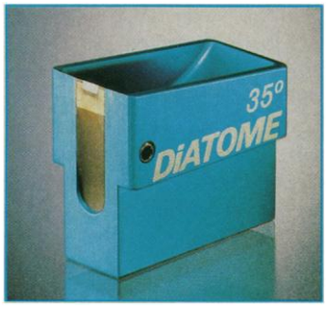
55° for hard materials

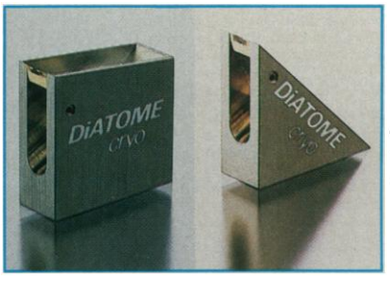
Ultrathin 30-150nm

45° standard

Semi thin 0.1-1µm, Histo 0.2-5 µm

35° for better stuctural preservation





Cryo wet & dry at low temperatures, 50-1µm

DIATOME DIAMOND KNIVES: The ultimate in precision and reliability. Whether your needs are Biological or Materials related, in EM or LM, at ambient or low temperatures, Diatome has the answer. Three different angles and five different types of knives covering the entire microtomy spectrum. Every knife is manufactured in Switzerland from gem quality diamonds. Over the past 20 years, we have had great support from our many customers. This cooperation has allowed us to continue to develop our technology and expertise and offer you the most up to date technologies in the field of ultramicrotomy. Our dedication is to you, the customer, and to the field of ultramicrotomy. For a perfect cut every time, look for the name that is leading the way- Diatome, your guarantee for accuracy, durability, and the highest standard in quality.

SEE US AT CELL BIOLOGY BOOTH # 1001
SEE US AT NEUROSCIENCE BOOTH # 1103

DiATOME

Call or write today for more information
In U.S.: P.O. Box 125, Fort Washington, PA 19034 • (215) 646-1478 • (800) 523-5874 • Fax: (215) 646-8931
In Europe: DiATOME Limited CH2501 Biel Switzerland P.O. Box 557 • Tel.:41 32 515811 • Fax: 41 32 515257

An Early Announcement for the:

INTERNATIONAL SYMPOSIUM ON APPLICATIONS OF BIOTECHNOLOGY TO TREE CULTURE, PROTECTION, AND UTILIZATION

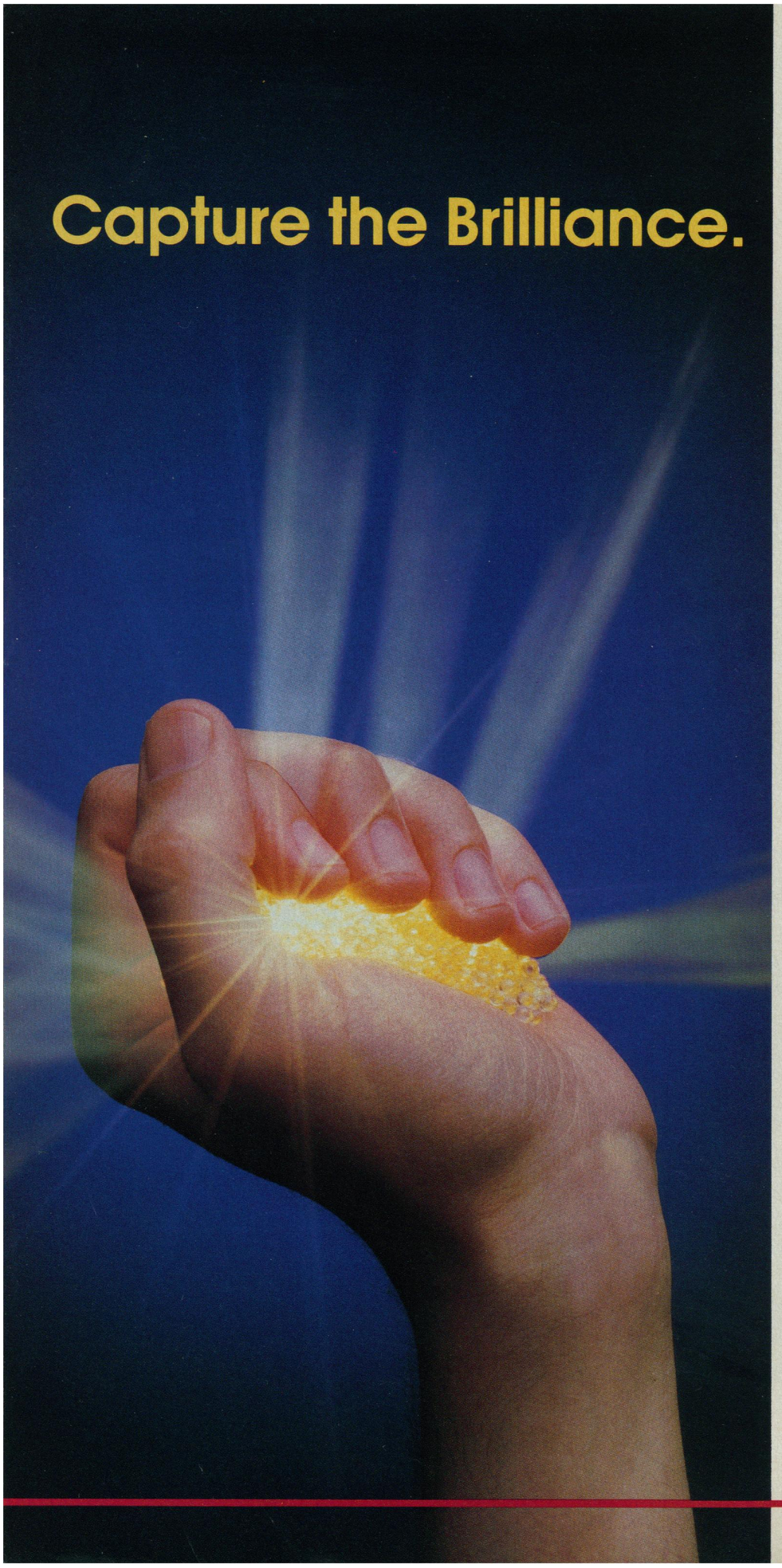
August 5–8, 1991

Radisson Hotel Conference Center Columbus, Ohio

The USDA Office of Biotechnology and the USDA Forest Service are sponsoring this symposium to highlight recent contributions of biotechnology to the field of forestry and to facilitate future applications of molecular biology within the forestry discipline. The sessions for the symposium include the following:

–Genetics/Physiology
–Biological Control of Tree Diseases and Insect Pests
–Bioprocessing
–Techniques of Tree Culture and Protection
–Techniques in Tree Utilization
–Public Policy Issues
–Commercial Applications

In addition, the format will offer poster presentations. A second announcement will appear early in 1991 with a call for abstracts for poster presentation. For additional information please contact Rhonda Cobourn, USDA Forest Service, Northeastern Forest Experiment Station, 359 Main Road, Delaware, Ohio, USA, (614) 369-4476, fax (614) 363-1437.



Amberlite® Resins

for Biomolecular and Chemical Separations

Let the glow of Amberlite maximize the potential of your innovative idea. These Rohm and Haas resins introduce a universe of possibilities to your separations needs.

- Comprehensive selection of polarities, particle sizes, degree of cross-linking, and surface chemistries
- Economical 500 gram bottles of any Amberlite resin *for less than $100 each*

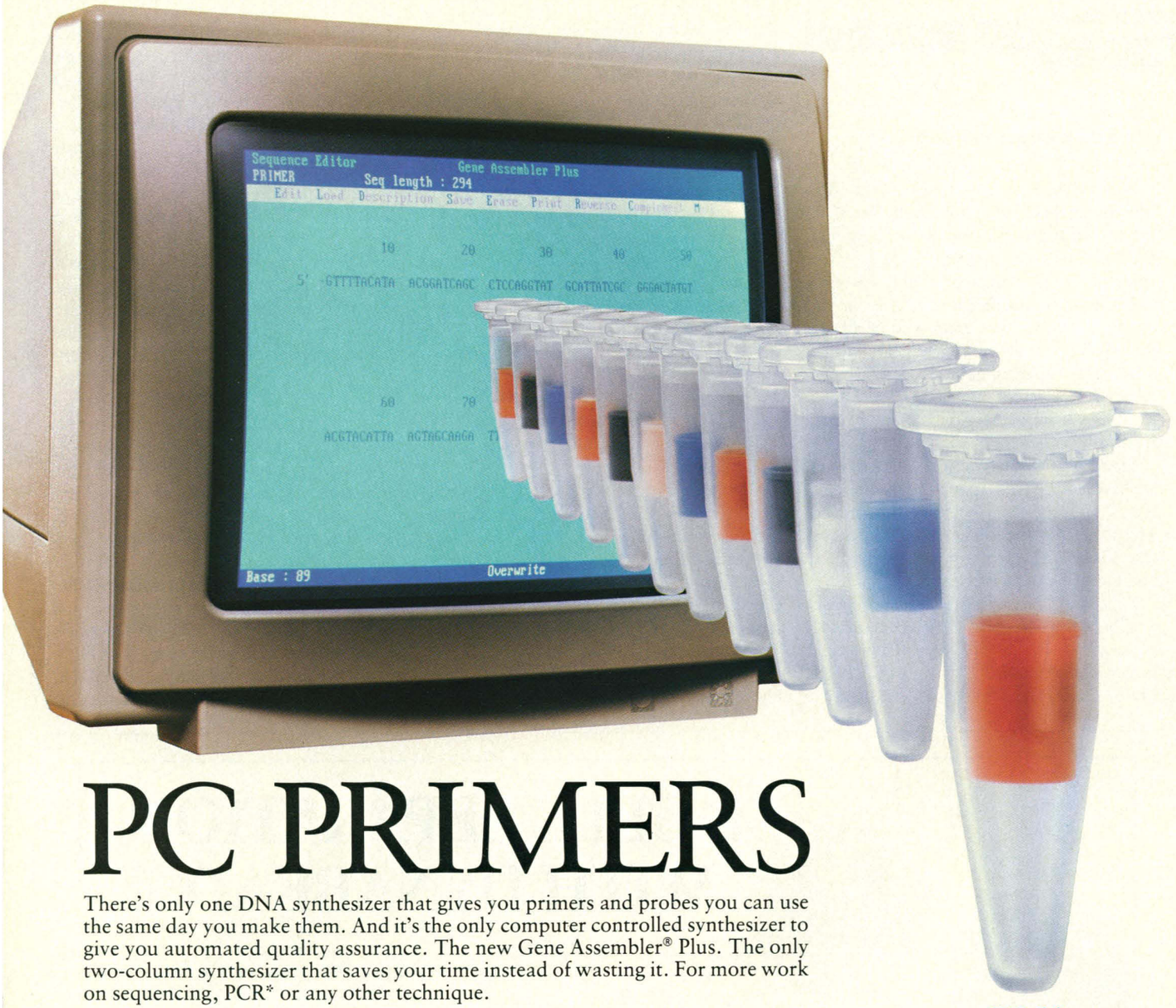
And now these resins are available from Supelco in affordable lab-scale quantities. This partnership combines Rohm and Haas's 50 years of industry leadership in copolymer resin design with Supelco's 25 years of expertise in separation technology.

Look to Supelco for the brilliance of Amberlite. For more information, call our Technical Service Department at 1-800-359-3041 and request the *Amberlite Selection Guide.*

SUPELCO
SEPARATION TECHNOLOGIES
DIVISION OF ROHM AND HAAS
SUPELCO, INC. • Supelco Park • Bellefonte, PA 16823-0048

Circle No. 125 on Readers' Service Card

P H A R M A C I A L K B B I O T E C H N O L O G Y



PC PRIMERS

There's only one DNA synthesizer that gives you primers and probes you can use the same day you make them. And it's the only computer controlled synthesizer to give you automated quality assurance. The new Gene Assembler® Plus. The only two-column synthesizer that saves your time instead of wasting it. For more work on sequencing, PCR* or any other technique.

Make your primers after breakfast

Making DNA primers has never been faster or easier. Just enter the sequence you want. Choose preprogrammed methods or customize your own protocols. Documenting all data, your PC then manages and controls the entire synthesis. The unique on-line monitoring system continuously evaluates the detritylation of every base, and displays coupling efficiencies in real time. So unlike other instruments, you can forget about fraction collection, purity analysis and wasteful re-runs. You've now got a built-in guarantee that gives you primers you can always use.

Use your primers after lunch

Getting optimal quality primers in the shortest time requires advanced chemistry. Giving you high coupling efficiency (>99%), stable reagents and few reaction steps. Plus complete cleavage and deprotection within 1 hour (PAC amidites).

All of which means you can make quality assured primers for same day use. Or overnight. Ready to use next morning. For the first time, you've got a choice. And for the first time, you'll be getting the fastest, easiest and most dependable DNA synthesizer in the world. To find out why, just call us. For more information regarding Gene Assembler Plus and PC primers, call toll free 1-800-678-1592.

*PCR is a registered trademark of the Cetus corporation.

DNA
THE SAME
DAY

4144

Pharmacia

Pharmacia LKB Biotechnology

We help you manage biomolecules

Circle No. 68 on Readers' Service Card

Head office Sweden Tel 46 (0)18 16 30 00 **Australia** Tel 61 (0)2 888 36 22 **Austria** Tel (0222) 68 66 25 0 **Belgium** Tel (02) 242 4660 **Brazil** Tel 011-288 9122 **Canada** Tel (514) 457 6661 **Denmark** Tel 42 26 52 00
Federal Republic of Germany Tel 49 (0)761 490 30 **Finland** Tel (90) 5021 077 **France** Tel 1-30 64 34 00 **Great Britain** Tel (0908) 661101 **Holland** Tel 0348 077911 **India** Tel (0812) 269631 **Italy** Tel 02 273221
Japan Tel 03-492-9481 **Norway** Tel (02) 54 90 95 **People's Republic of China** Tel 852 814 8421 Tel 861 256 5603 **Republic of Korea** Tel 02 5110801 **Spain** Tel 34 (9)3-675 44 11 **Sweden** Tel 08 623 85 00
Switzerland Tel (01) 821 18 16 **United States** Tel (201) 457 8000 **Eastern Europe** 43 222 982 1607 **Far East** Tel 852 814 8421 **Middle East** Tel 30 (0)1 962-7396 **Other countries** Tel 46 (0)8 799 80 00 *(9006)*

Chromatography Redesigned

The Econo System

Introducing the Econo System: Modular, low pressure liquid chromatography.

Econo Pump • Econo UV Monitor • Econo Fraction Collector • Econo Chart Recorder • Econo System Controller • Econo-Pac® Cartridges • Econo Rack

Designed to work together, or separately.

Use the components in the cold room, on crowded benches, with existing set-ups. Each is durable, compact, easy to operate, easy on your budget.

Link components to gain performance. Benefits accumulate. The complete system gives you automatic peak collection and gradient formation, features that make purifications simpler, more efficient.

The Econo System: Chromatography redesigned.

Find out more. Call 1-800-4BIORAD to request an Econo System brochure, bulletin 1581.

BIO-RAD **Chemical Division**

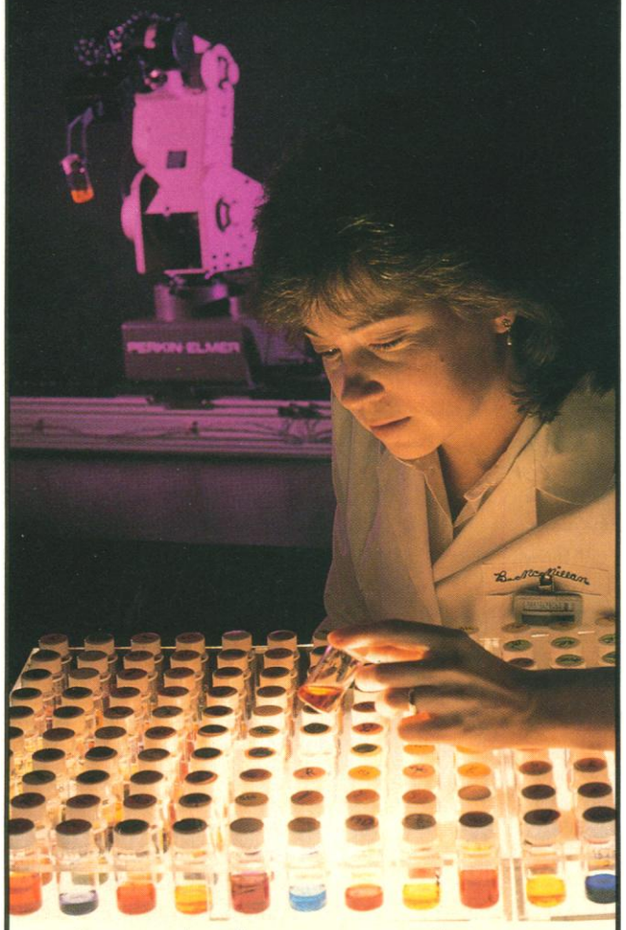
3300 Regatta Boulevard
Richmond, CA 94804
(415) 232-7000
1-800-4BIORAD

Also in Rockville Centre, NY; Hornsby, Australia; Vienna, Austria; Brussels, Belgium; Mississauga, Canada; Hemel Hempstead, England; Paris, France; Munich, Germany; Hong Kong; Milan, Italy; Tokyo, Japan; Utrecht, The Netherlands; and Glattbrugg, Switzerland.

Circle No. 92 on Readers' Service Card

NovaScreen®

Biological Screening and Research Service



Customized receptor and enzyme based screening to advance your research programs.

Support for the research decisions you need to make quickly.

Complements your in-house expertise.

In vitro *assays for research in:*

- *cardiovascular diseases*
- *central nervous system disorders*
- *immunology*
- *gastrointestinal diseases*
- *oncology*

Telephone: (301) 563-6067
Facsimile: (301) 563-6075

NovaScreen® Division
Nova Pharmaceutical Corporation
6200 Freeport Centre
Baltimore, MD 21224

Inquire about our NIMH sponsored screening program

Circle No. 110 on Readers' Service Card

Separating proteins by size?

The ZORBAX® GF-250 and GF-450 Columns outperform the competition!*

Check it out.

	ZORBAX GF	TSK-GEL®
Longer column life	✓	
Better peak shape	✓	
Lower cost per test	✓	

Find out how more and more of your colleagues are benefiting from ZORBAX GF performance. Call 800-441-7508 and we will send you the facts that show how ZORBAX GF Series columns are better.

*Information based on comparative data for the GF-250 vs. the TSK-G3000SW at pH 8.25.

MAC MOD analytical inc.

127 Commons Court
Chadds Ford, PA 19317
800-441-7508 215-358-9696
FAX: 215-358-5993

ZORBAX® is a registered trademark of The Du Pont Company.
TSK-GEL is a registered trademark of The Tosoh Corporation.

Circle No. 50 on Readers' Service Card

How our peptide technology runs rings around other methods.

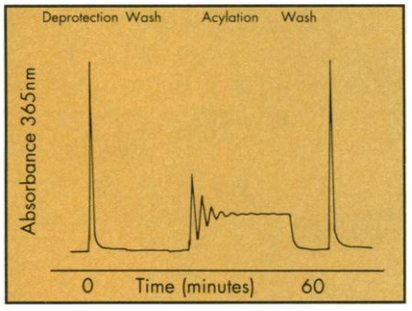
Synthesize peptides more efficiently. Continuous flow methodology is just one way MilliGen/Biosearch is helping researchers assemble peptides. With continuous flow, a macroporous solid support is placed in a packed-bed reaction column. Activated, protected amino acid solutions are introduced and *recirculated* through the bed. The column's inherent low volume maintains high amino acid concentration throughout the process, maximizing coupling efficiency.

Flowing solutions through the column minimizes consumption, provides more thorough washing and can reduce cycle times to 30 minutes.

Our unique fluid delivery system provides precise control of all reagents, while specialized flow programming lets you increase synthesis speed.

With continuous flow, activated amino acids are introduced into the system and recirculated through a packed bed reactor. The bed's inherent low volume maintains high amino acid concentration during coupling.

Having three columns in parallel produces peptide analogues quickly and simply, saving time and reagents.



Real-time on-line reaction monitoring gives you an up-to-the-second picture of your synthesis.

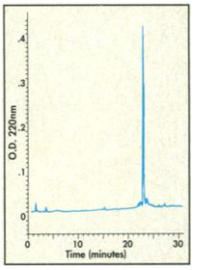
On-line UV monitoring gives an up-to-the-second picture of your synthesis. No waiting to see if your synthesis was successful. No wasted reagents.

Bringing innovation to peptide chemistry. Our continuous flow instrument offers plenty of benefits. But continuous flow isn't all we offer.

We were the first instrument manufacturer to champion Fmoc chemistry. In fact, all our instruments use Fmoc methodologies. That means you can use TFA for peptide resin cleavage and side chain deprotection. This speeds up post-synthesis preparation and eliminates hazardous HF.

We pioneered the patented BOP/HOBt activation method. We were first to use pentafluorophenyl (OPfp) active esters. And first to include on-line UV monitoring.

We've improved scale-up, too. Depending on your needs, we have instruments capable of producing quantities from 0.1 mmol up to as much as 6.0 mmol.



HPLC analysis of 10µl crude synthetic Neuromedin U-25 (5 mg-ml) produced by continuous flow method.

For technical papers and details on our complete line of peptide synthesizers, including our continuous flow instruments, call in the U.S. 800-872-0071 (in MA: 617-229-2870), in France 30.45.70.00, in Japan (03) 471-7191, in the U.K. 923 816375, and in W. Germany (6196) 4940.

MilliGen/Biosearch
Division of MILLIPORE

Circle No. 39 on Readers' Service Card

Spectroscopy for Research... SLM Leads the Way

SLM Instruments is the leader in the innovative design and manufacture of spectrophotometers and spectrofluorometers for research. From our introduction of fluorescence polarization and time-resolved spectroscopy using the T-Optics™ lightpath, to our patented dual wavelength system, to the world's only multi-harmonic fast Fourier-transform fluorometer, we continue to explore and expand the frontiers of spectroscopy.

Our comprehensive line of instruments and accessories answers the demands of the widest range of research applications:

Fluorescence Polarization and Photon Counting

Highest sensitivity in its class • T-Optics polarization • Dual emission wavelengths • Simultaneous multiparameter measurements • Photon counting, analog, and millisecond kinetics on each of three channels • *SLM 8000C™ Photon Counting Spectrofluorometer*

Circle # 131

Fluorescence Lifetimes

Picosecond lifetimes • Dynamic depolarization • Phase resolved spectroscopy • Three-frequency, continuous, and multi-harmonic fast Fourier-transform instruments • *SLM 4800C™ and SLM 4800S™ Lifetime Spectrofluorometers and SLM 48000MHF™ Multi-harmonic Fourier Fluorometer* **Circle # 154**

Fluorescence in an Integrated Package

Outstanding sensitivity and resolution • Complete scanning, ratiometric, and timebase capabilities • Keyboard or computer control • *SPF-500C™ Spectrofluorometer*

Circle # 155

Dual Wavelength UV-Visible Spectrophotometry

Simplifies difficult analyses such as turbid samples, highly scattering samples, whole tissue preparations, and other complex systems • Dual wavelength and split beam modes • Millisecond reaction rate studies • Stand-alone operation or computer control • *DW-2000™ Dual Wavelength UV-Visible Spectrophotometer* **Circle # 156**

Intracellular Calcium Measurements

Designed for dual wavelength fluorescent probes • Simultaneous multiple probe measurements • Unmatched specifications • *DMX-1000™ Multiparameter Cation Measuring Spectrofluorometer* **Circle # 157**

Stopped-Flow Kinetics

UV-Vis absorption and fluorescence applications • For reactions in the millisecond range or longer • Maintains full instrument capabilities • Easy operation **Circle # 158**

Use the Reader Service Numbers, or call or write to us for more information on any SLM products.

SLM AMINCO®

SLM Instruments, Inc., 810 West Anthony Drive, Urbana, IL 61801
(217) 384-7730 • (800) 637-7689 • Telex 206079 • FAX (217) 384-7744

ECET Femtotip®

The tip-top standard capillary

Our tip for microinjection

The ECET Femtotip has the top form for microinjection. The design and outlet diameter (0.5 ± 0.2 µm) of this standard capillary are optimized for accurate microinjection in tissue culture cells. You can start microinjection at any time. The hazard of blockages is reduced to a minimum with Eppendorf's precisely designed Femtotips.

Simplified operation

With the aid of the Eppendorf Microloader, all capillaries can be filled with filament. The Microloader is a very finely pulled pipette tip that fits Eppendorf Pipettes 4700 and 4710. It places the liquid to be injected near to the capillary tip. By keeping the path of the injection liquid to the capillary tip as short as possible, you minimize adsorption, aggregation and concentration effects. Therefore, you can even handle smallest volumes with outstanding precision.

Your distributors:

Fed. Rep. of Germany:
Eppendorf -
Netheler - Hinz GmbH
P.O. Box 65 06 70
D-2000 Hamburg 65
Telephone (0 40) 5 38 01 - 0
Teletex no. 40 30 61 = EGHAM
Telefax (0 40) 5 38 01 556

France:
Roucaire S. A.
B. P. 65
F-78143 Vélizy Villacoublay
Cedex
Telephone (1) 39 46 96 33
Telex no. 69 73 82
Telefax (1) 30 70 87 20

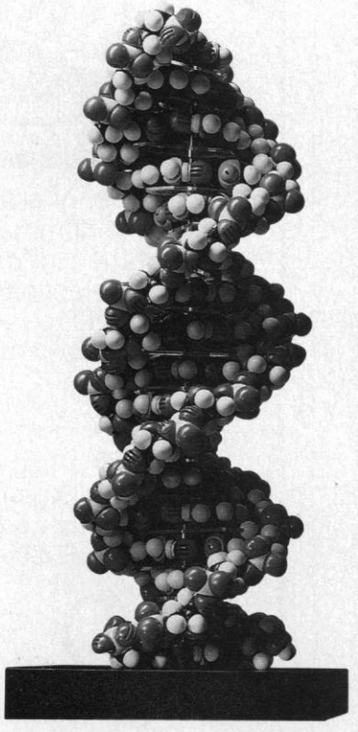
USA:
Eppendorf Incorporated
45635 Northport Loop East
Fremont, CA 94538
Telephone (800) 421-9988
(415) 659-0181
Facsimile (415) 659-0154
Telex 332917 Eppendorf UD

For all other countries:
call your local Zeiss dealer

Eppendorf -
Netheler - Hinz GmbH
P.O. Box 65 06 70
D-2000 Hamburg 65
Telephone (0 40) 5 38 01 - 0
Teletex no. 40 30 61 = EGHAM
Telefax (0 40) 5 38 01 556

eppendorf

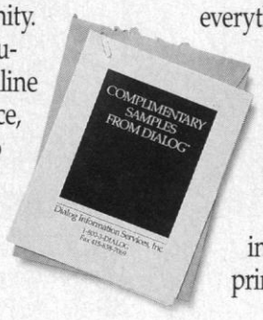
Quality you can rely on



THE BEST WAY TO SEARCH THIS STOREHOUSE OF INFORMATION,

IS WITH THIS ONE.

Just as DNA is the information center of the cell, DIALOG is the storehouse of information for the scientific community. DIALOG, a continuously-updated online information service, provides access to an amazing body of accurate, up-to-the-minute, technical, patent, product, regulatory, and industry information... worldwide!



DIALOG has information on everything from the latest gene-cloning experiment to new diagnostic tests and vaccines, as well as grants, competitor activities and industry trends.

Call today for more information and a free print-out of a sample DIALOG search. When you see what our storehouse of information can do for you, you'll agree DIALOG is one discovery that's sure to lead to many other important findings.

Call 800-3-DIALOG (800-334-2564), or Fax 415-858-7069.

DIALOG INFORMATION SERVICES, INC.
A Knight-Ridder Company

The world's largest online knowledgebank.

Circle No. 51 on Readers' Service Card

NEW

Electron Microscopy Sciences

Serving the Entire EM and LM Industry for Over 20 Years.

You know us for our complete line of chemicals, accessories and supplies for all your EM, LM, SEM, CRYO, Biological and Materials Science needs: our high product quality, our reasonable prices and our prompt service. Now get to know us for our complete line of the highest quality EM equipment.

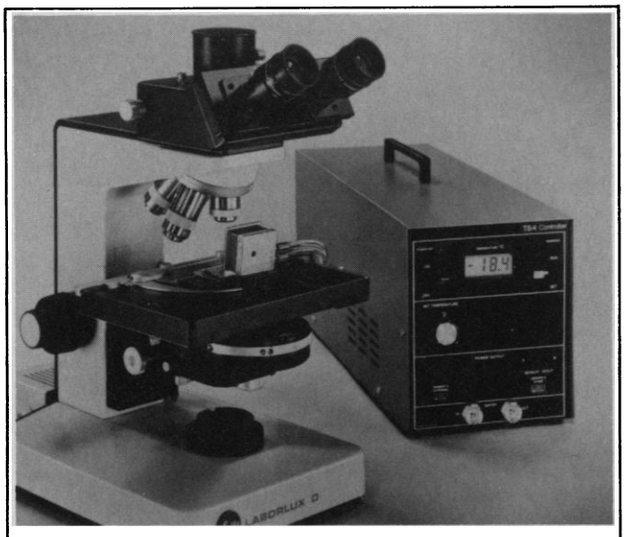
*Don't forget our #1 sellers at the lowest prices, highest quality; Osmium Tetroxide, Tweezers, Grids, Glutaraldehyde, any quantity packed to your specifications. For customers using the Life Cell Process® we now have available specially priced and packed Osmium Tetroxide that meets all the requirements for use in the Molecular Distillation Dryer (MDD-C). For more information please call.

Circle No. 35 on Readers' Service Card

See us at Cell Biology, Booth #1003
See us at NeuroScience, Booth #1105

Call or write for our new equipment brochure today. Our complete catalog of chemicals and accessories is available upon request.

321 Morris Road, Box 251 Fort Washington, PA 19034,. Toll-free call: 1-800-523-5874, In PA: (215)646-1566, Fax: (215)646-8931, Telex: 510-661-3280



Thermal Microscope Stage

Maintains specimen at any temperature between −20° and +100°C

Fits most standard microscopes

Temperature control is automatic

physitemp

154 HURON AVENUE, CLIFTON NJ 07013, USA • Tel: 201-779-5577

Circle No. 17 on Readers' Service Card

At Synthecell,

We Foresaw the Need . . . and Responded

Introducing

S-OLIGOS™

Anti-Sense DNA
for Experimentation in Living Cells

S-OLIGOS ARE SULFUR DERIVATIZED OLIGONUCLEOTIDES.

CHARACTERISTICS -
- MORE CELL PERMEABLE
- RESISTANT TO NUCLEASES

RESULT -
- REPLICATION, TRANSCRIPTION AND TRANSLATION SIGNIFICANTLY BLOCKED

FOR A BIBLIOGRAPHY ON S-OLIGOS, OR INFORMATION ON OUR OTHER OLIGONUCLEOTIDE PRODUCTS, PLEASE CALL

1-800-336-7455

301-869-7455 SYNTHECELL SYNTHECELL SYNTHECELL CORP **FAX 301-977-5079**

2096 Gaither Road, Rockville, MD 20850 USA

Circle No. 42 on Readers' Service Card

An expanding universe of cyclodextrin applications.

FOOD STUFFS
BIOTECHNOLOGY
AGRICULTURE
COSMETICS
PHARMACEUTICALS
INDUSTRIAL
ELECTRONICS
TOXIC WASTE TREATMENT

Molecusol®

Aqueous Solubility
Molecusol creates true aqueous solutions with even the most hydrophobic compounds.

Stability
Molecusol encapsulated compounds — whether in solution or solid form — are protected from heat, light, oxidation, and hydrolysis...waiting to be released by solution or dilution.

Commercial Development
Call for technical literature and details. Worlds of new applications await you. To learn more, call PHARMATEC 1-800-526-8222, P.O. Box 730; County Rd. 2054, Alachua, Florida 32615

Molecusol®
cyclodextrin derivatives

Circle No. 77 on Readers' Service Card

Fourteenth Annual Symposium

Jointly sponsored by The Pharmaceuticals Division of CIBA-GEIGY and Drew University

"The Double Helix: Replication, Recombination and Transcription"

Presentations of the CIBA-GEIGY DREW Award in Biomedical Research will be made to:

Arthur Kornberg, MD
Stanford University Medical Center
Stanford, CA
"DNA Replication: From Start to Finish"

Nicholas R. Cozzarelli, PhD
University of California
Berkeley, CA
"Molecular Mechanisms of Recombination"

Roger Kornberg, PhD
Stanford University School of Medicine
Stanford, CA
"Gene Activation and Transcription in a Soluble System"

The proceedings will be introduced and moderated by:

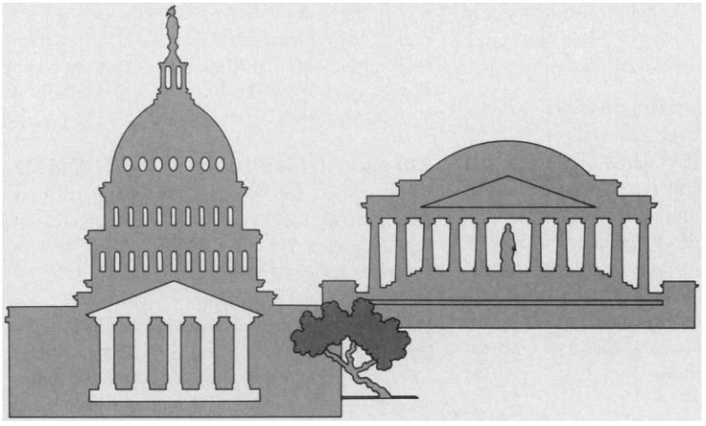
Arthur Kornberg, MD
Stanford University

Baldwin Gymnasium-Auditorium
Drew University
Madison, New Jersey 07940
Tuesday, 16 October 1990
1:30 pm–5:30 pm

Address inquiries to:

George deStevens, PhD
Frontiers in Biomedical Research
Drew University
Madison, New Jersey 07940

099-4133-D 6



AAAS☆91

The AAAS Annual Meeting

Washington, DC; 14-19 February 1991

Plenary Lectures

Walter Bodmer, Imperial Cancer Research Foundation, U.K.; **José Goldemberg,** Secretary of Science and Technology, Brazil; **Donald N. Langenberg,** Univ. of Maryland; **Kenneth R. Manning,** MIT; **Shosaku Numa,** Kyoto Univ. Faculty of Medicine; **Larry L. Smarr,** National Center for Supercomputing Applications; and nine others.

Neuroscience Seminar

(3 days, 16-18 Feb.; additional fee required)

The Neurosciences: Challenges for the 1990s: This seminar brings together some of the world's leading researchers from the six areas of neuroscience expected to be extremely productive in the 1990s. Each area is covered in a separate half-day session, as follows *(presider names are in parenthesis):* Stimulus-Transcription Coupling in Neuronal Cells *(James I. Morgan);* Structure and Function of Potassium Channels *(Arthur M. Brown);* Olfaction and Taste *(Gordon M. Shepherd);* Activity-Dependent Plasticity in Development and Learning *(Carla J. Shatz);* Cognitive Processes *(Larry R. Squire);* Molecular Basis of Neurological Disease *(Joseph B. Martin).*

Short Courses

(1 day, 14 Feb.; additional fee required)

Sophisticated Uses of Simple Computers: Speakers will discuss some of the main uses of small computers to solve sophisticated research problems, citing specific examples. Then they will provide individualized, hands-on instruction using these examples.

Computers in Medical Imaging and Graphics: Speakers will discuss imaging components of interventional procedures as used by cardiologists and pulmonary and other specialists. Topics include digital fluoroscopy, stereo 3-D imaging, imaging in lithotripsy, imaging in basic cardiology, and imaging hardware for microscopic applications.

Symposia, Workshops & Technical Sessions

(Listed below are shortened titles of the 200+ symposia, workshops, and technical sessions.)

I Physical Sciences & Technology

General Physical Sciences: The Frontiers of the Physical Sciences: 1991

Computing; Communications: High-Performance Computing and Networking ✦ Computer Virus Legislation ✦ Electronic Publishing and the Science Library Crisis ✦ Information Technology in Support of Research: Activities of the National Libraries ✦ Scientific Communication and Research Productivity ✦ Robotics and Mathematics ✦ Stereo Computer Imaging and Analysis

Energy; Technology: U.S. Energy R&D Policy ✦ Energy Technologies: Developing Countries ✦ Advances in Solar Energy Technologies ✦ Engineering in Japan ✦ Science and Engineering Interactions Today ✦ Geophysical Imaging Systems: From Medical Microcosm to Outer Space ✦ New Technology for People with Disabilities

Physics; Chemistry: 75 Years of General Relativity ✦ Elementary Particle Physics ✦ Single Atom Quantum Mechanics ✦ Mathematics in Materials Sciences ✦ Chemistry Rediscovers Materials Science ✦ High-Temperature Superconductivity ✦ Musical Acoustics ✦ Revisionist's Kinetics: Nature's Throttle

Astronomy; Planetary Science: Cosmology: What We Know ✦ Environmental Threats to Astronomy ✦ Rationale for Human Exploration of Mars ✦ Human Exploration of Space

Geoscience; Climate: Global Warming ✦ Small-Island States and Sea-Level Rise ✦ Coastal Erosion Zone Management ✦ Climate in the U.S. Region ✦ Regional Climate Conditions: U.S. Impacts ✦ Rising Atmospheric CO_2 and the Terrestrial Carbon Cycle ✦ Earthquake Prediction/Validation

Global Change: Satellite Measurements for a Safe Environment ✦ Humankind in Global Change: Indicators and Prospects ✦ Science/Technology for Third World Development ✦ Science in Africa ✦ Effects of Human Activity on the Global Ecosystem ✦ The Resourceful Species: The Human Enterprise ✦ Resources to Minimize Global Warming, Air Pollution, and Energy Insecurity

Environment: Responsibilities of Scientists and Engineers in Environmental Debates ✦ Science: A Basis for Environmental Policy? ✦ Is Superfund Working? ✦ Oil and Gas: Outer Continental Shelf Environmental Issues ✦ Cleaning Up the Mess at the Nuclear Weapons Complex ✦ Assessing Impacts of Nuclear Waste Facilities ✦ Proof of Environmental Damages in Litigation ✦ Meta-Analysis and Risk Assessment

Popular Science: The Physics of Everyday Experience ✦ Chemistry Is Fun ✦ Science, Technology, and Espionage

II Life Sciences & Technology

General Life Sciences: Consciousness in Life

Molecular & Cellular Biology: The Developmental Biology Revolution ✦ Cellular Signaling ✦ Plant Genome Mapping ✦ Interactions of Topology and Science

Medical Sciences: Gene Therapy: Prospects and Societal Implications ✦ New Mo-

(continued on next page)

lecular Insights into "Old" Genetic Disorders ✦ The Aging and Cancer Interface ✦ Molecular Determinants of Human Cancers ✦ RU486 ✦ Immunocontraception Prospects ✦ Controlling Infectious Diseases: New Aspects of Vaccines ✦ Medications for Brain/Behavior Disorders ✦ Scientific/Statistical Inferences in Modelling Animal Research

Health Care & Policy: U.S. Drug Approval in the United States ✦ AIDS: Research and Public Policy ✦ HIV/AIDS in Eastern Africa ✦ Modelling Geographic Diffusion of AIDS ✦ The Father and the Fetus: Facts and Fallacies ✦ Dentistry for the '90s ✦ Firearm Injury Prevention: Scientific/Public Policy Directions ✦ Balance and "Dizziness" ✦ Drug Development/Regulation via Pharmacokinetic/Pharmacodynamic Procedures

Agriculture: Economically Useful Plants for Developing Countries ✦ International Biosafety Policy and Practice ✦ Biological/Biotechnological Alternatives to Chemical Insecticides ✦ Pest Resistance and Sustainable Pest Management ✦ Knowledge-Based Systems in Agriculture and Aquaculture ✦ Value-Added Products from Agriculture ✦ Beneficial Uses of Pathogens ✦ Economic Potential for U.S. Aquaculture ✦ Bovine Somatotropin and the U.S. Dairy Industry

Ecology; Evolution: Defining Ecosystem Health: Science, Economics, or Ethics? ✦ Inheritance of Acquired Characteristics: Evolutionary Origins of New Significant Traits ✦ Crop Germplasm of the Americas ✦ Conserving Genetic Resources in Natural Habitats ✦ Nonrandom Evolution: Matter, Life, Mind ✦ Stakes in the Tropical Forests ✦ Science and Management of Large Marine Ecosystems ✦ Zoo Biology and Conservation ✦ Coastal Zone Management Policy ✦ Multiple-Use Ecosystem Management ✦ Tropical Biology: Past and Present

Biomedical Ethics: Cystic Fibrosis Carrier Screening: Ethical/Clinical Issues ✦ AIDS Clinical Trial Alternatives: Ethics/Methodology ✦ DNA-Based Identification Systems ✦ Human Genome Research: Ethical/Social Issues ✦ Scientists' Responsibilities in Socially Sensitive Research ✦ Agriculture Research Funds: Management and Accountability

Psychology; Neurobehavior: Reassessing Freud and Psychoanalysis ✦ Critical Periods: A Critical Examination ✦ Current Conceptions of Intelligence ✦ Critical Periods in Second Language Acquisition ✦ Cognitive Aging in the Intellectually Able ✦ Cults and the Courts: Use of "Brainwashing" Theory ✦ Effects of Fragrances on Behavior, Mood, and Physiology ✦ Evolution of Cognitive Functions in Ecological/Cultural Context ✦ Cognitive Equilibrium

III Social Sciences & Science Policy

General Social Sciences & Policy: Anthropology of Science and Scientists

Anthropology; Archaeology: Indigenous Peoples and the Rainforest: Science, Marketing, and Human Rights ✦ Evolution of Deception ✦ Evolutionary Interrelationships: Technology, Language, and Social Behavior ✦ Deterioration of Human Health in Economic and Political Development ✦ Ethnography of Drug Use in Traditional and Modern Societies ✦ Light Stable Isotopes: Scientific Uses ✦ Biomolecular Identification of the Species of Origin of Blood Residues on Artifacts

Demography; Political Science: Scientific/Technical Personnel in the '90s ✦ Consequences of the Rapidly Increasing Physician Supply ✦ Voting: Mathematical Foundations and Political Reality ✦ Scientists and Engineers in Emerging Markets ✦ Science Policy for Women in Science: Case Studies ✦ Women of Science: Secrets of Success

Sociology: Social Pathology of Large Cities ✦ Mental Health and Violence ✦ Family Violence and Child Abuse ✦ Drugs, Crime, and Violence ✦ Violence and Youth: Research and Prevention Programs ✦ Rural Recreation Enterprises

Economics; Competitiveness: Systematic Economic Analysis: Monopoly and Competition ✦ Research in Experimental Economics ✦ Sustainable Economic Development ✦ Manufacturing and the New Global Challenge ✦ Technology Transfer from the Laboratory to the Marketplace ✦ Mineral Resources in the '90s ✦ Health Care Quality ✦ Ecological Economics ✦ Economic Microsimulation and Public Policy

Science & International Security: Defense Technology and Policy After the Cold War ✦ Arms Control in a Radically Changed Environment ✦ Soviet Politics and National Security Policy ✦ Implications of Proliferating Advanced Weaponry ✦ Verifying/Implementing Arms Control Agreements in the '90s ✦ Chemical and Biological Weapons: Elimination or Proliferation ✦ Scientific Approaches to International Conflict Resolution ✦ Naval Forces and Arms Control ✦ Disposition of Fissile Materials

Science & Technology (S&T) Policy: Organization for S&T in the Executive, Legislature, and Judiciary ✦ Science Advice to National Leaders ✦ S&T Policy Issues ✦ National vs. International Roles of Universities ✦ Bringing Oz Into the Courtroom ✦ Mathematics and Public Policy ✦ International S&T Issues for the '90s ✦ Knowledge Synthesis: Ethical Imperative ✦ Improving Government Agencies ✦ Allocating Public Funds for Science ✦ Risk Perception and Public Policy ✦ Communicating with Policy Makers: Strategies for Scientists and Engineers ✦ Expert Witnesses: Giving Effective Testimony

History & Philosophy of Science: The Beginning and End of the World: Historical Perspectives ✦ Mathematics in Times of Social Upheaval ✦ Metaphors and Models in the Brain Sciences ✦ Creative Couples and Gender Complementarity ✦ AAAS in Public Affairs, 1848-1970 ✦ Measuring Similar Processes at Multiple Levels of Biological and Social Systems ✦ Neurobiology and Narrative: The Works of Walker Percy ✦ Technical Change and the 20th-Century State ✦ Testing Theories of Scientific Change ✦ Science in National Life: A Videohistory Workshop

Science & Technology Education: Public Understanding of Science: Cross-National Perspectives ✦ Science for the Nonscience Major ✦ Animals in K-12 Classrooms ✦ Science and the Media: Information Controls and Reporting ✦ Museums and Science: Ethics and Policy ✦ The Media & Math/Science Education ✦ Urban Initiative in Precollege Science and Math: A Model Program ✦ Successful Minority Math/Science Programs at Community Colleges ✦ Advocacy Journalism: Reporting on Sustainable Development ✦ Satellite Delivery of Education ✦ Improving the U.S. Educational System ✦ Scientist-Teacher Partnerships in Middle School S&T Education ✦ Project 2061 Curriculum Development Workshop: The Nature of Science and Evolution ✦ Progress in Public Understanding of Science ✦ Science in the '90s: A Hands-On Decade

Science & Technology Curricula: Science as Faith: Radical Constructivism ✦ State Models of Reform ✦ Curriculum Reform ✦ Assessment ✦ Reform in Science and Math Curricula: How They Relate ✦ NSF-Supported Innovations in Undergraduate Education ✦ Mathematics and Math Education ✦ Reform of Scope, Sequence, and Coordination — A Progress Report ✦ Using the Project 2061 Report to Redesign Science Curricula ✦ U.S. Science/Math Education: Longitudinal Study of American Youth ✦ Calculus Reform

Call for Poster Papers

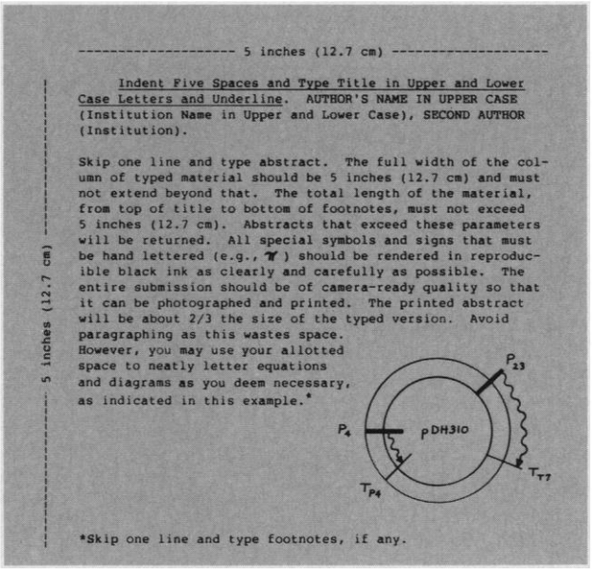
Poster sessions at **AAAS★91** provide an informal, visually oriented way for you to present a contributed paper to your peers. Appropriate topics include all of the physical, life, behavioral, and social sciences as well as topics related to the neuroscience seminar. If your abstract is accepted, you will be assigned to a poster session (based on general subject area) and provided with a bulletin board on which to display graphics and large, easy-to-read text for 90 minutes. Accepted abstracts will also be published and distributed to all meeting registrants.

Eligibility: An abstract for a poster presentation will be considered only if it is submitted or endorsed by a AAAS member or fellow. In addition, the presenter must be registered for **AAAS★91.** (Presenters of neuroscience seminar papers must also be registered for the neuroscience seminar.)

Abstracts: Type the text on plain white paper to fit within a 5" square. Use only a typewriter or letter-quality (not dot matrix) printer. Use black ink for all hand lettering. Indent, space, underline, and capitalize as in the example at right. Do not double-space the body of the text. Do not box or cut out the abstract.

Submission: Above the 5" square, type the name of the broad discipline that encompasses the subject matter and provide three index words to describe the area within that discipline (in the case of seminar papers, just indicate the seminar name). Below and to the left, type the name, address, and phone number of the person to be contacted regarding status and scheduling. Below and to the right, type the name, affiliation, and membership number (from *Science* mailing label) of the member or fellow endorsing the abstract, and provide his/her signature. Send original plus one copy no later than 2 November to: **Contributed Papers, AAAS Meetings Office, 1333 H Street, NW, Washington, DC 20005.**

Example



Deadline for Poster Session Abstracts: 2 November 1990

Invitation to Exhibit

If your organization provides products or services that would be of interest to AAAS members, or if you would like to publicize your latest advances in science and technology before a worldwide audience, you should exhibit at **AAAS★91.**

The AAAS Annual Meeting serves as an important public forum in which registrants share ideas and information with each other and (through extensive press coverage) with their colleagues around the world. By exhibiting, you can meet *face to face* with many of the more than 5,000 attendees — scientists, educators, and researchers from virtually every field of scientific inquiry, including the biological and medical sciences, the physical sciences, the social and behavioral sciences, technology, and science policy.

You can develop new customers or members, give demonstrations, introduce something new, publicize your successes, recruit qualified personnel, increase name recognition, and demonstrate your organization's commitment to the cause of advancing science.

Organizations that should exhibit:

- Publishers of books and journals
- Computer software and hardware companies
- On-line information services
- Scientific associations
- Equipment manufacturers

For complete details:

Call Stacy Weinberg at 202-326-6462, or write: AAAS Exhibition Office, 1333 H Street, NW, Room 815, Washington, DC 20005.

Discount Air Fares to Washington, DC

Fly United Airlines or Delta Air Lines to **AAAS★91** in Washington, DC, and save when you travel during 10–23 February 1991:

- **5% off** lowest published round-trip fares, subject to availability and qualifying conditions, and 5% off first class. (Not available in Canada.)
- **45%** off regular round-trip fares; no minimum stay necessary; 7 days advance purchase required. (In Canada, discount up to 35% only.)

These discounts are available only through the airlines' convention reservation desks. Certain restrictions may apply and seats are limited. For details, you or your travel agent should call one of the toll-free numbers below and give the appropriate convention code:

United Airlines: Convention Code 447JU
Call 7 days a week; 8:00am–11:00pm Eastern time
USA (incl. HI, AK) & Canada: 1-800-521-4041

Delta Air Lines: Convention Code R0030
Call 7 days a week; 8:00am–8:00pm Eastern time
USA (incl. HI, AK, PR): 1-800-241-6760
Canada: Call Delta locally

Advance Registration Form – AAAS☆91

AAAS Annual Meeting; Washington, DC
14–19 February 1991

Please print

Name of registrant _____
(last name) (first name)

Institution/company _____
(institution/company name will appear on badge)

Mailing address _____
(number / street)

_____
(city / state / zip / country)

Daytime telephone number _____

Name of spouse registrant _____
(if registering for meeting, see spouse registration fees at right)

Convention address _____
(hotel or phone number)

Circle days you will attend meeting: Thu Fri Sat Sun Mon Tue

[ ] Check here if you need special services due to a handicap.

[1] **11 January deadline**: Advance registrations received after this date cannot be processed; however, you may register on site, beginning 14 February, at the Sheraton Washington Hotel. On-site rates: regular member, $140; regular nonmember, $190; all others, same as advance rates.

[2] **Refund requests** must be made in writing to the address below by **5 February** and will be honored after the meeting. **No refunds will be made for cancellations received after this date.**

[3] **Special rates**: To qualify for student rates, you must attach a copy of your student ID card. (Student rates apply to full-time undergraduate and graduate students only.) To qualify for postdoctoral rates or high school teacher rates, you must attach a letter from your chairman confirming your status. **Registrations received without appropriate proof of status will be charged at the regular rates.**

[4] Regular nonmember 6-day (not 1-day) registration fee includes an introductory membership with 25 issues of *Science* (16 issues if mailed outside the USA).

Advance registration deadline: 11 JANUARY 1991

Mail this registration form to:

AAAS Annual Meeting Registration
P.O. Box 23320
Alexandria, VA 22304-9330

OFFICE USE ONLY
AMT PD _____
CHECK # _____
DEP. DATE _____
SOURCE: D E

I. Meeting Registration Fees[1]

Registrant	Six-day	One-day	Amount
Regular member	[ ] $110	[ ] $50	$ _____
Regular nonmember	[ ] $160[4]	[ ] $65	$ _____
Student member[3]	[ ] $ 10	[ ] $ 5	$ _____
Student nonmember[3]	[ ] $ 15	[ ] $ 5	$ _____
Postdoctoral member[3]	[ ] $ 30	[ ] $15	$ _____
Postdoctoral nonmember[3]	[ ] $ 40	[ ] $20	$ _____
HS teacher[3] or emeritus	[ ] $ 50	[ ] $25	$ _____
Spouse of registrant	[ ] $ 40	[ ] $20	$ _____

Important: *Students, postdocs, and high school teachers must attach proof of status.[3] Members must provide membership # below:*

_____
(appears above name on *Science* magazine label)

One-day registrants circle one: Thu Fri Sat Sun Mon Tue

II. Additional Fees

(Seminar and short course fees are in addition to, not in lieu of, the meeting registration fee.)

Neuroscience Seminar (16-18 February)
Regular [ ] $110
Grad student or postdoc [ ] $ 30 $ _____

Short Courses (14 February)
Regular [ ] $ 50
Grad student or postdoc [ ] $ 15 $ _____
Select one short course only:
[ ] Sophisticated Uses of Computers
[ ] Computers in Medical Imaging

TOTAL AMOUNT: $_____

III. Payment [2]

[ ] check enclosed [ ] VISA [ ] MasterCard
(no other cards accepted)
[ ] original institutional purchase order attached

Card no. _____

Expires _____ Signature _____

Hotel Reservation Instructions

To make hotel reservations: Call the AAAS Housing Bureau, toll free, weekdays between 9:00 a.m. and 5:00 p.m., Eastern time, at the following numbers:

United States: 1-800-535-3336

Canada: 1-800-535-3356

Metropolitan Washington: 202-842-2930

Have the following information ready when you call: [1] Name of convention: "AAAS Annual Meeting"; [2] 1st, 2nd, and 3rd choice of hotel; [3] arrival/departure dates [4] number of rooms needed; [5] type of room (single, double, etc.); [6] number of persons in party; [7] arrival time; [8] credit card name, number, and expiration date; [9] names of all occupants of room; [10] your mailing address; [11] your telephone number; [12] any special needs due to a handicap.

Hearing-impaired and international attendees: Hearing-impaired attendees and those from outside the USA and Canada may send written requests containing the indicated information to: AAAS Housing Bureau, 1212 New York Ave., Washington, DC 20005, USA (FAX: 202-789-7037).

Hotel confirmations: Confirmations will be sent by the Housing Bureau. If you do not use a credit card, you must remit the deposit indicated on the confirmation within 15 days of its receipt. (No deposit is required if you use a credit card.) Your choice of hotel and/or room is subject to availability.

Changes/cancellations: Prior to 15 January, changes and cancellations must be made with the Housing Bureau. After this date, contact the appropriate hotel directly.

Hotels and rates:
Please add 11% DC sales tax and $1.50 room tax per night.

	Single	*Double*
Sheraton Washington	$110	$130
2660 Woodley Road, NW	$125	$145
(AAAS headquarters hotel)	$140	$160
Omni Shoreham	$105	$120
2500 Calvert Street, NW	$121	$136
(Across from Sheraton)	$134	$149
Dupont Plaza	$ 80	$ 90
1500 New Hampshire Ave., NW		
(One Metro stop from Sheraton)		

Hotel reservation deadline:
15 JANUARY 1991