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19 October 1990 $3.50
Vol. 250 ■ Pages 345–476

Southerns/Northerns: Electrophoresis, Blotting, and Crosslinking in 2.5 Hours Instead of 30.

Stratagene has streamlined agarose gel electrophoresis and blotting. The system decreases the time required, from sample loading to prehybridization ten fold.

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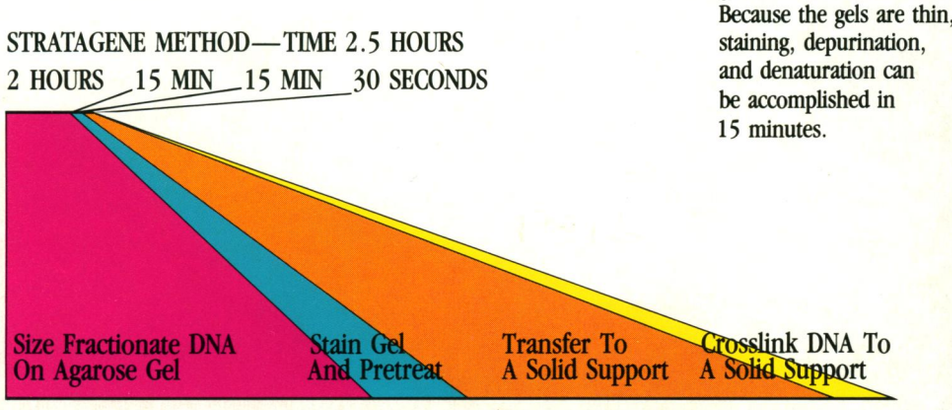
The VAGE™ vertical agarose/acrylamide gel electrophoresis system allows the casting of agarose or acrylamide gels in the unit. Nucleic acids can be electrophoresed through a 3 mm, 0.8% vertical agarose gel in less than two hours with excellent resolution (Figure 1). Because the gels are thin, staining, depurination, and denaturation can be accomplished in 15 minutes.



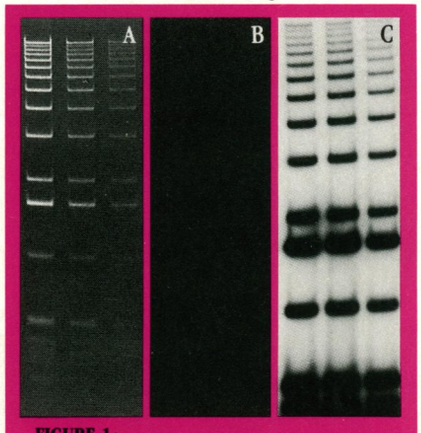
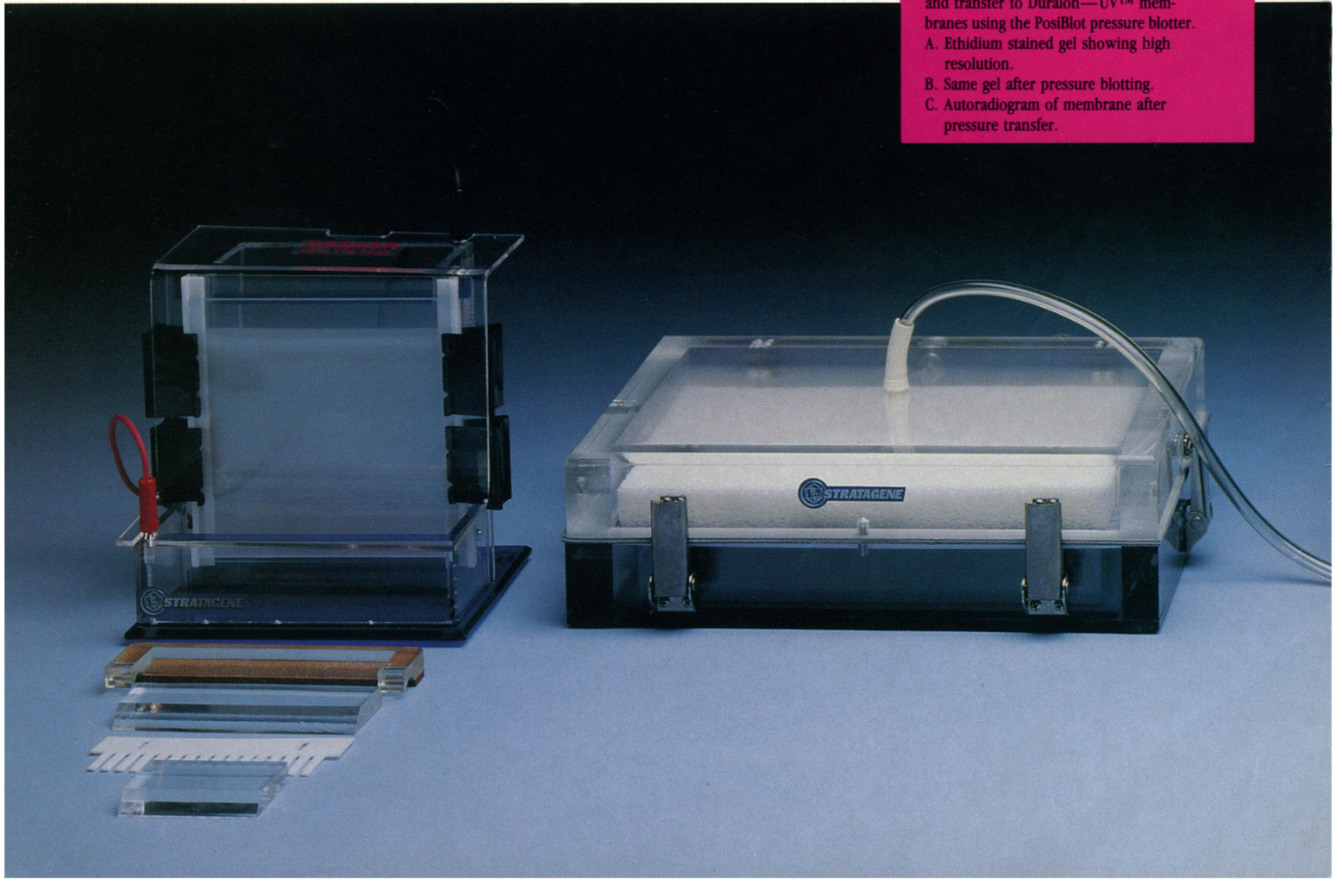


FIGURE 1:
Figure Legend: Fractionation of end labeled DNA markers on 3mm thick 0.8% agarose by the VAGE apparatus and transfer to Duralon—UV™ membranes using the PosiBlot pressure blotter.
A. Ethidium stained gel showing high resolution.
B. Same gel after pressure blotting.
C. Autoradiogram of membrane after pressure transfer.



PosiBlot™* Pressure Blotter

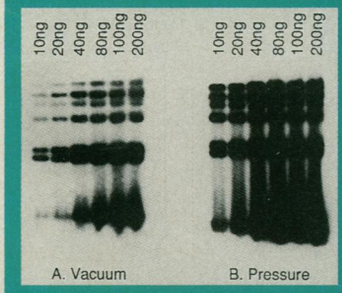


FIGURE 2:
Figure Lengend: ^{32}P end-labeled lambda Hind III markers were electrophoresed in 0.8% agarose. The DNA was then transferred to a nylon membrane with a vacuum blotter at 30mm Hg below atmospheric or with the PosiBlot pressure blotter at 100mm Hg above atmospheric. Both transfers were carried out for 15 minutes. As can be seen, pressure blotting transferred significantly more DNA in the same period of time, especially in the higher molecular weight range (largest band is 23 kilobases).

The PosiBlot™ positive pressure blotter permits the transfer of nucleic acids in 1/3 the time of vacuum blotters and 1/50 the time of capillary blotting (Figure 2). Pressure blotting does not dehydrate gels as do other methods. This allows the use of substantially higher pressure differentials, compared with vacuum blotting, without gel collapse. The PosiBlot apparatus reduces blotting time to 15 minutes.

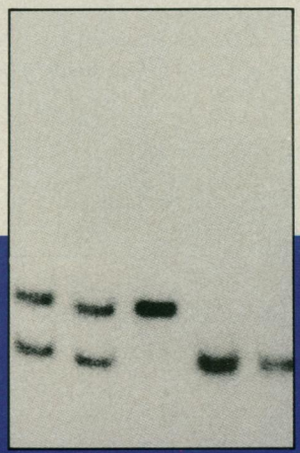


FIGURE 3:
Figure Legend: Autoradiogram showing the resolution of 2.8 and 1.3 Kb Msp I RFLP alleles revealed by a cystic fibrosis human DNA probe using the VAGE, PosiBlot and Stratalinker all in 2.5 hours.

Stratalinker™* UV Crosslinker

The Stratalinker™ UV Crosslinker fixes nucleic acids to solid supports such as nitrocellulose or nylon membranes, in less than one minute. This compares favorably to vacuum baking, which requires 2 hours. The Stratalinker actually monitors the ultra violet energy flux and deactivates the light source upon reaching the user-programmed energy level (Figure 4). Figure 3 shows an autoradiogram of a human genomic Southern blot performed using the VAGE, PosiBlot and Stratalinker all in 2.5 hours.

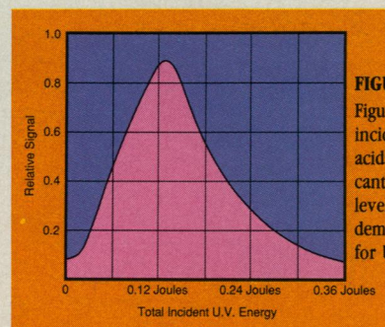


FIGURE 4:
Figure Legend: The effects of altering the incident energy for crosslinking nucleic acids to nylon membranes. The significant drop in signal intensity at energy levels below and above 0.12 Joules demonstrates the limited optimal range for UV treatment.

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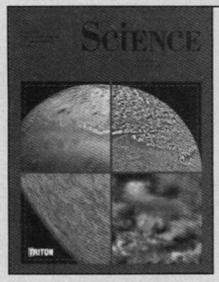

COVER Montage of Voyager 2 images showing surface activity on Triton, Neptune's large satellite. Upper left: Triton's south polar region with dark streaks from extinct geysers. Upper right: Enhanced image of the remainder of the polar region. Lower left: Image of "east" plume, which was erupting from Triton's surface at the time of the Voyager 2 encounter, with both the plume (dark blue streak in left of center) and fine particles (probably nitrogen ice crystals) suspended in the atmosphere above the limb shown in deep blue. Lower right: Two different Voyager 2 images of the active "west" plume, projected to a common viewpoint and composited in red and blue. Parallax between the two images causes the plume and its cloud trail to appear as a horizontal red-blue streak. See pages 410 to 443. [Photographs courtesy of National Aeronautics and Space Administration and the U.S. Geological Survey]

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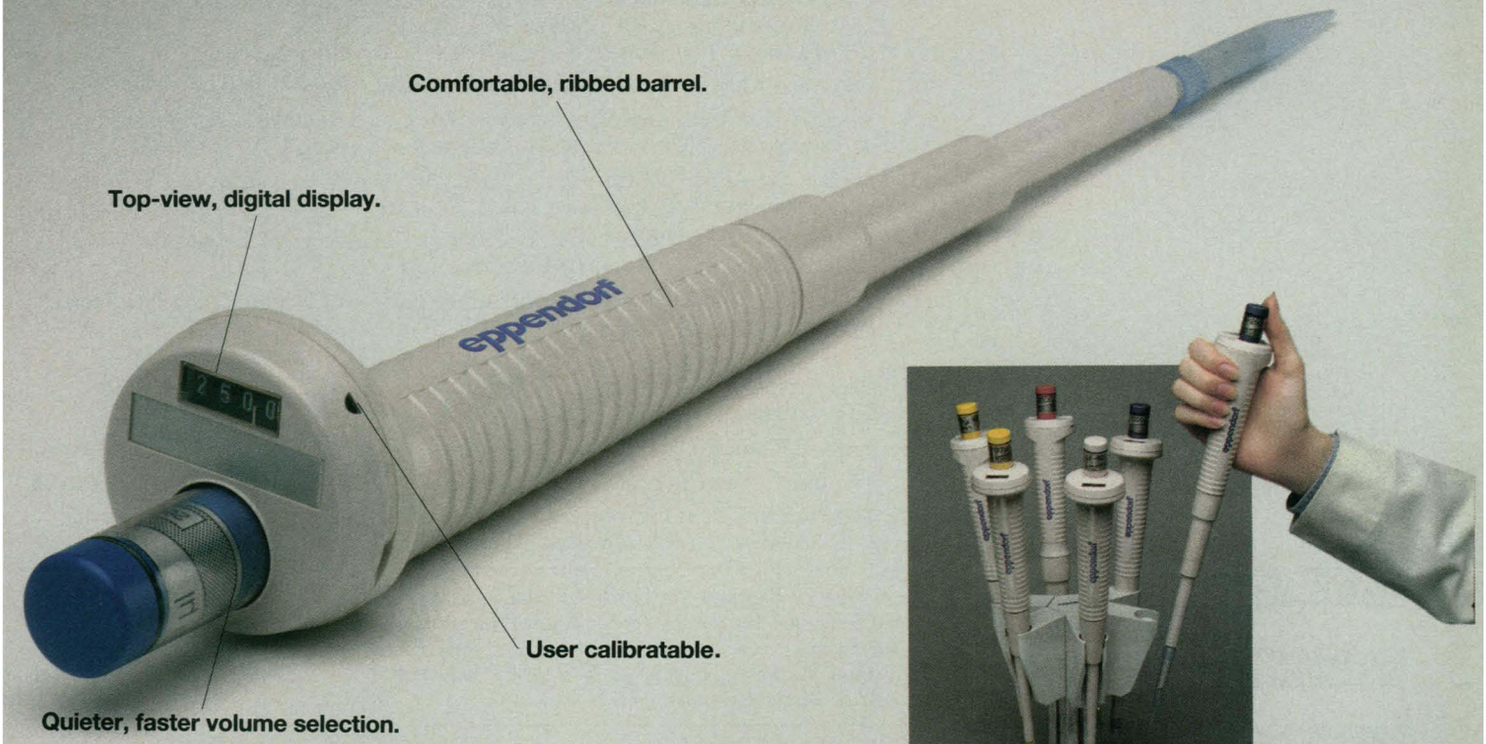

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Triton as seen by Voyager 2

ALTHOUGH Neptune's satellite Triton was discovered in 1846, little was known about it until the Voyager 2 spacecraft began its close-up study of the Neptune system—which is some 3.5 billion miles from Earth—in August 1989. On pages 410 to 443 of this issue, analyses of the data collected by Voyager 2 are presented; these data provide new clues to the nature of Triton's surface and atmosphere and to the processes that likely affected the evolution of this captured satellite (cover). One of the most intriguing observations was the discovery of huge geysers at Triton that spewed nitrogen gas, ice, and dark particles upward from the surface for many kilometers. The challenge to theoreticians has been to identify what force, working at this cold satellite so far from the sun, could drive the conversion of ice to gas that is needed to produce the plumes. Several models—a solid-state greenhouse, a leaky greenhouse, a super greenhouse—are proposed to account for the powering and later shut-off of geysers. Dust devils—cyclones like those that sweep desert plains—have also been proposed to explain the plume features, and this proposal is evaluated in more detail by Kerr (page 377). An introduction to these reports and an overview of their findings is provided by Lunine's Perspective (page 386).

Nuclear decay techniques

WHAT does a molecule look like after a radioactive ion in it has decayed? The remaining "decay ion" or "daughter ion" is usually charged, highly reactive, and unstable. Study of these species and of the end products of the reaction—which are neutral but from which the nature of precursor ions can be inferred—is helping to solve many of the puzzles of the structure, kinetics, and mechanisms of action of ions, especially in cases where ions are elusive reaction intermediates. Cacace describes procedures for labeling starting materials and the steps that characterize their excitation and disruption; both chemical and spectral analyses contribute to the identification of the reaction products (page 392). Results of nuclear decay studies have led to new insights about ion structure and formation. This technology makes it possible to compare the reactions of a given ion in different types of media—low-pressure gases, liquids, and solids—because the same charged species can form in all kinds of reaction environments. In addition, nuclear decay studies have been useful in proving that certain elusive ionic species actually exist—such as the perbromate anion—and this has been followed by development of pathways for synthesizing previously evasive ions.

Vitamin A

VITAMIN A in the proper doses is crucial for fetal development, for vision, and for cell proliferation and differentiation throughout life. People need only a small amount of it in their daily diets, but when they don't get it they can suffer from blindness or become especially susceptible to infections; a severe vitamin A deficiency can even lead to death. Vitamin A is a fat-soluble substance. How it and its derivatives are processed in the gut, transported through the intestinal lymph into the general circulation, stored in cells, and later mobilized for use are topics reviewed by Blomhoff *et al.* (page 399). Stellate cells of the liver (and many other tissues when vitamin A is plentiful) store vitamin A, and they appear to be key to keeping vitamin A at a constant level in plasma despite fluctuations in daily uptake. A likely scenario for how vitamin A affects cellular processes is the following: after vitamin A is taken into a cell, it is oxidized to retinoic acid and then diffuses into the nucleus; there it binds to a specific nuclear receptor, several of which have been identified; this complex interacts with a responsive element (a short DNA sequence) to regulate the actions of nearby target genes. In a separate News article, Hoffman focuses on the role of vitamin A in vertebrate development: vitamin A is thought to act as a morphogen, a substance that spreads out over developing tissue and is instrumental in imprinting a pattern for development on undifferentiated embryonic tissue (page 372). What is still unclear (and what is the central question in developmental biology) is how this one substance can exert so many different effects at different times on so many different types of tissue.

Splicing RNA

In the nuclei of cells, precursor messenger RNA molecules are spliced together on a structure called the spliceosome. The RNA molecules contain messages assembled from noncontiguous pieces of chromosomal DNA and serve as templates from which, down the line, proteins are eventually produced. Spliceosomes are complex structures that have many components. Among them are five small nuclear RNA molecules that, working in conjunction with proteins, help to fold pieces of RNA into the right shapes and later splice them into the message. The most conserved of the small nuclear RNA molecules in both size and sequence is U6; its striking similarity in organisms as different as yeast and humans has led to the proposal that U6 is a central factor in the splicing process, perhaps serving as the splicing catalyst. Fabrizio and Abelson describe experiments in which U6 molecules with various point mutations were made (page 404). Two domains of U6—the central domain and the stem I region—were found to be important for proper splicing in vitro; some mutations prevented the proper formation of a spliceosome while others interfered with the completion of the two-step splicing process. These results are consistent with the proposal that precursor messenger RNA splicing may be catalyzed by RNA and that U6 may be one of the key RNA species involved.

■ RUTH LEVY GUYER

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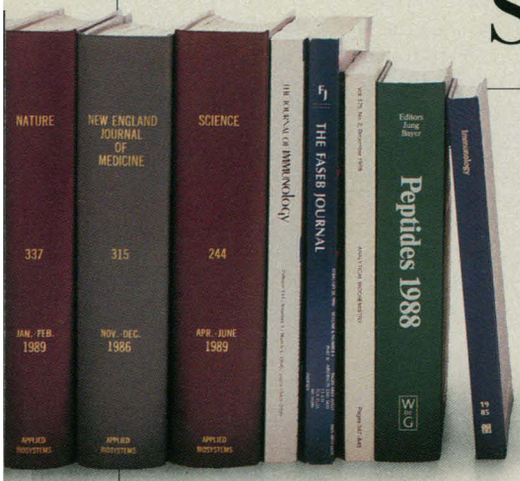

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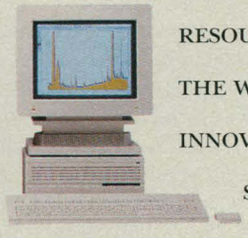

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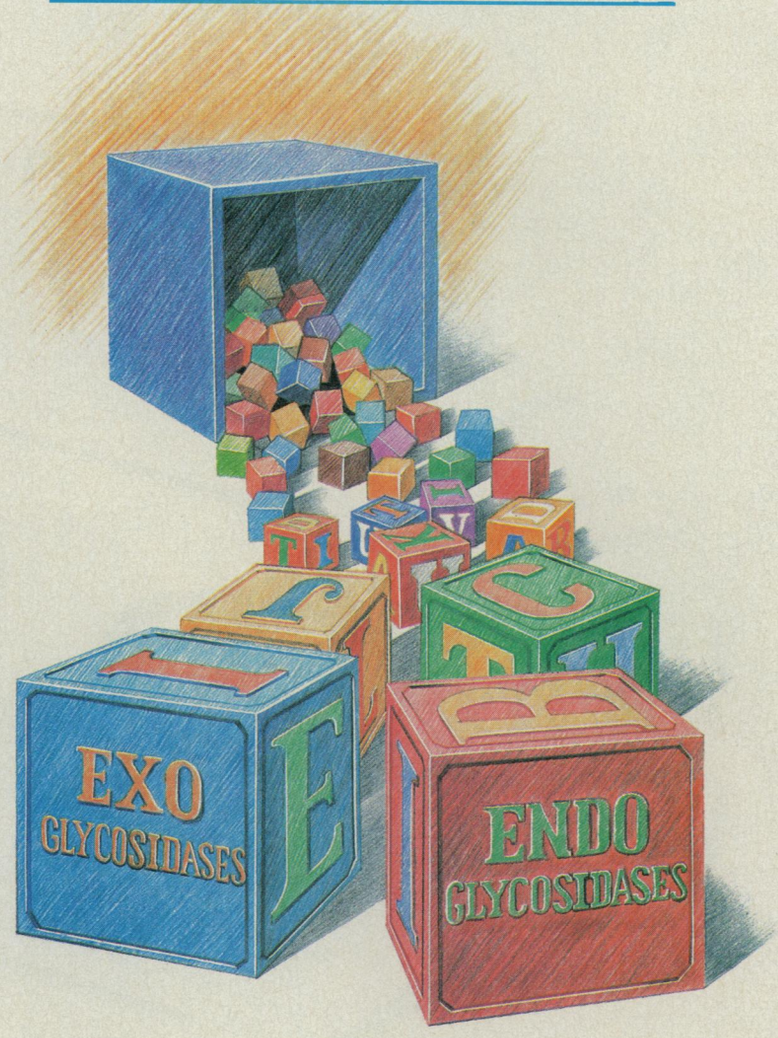

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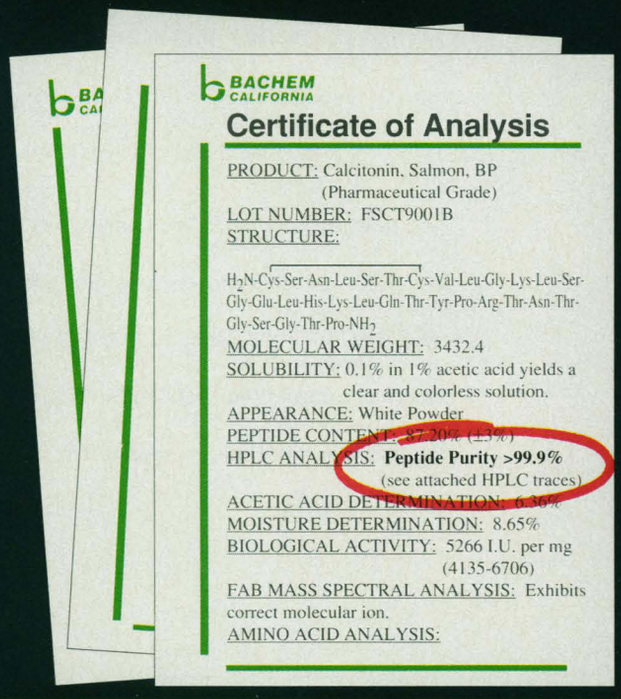

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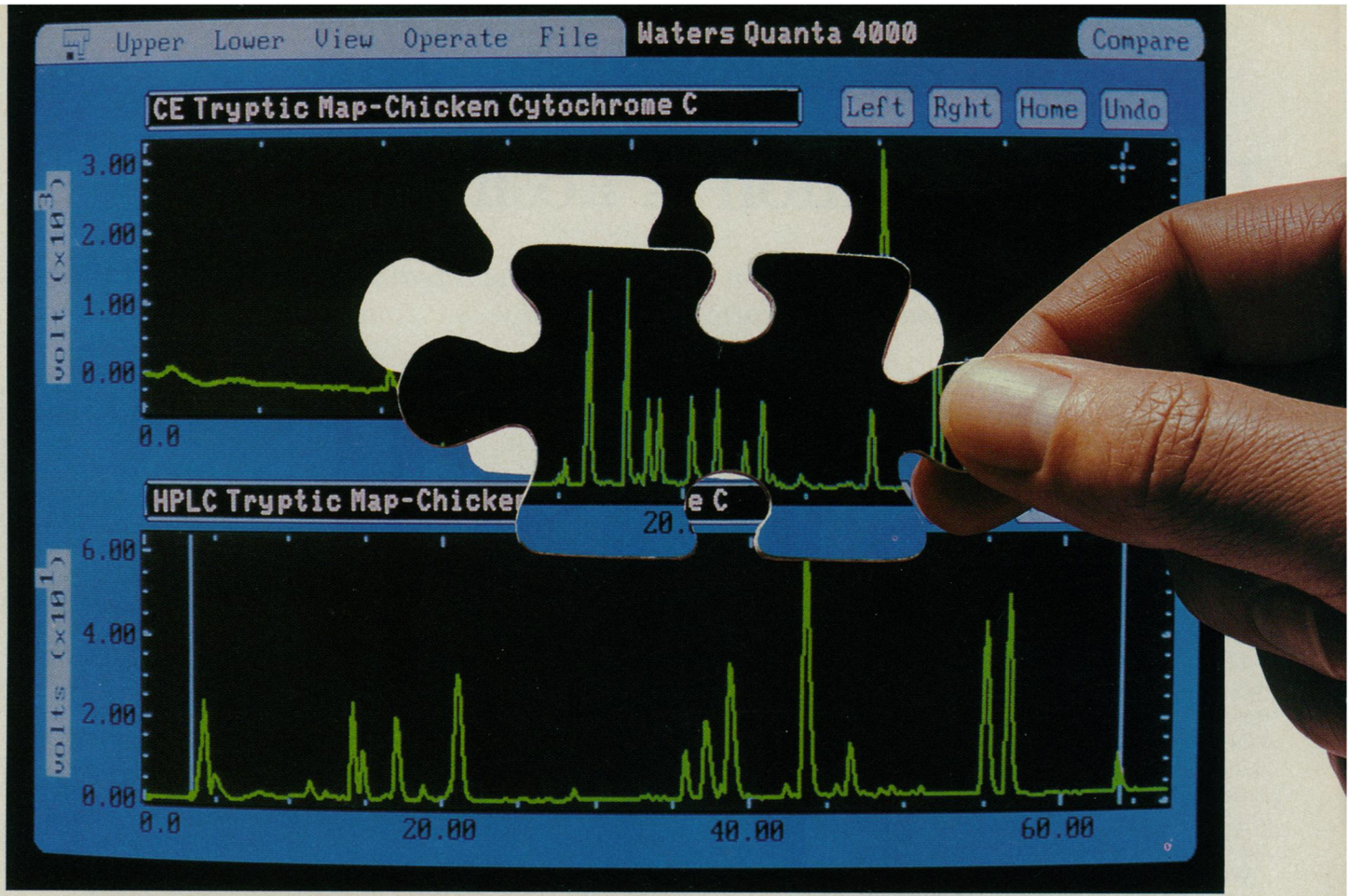

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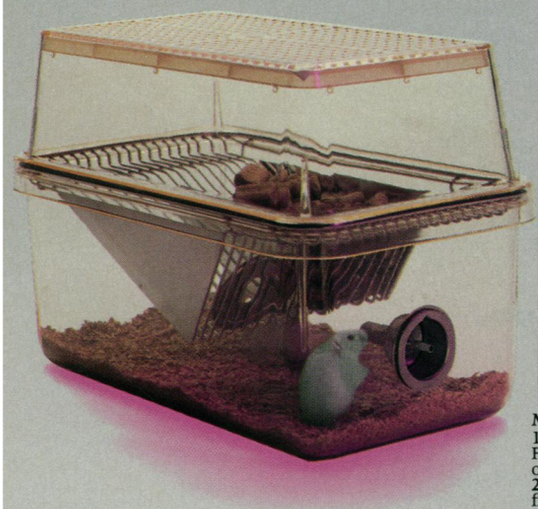

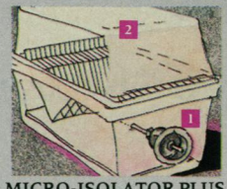

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1. Unique docking port: Floor-level air with optional dripless watering.
2. Original Micro-Isolator filter top design provides unmatched filter protection.

This innovation on the still-available and popular static Micro-Isolator deploys positive ventilation with optional automatic watering through a unique connecting mechanism which docks the cage to an air/water manifold built into our racks.

This system dramatically lowers the levels of ammonia*, carbon dioxide and humidity at the cage level and eliminates the cross-contamination associated with other automatic watering valves that are outside the cage barrier.

Air passed through a HEPA filter (99.99% efficient to 0.3 micron particles) is uniformly introduced directly into each cage ensuring the protective barrier with positive internal pressure. Air then flows out the top of the cage through a protected filter as well as from under the Petri-type lid.

The unique, dripless L-2000 Bedding-Proof Watering Valve and quick-disconnect system is part of the cage's port and so remains with the cage for cleaning and sterilization.

The result of these combined systems is an extended healthier environment with substantial savings in labor and material costs, plus greater assurance against disastrous research compromise via contamination or flooding.

It is a cost-efficient way to sustain microbial integrity from and between animals and personnel while extending animal populations to the maximum-allowable housing densities.

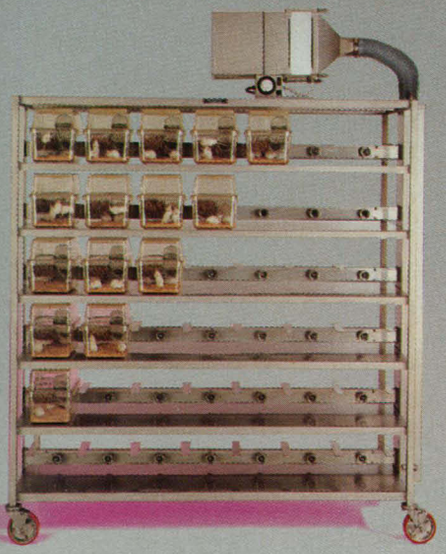
* Testing shows ammonia levels are maintained well below 10 ppm with only one cage change for up to a two-week period.

solving mentality led us housing technology.

Our Micro-Environmental Control Rack Systems complete the housing picture.

In one simple motion the individual Micro-Isolator Plus™ cage is slipped onto a shelf of one of a variety of Lab Products rack systems that support the HEPA air supply and integrated water manifold docking systems. Each shelf's air manifold is designed to supply balanced, low-velocity air to each cage regardless of the number of cages being docked. And it does so at very low levels of noise and vibration.

The Open-Shelf Rack System is used with the



Micro-Isolator Plus System when isolation at the rack level is not required, thus the cage is positive to the room.

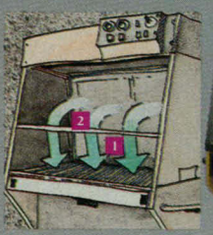
The Ventilated Rack Systems provide additional isolation by exhausting air from each shelf to the building exhaust ventilation or through a HEPA filter module that exhausts into the room. This puts each shelf space under negative pressure relative to the room and to each cage.

Our mobile, Laminar Flow Stay-Clean™ Workbench II just got even better.

Because handling equipment must maintain the aseptic integrity of housing and be practical and efficient, Lab Products Inc. continuously performs R&D in this area. Example: our newly improved workbench with easier access, cleaning and maintenance, greater user comfort, and improved mobility and safety features.

Through extensive testing we found that Class 100 horizontal air flow patterns from back to front more effectively protect animals and control particulate from spreading across cages and work area than vertical air flow systems. We combined this with a full-length front edge air intake which then pulls the air down, creating a vertical air flow curtain at the face opening of the workbench to minimize the escape of allergens and other cage effluent into the room. One new Stay-Clean Workbench II can easily be moved around to accommodate several projects daily.**

When combined with a Lab Products Waste Management



STAY-CLEAN WORKBENCH II
1. Airflow allows maximum product protection.
2. New design features adjustable sash for improved access.

Unit, these components complete a comprehensive system that ensures the integrity of complex animal research at cage barrier levels. Now you can house and process hundreds of small animals of varying species involving a variety of research in one small facility with greater effectiveness and greater efficiency. And it can all be done in a pleasant, virtually-odorless environment.

For more information please use the reader service card, drop us a line, or call Toll-free: 1-800-526-0469.

lab products inc
a bioMedic company

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201/843-4600 800/526-0469 FAX: 201/843-6040

Micro-Isolator, Micro-Isolator Plus, and Stay-Clean are trademarks of Lab Products, Inc.

** Not approved for use with biohazardous, toxic or flammable materials.

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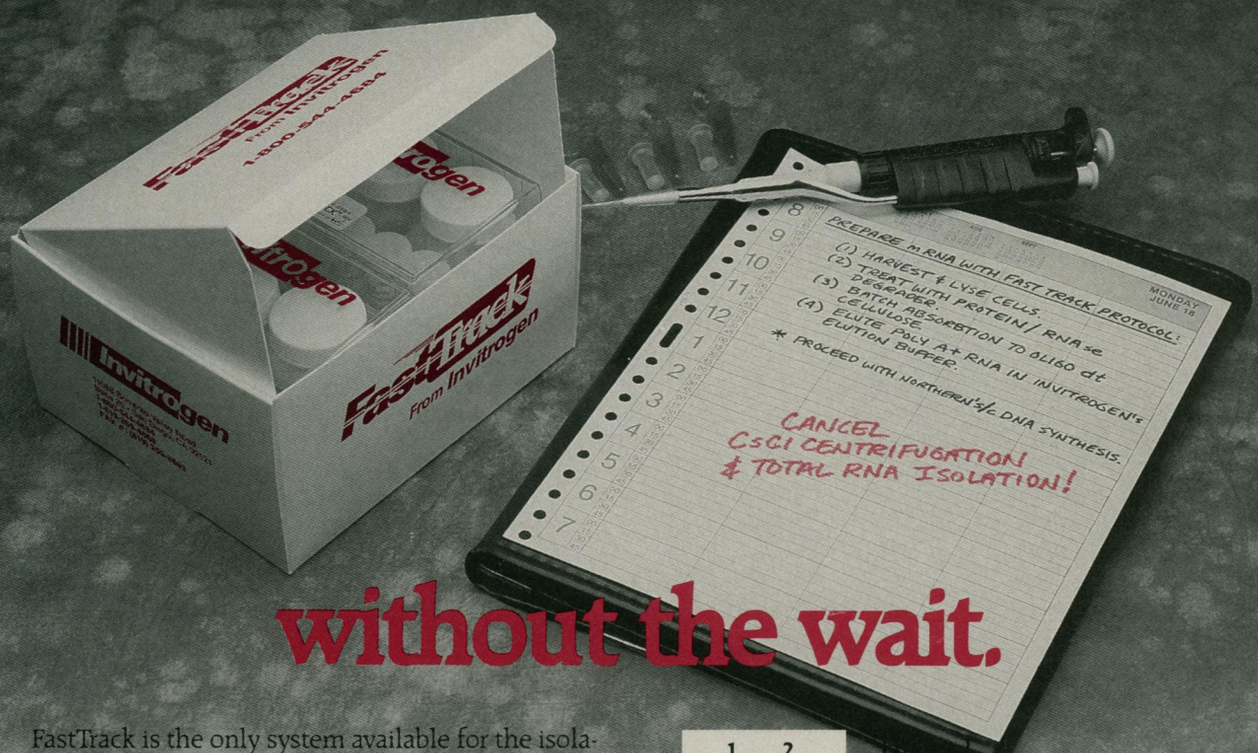
FastTrack™

The highest quality mRNA...



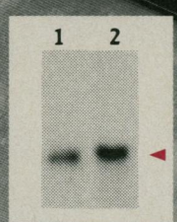
without the wait.

FastTrack is the only system available for the isolation of high quality, intact messenger RNA directly from cells or tissue in four hours or less with double the yield of conventional protocols. The entire procedure can be completed without ultracentrifugation, cesium chloride, toxic chemicals or total RNA isolation.

FastTrack guarantees:

- Higher yields of full length transcripts
- Lower ribosomal contamination
- No need for total RNA isolation
- Speed and simplicity

FastTrack has been designed to provide consistent and improved results during **cDNA synthesis** by eliminating guanidine and phenol which inhibit reverse transcriptase activity, and for **Northern blotting** by removing ribosomal contaminants and providing stronger signals (see fig. 1).



Lane 1. mRNA isolated using guanidinium, CsCl centrifugation and oligo dT column selection. (30 hrs).

Lane 2. mRNA isolated directly from cells with FastTrack (3 hrs).

For high quality mRNA without the wait, *get the message* with FastTrack.

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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: F G

I. Annual 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]*

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

Note: *To attend the neurosciences seminar, you must register for both the Annual Meeting (above) and the seminar (below).*

II. Additional Fees for Seminar

(Seminar fees are *in addition to,* not in lieu of, the Annual Meeting Registration Fee above.)

Neurosciences Seminar (16-18 February)

Regular	[ ] $110	
Grad student or postdoc	[ ] $ 30	$ ____

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).

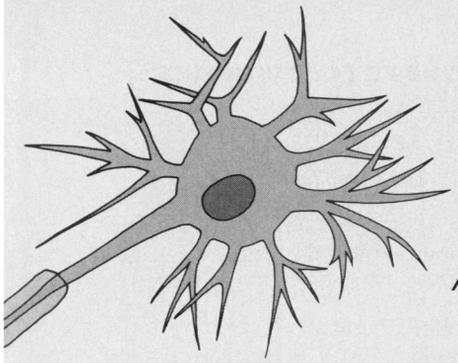
Hotel confirmations: Confirmations will be sent by the Housing Bureau. If you do not use a credit card, you must remit the deposit indicated on the confirmation within 15 days of its receipt. (No deposit is required if you use a credit card.) Your choice of hotel and/or room is subject to availability.

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



The Neurosciences

Challenges for the '90s

A Three-Day Seminar at the AAAS Annual Meeting in Washington, DC

Seminar Dates: ***16–18 February 1991***

The neurosciences are promising to answer some of biology's most intriguing questions. It may not be too long, for example, before we can understand the basis of perception and consciousness; explain how humans learn and remember; discover how the millions of intricate connections in the brain are formed; and know why the brain has such a remarkable computational capacity.

Recent scientific advances in molecular biology have made it more likely that these questions can eventually be answered. The revolution in that field has made it possible to begin to elucidate, at the molecular level, key problems of neuroscience such as the primary structure of ion channels, the basis of electrophysiological phenomena, the genetics of neurological disease, and the control of neuronal gene expression.

These are the advances that provide the impetus for the three-day AAAS neurosciences seminar described below. Each half-day session will focus on one of six areas of the neurosciences that are at the forefront of the field and that promise to make fundamental contributions to key unanswered questions. Distinguished researchers will present their current work and survey recent progress in their area. Registrants will come away from each session having learned of some of the most exciting research in that area of the neurosciences as well as with an excellent overview of that area.

To further promote the exchange of ideas and information, we have scheduled a poster session for all seminar registrants. You are invited to submit an abstract for a poster presentation to share your own research with the speakers and attendees. (See "Call for Neuroscience Poster Papers" on page 447.)

I hope that you will not only participate in this stimulating program but also encourage your students and colleagues to do the same. Space is limited, so register now. I look forward to seeing you in Washington.

— Katrina L. Kelner
Senior Editor, Science *Magazine*
and organizer of The Neurosciences seminar

Program

SATURDAY, 16 FEBRUARY

8:30 am: *Stimulus-Transcription Coupling in Neuronal Cells*

Presiding: **James I. Morgan** *(Roche Institute of Molecular Biology)*

Inducible Proto-Oncogenes in the Nervous System
—James I. Morgan

Regulation of Neuronal Gene Expression by Depolarization
—Michael Greenberg *(Harvard Medical School)*

Pleasure, Pain, and Proto-Oncogenes
—Michael J. Iadarola *(NIDR, NIH)*

NGF Induces Transcription of Genes Encoding Zinc-Finger Proteins
—Jeffrey Milbrandt *(Washington Univ. School of Medicine, St. Louis)*

2:30 pm: *Structure and Function of Potassium Channels*

Presiding: **Arthur M. Brown** *(Baylor College of Medicine)*

A Minimalist Potassium Channel
—Arthur M. Brown

Molecular Studies of Voltage-Gated Potassium Channels
—Lily Y. Jan *(Univ. of California at San Francisco)*

Structure-Function Correlations in a Family of Rat Brain Potassium Channels
—Walter Stuhmer *(Max Planck Institute, Gottingen, Germany)*

Biophysical and Molecular Mechanisms of Potassium Channel Gating
—Richard W. Aldrich *(Stanford Univ. School of Medicine)*

SUNDAY, 17 FEBRUARY

8:30 am: *Olfaction and Taste*

Presiding: **Gordon M. Shepherd** *(Yale Univ. School of Medicine)*

(continued on next page)

Plenary Lecture

Shosaku Numa *(Medical Chemistry and Molecular Genetics, Kyoto University Faculty of Medicine, Japan)*
Topic: "Molecular Insights into the Function of Neurotransmitter Receptors and Ionic Channels" (date/time TBA)

From Ions and Molecules to Perception and Cognition
—**Gordon M. Shepherd**

Molecular Mechanisms of Transduction in Olfaction: A Model for Receptor-Ligand Signaling Systems
—**Stuart Firestein** *(Yale Univ. School of Medicine)*

Long-Term Potentiation and Serial Memory Processing in the Olfactory Hippocampal Circuit
—**Gary S. Lynch** *(Center for Neurobiology of Learning, Univ. of California, Irvine)*

The Initial Events in Taste Transduction
—**Stephen D. Roper** *(Colorado State Univ.)*

Sensory Coding of Gustatory Information
—**David V. Smith** *(Univ. of Cincinnati)*

2:30 pm: *Activity Dependent Plasticity in Development and Learning*

Presiding: **Carla J. Shatz** *(Stanford Univ. School of Medicine)*

Long-Term Potentiation: A Cellular Model for Learning
—**Roger A. Nicoll** *(Univ. of California School of Medicine, San Francisco)*

Mechanisms for Use-Dependent Synaptic Plasticity in the Developing and Mature Visual Cortex
—**Wolf Singer** *(Max Planck Inst., Frankfort, Germany)*

Regulation of Synapse Stabilization by Regulation of a Receptor System
—**Martha Constantine-Paton** *(Yale Univ.)*

Spontaneous Activity and the Patterning of Connections in Fetal Development
—**Carla J. Shatz**

MONDAY, 18 FEBRUARY

8:30 am: *Cognitive Processes*

Presiding: **Larry Squire** *(Veterans Administration Medical Center, San Diego)*

Memory: Brain Systems and Cognition
—**Larry Squire**

Attentional Control of Visual Perception: Cortical and Subcortical Mechanisms
—**Robert Desimone** *(Laboratory of Neuropsychology, NIMH, NIH)*

Components of High-Level Vision: A Cognitive Neuroscience Analysis
—**Stephen Kosslyn** *(Harvard Univ.)*

Neural Circuits That Mediate Perceptual Judgments of Motion Direction
—**William T. Newsome III** *(Stanford Univ. School of Medicine)*

2:30 pm: *Molecular Basis of Neurological Disease*

Presiding: **Joseph B. Martin** *(Univ. of California School of Medicine, San Francisco)*

Molecular Genetic Approaches to Identification of Mutant Genes in Neurological Disorders
—**Joseph B. Martin**

Molecular Genetics of Retinoblastoma
—**Thaddeus P. Dryja** *(Massachusetts Eye and Ear Infirmary)*

Role of the Amyloid Precursor Protein in the Molecular Pathogenesis of Alzheimer's Disease
—**Dennis J. Selkoe** *(Center for Neurologic Diseases, Brigham and Women's Hospital)*

Molecular Biology and Genetics of Prions Causing Neurodegeneration
—**Stanley B. Prusiner** *(Univ. of California School of Medicine, San Francisco)*

Poster Session (date/time to be announced)

Call for Neuroscience Poster Papers

Share your research with colleagues at the neurosciences seminar!

You are invited to submit an abstract for a poster session presentation to be delivered as a part of the neurosciences seminar at the 1991 AAAS Annual Meeting. If your abstract is accepted, you will be 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 seminar registrants.

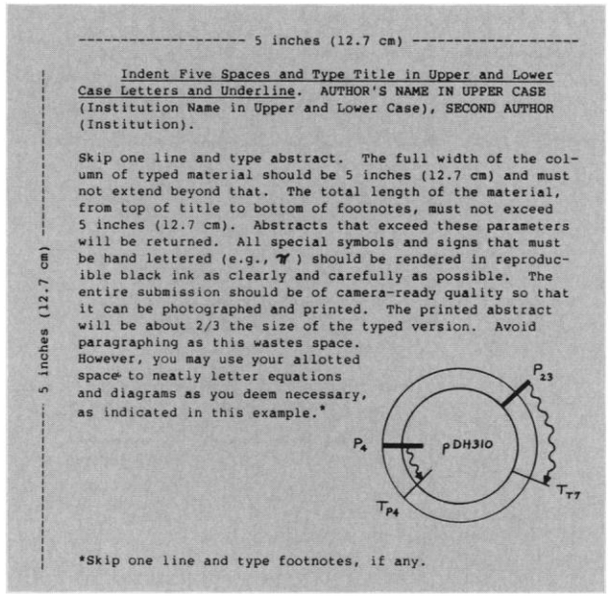
Eligibility: Presenters of seminar papers must be registered for the AAAS Annual Meeting and for the neurosciences seminar. (Use the advance registration form on the following page.)

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. Do not box or cut out the abstract.

Submission: Above the 5" square, type the name of the seminar: "The Neurosciences: Challenges for the '90s." Below the square, type your full name, address, and phone number. Send the original plus one copy no later than 16 December 1990 to the following address:

Contributed Papers
AAAS Meetings Office
1333 H Street, NW
Washington, DC 20005

Example:



Deadline for Abstracts: *16 December 1990*

Special Discounts for Graduate Students and Postdoctoral Fellows

In the interest of advancing science at all levels, AAAS encourages graduate students and postdoctoral fellows to take advantage of a unique learning opportunity by joining the professional registrants at the neurosciences seminar.

To make this possible, AAAS is offering especially low student registration fees for both the Annual Meeting and the neurosciences seminar. For details, see the registration form on the following page.

Invitation to Exhibit

If your organization provides products or services that would be of interest to seminar registrants, or if you would like to publicize your latest advances in science and technology before a worldwide audience, then you should exhibit at the 1991 AAAS Annual Meeting.

Organizations that should exhibit include publishers, computer software and hardware companies, scientific associations and societies, government agencies, scientific information services, and scientific equipment manufacturers.

For complete details, call Stacy Weinberg at 202-326-6462, or write AAAS Meeting Promotion Dept., 1333 H Street, NW, Room 815, Washington, DC 20005.

The AAAS Annual Meeting

As a registrant of the neurosciences seminar, you will have access to all general activities of the AAAS Annual Meeting, Thursday, 14 February, through Tuesday, 19 February.

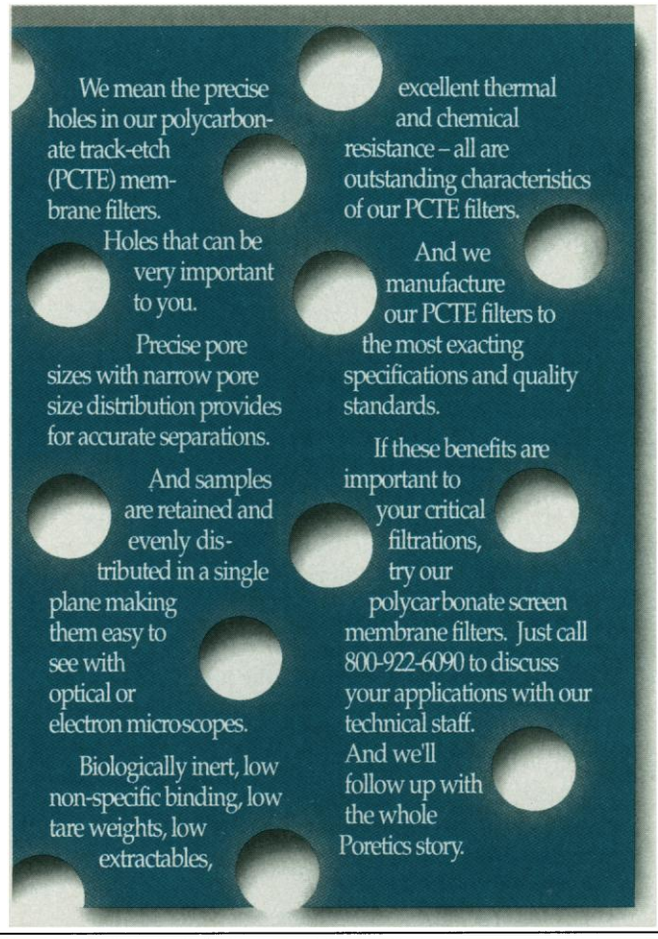
Come for the seminar, but stay for everything else that this unique scientific gathering has to offer. The Meeting promises to be charged with the intellectual energy that results when more than 5,000 scientific scholars gather for a single, multidisciplinary event. You can learn about new developments, not only in your own field, but in a wide range of other disciplines as well.

The Meeting features more than 200 symposia, technical sessions, and workshops that cover the entire spectrum of the physical, life, and social sciences. (The life sciences program is especailly strong, with a full schedule of sessions on molecular and cellular biology, medical science, health care, evolution, neurobehavior, biomedical ethics, psychology, and more.)

You can also hear plenary lectures by 15 eminent scholars; discover new publications, products, and services at the exhibition; talk one on one with researchers at a full series of poster sessions; and explore new job opportunities at the AAAS Employment Exchange.

For a complete program, see the insert in the 26 October 1990 issue of *Science* or the special preconvention section in the 7 December 1990 issue, or write: AAAS Meeting Promotion Dept., 1333 H Street, NW, Room 815, Washington, DC 20005.

There Are Some Important Holes In Our Story.



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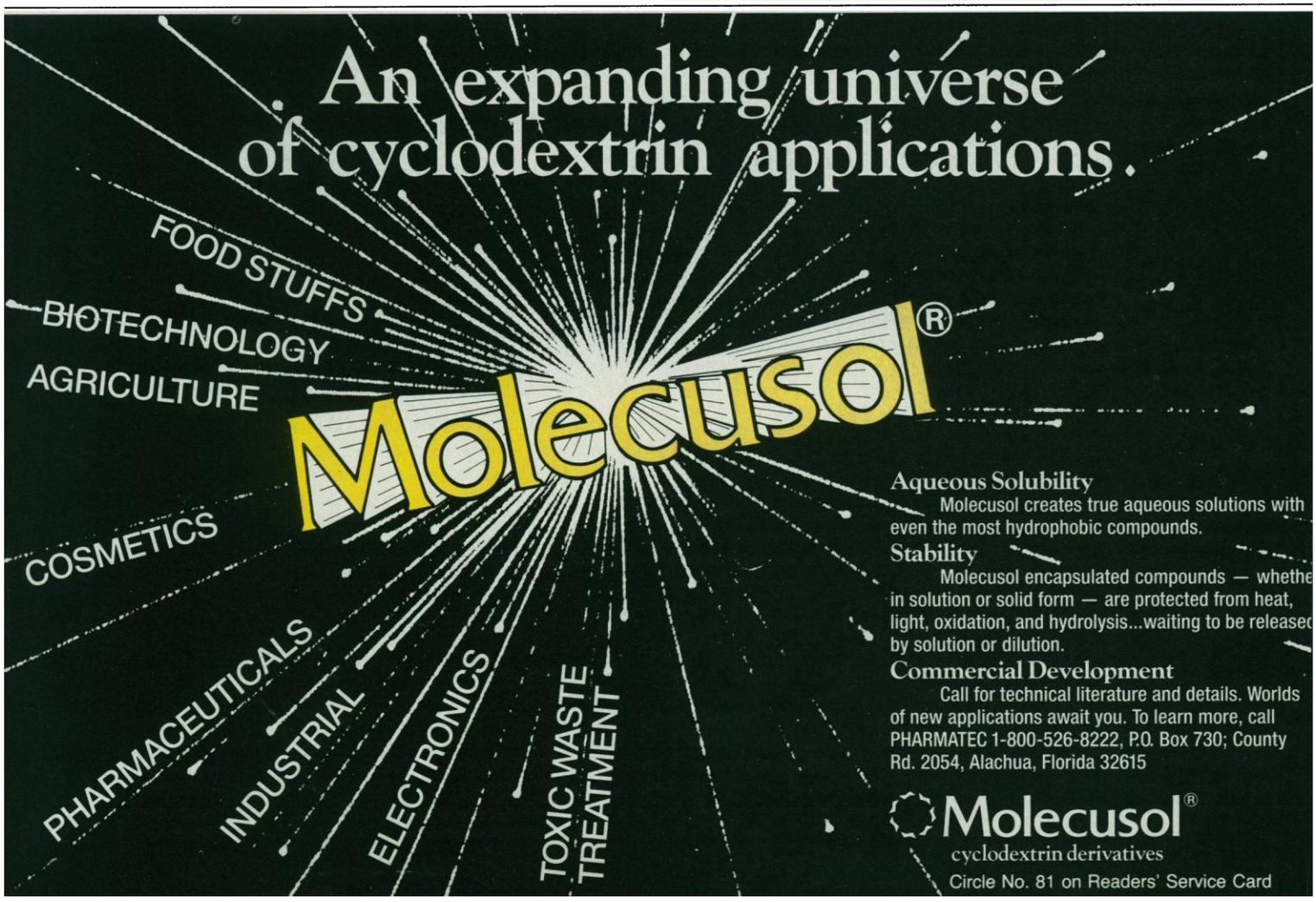

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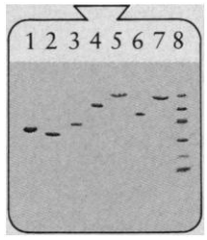

SDS-PAGE of FPLC*pure*® cloned modifying enzymes. Analyzed using PhastSystem™ and a PhastGel® Gradient 8-25. (1) Gene 32 Protein; (2) Polynucleotide Kinase; (3) T4 RNA Ligase; (4) Klenow Fragment; (5) T7 RNA Polymerase; (6) T4 DNA Ligase; (7) T4 DNA Polymerase; and (8) Low Molecular Weight Markers.

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