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6 September 1991 $6.00
Vol. 253 ■ Pages 1065–1180

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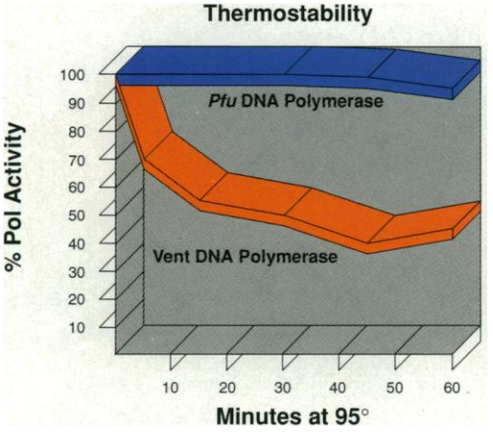

Figure 1: Thermostability of *Pfu* and Vent DNA Polymerases at 95°C.
To determine the thermostability of *Pfu* and Vent DNA polymerases at 95°C, 37.5 units of each enzyme were diluted to a final volume of 150 µl in the recommended reaction buffer and incubated at 95°C. At 0, 5, 15, 30, 45 and 60 minute time points, duplicated 10 µl aliquots (2.5 units) were assayed at 75°C for DNA polymerase activity.

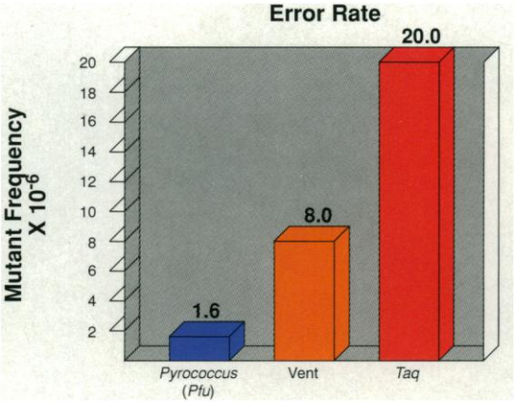

Figure 2: Polymerase fidelity was measured by modification of an assay described by Kohler *et al* (1991) *Pro. Natl. Acad. Sci. USA*, in press. Error rates reflect mutations per nucleotide incurred in the *lacI* gene during DNA synthesis. Vent is derived from *Thermococcus litoralis* and was obtained from New England Biolabs. *Pfu* is derived from *Pyrococcus furiosus* and is sold by Stratagene. *Taq* polymerase is derived from *Thermus aquaticus* and was obtained from Cetus Perkin Elmer.

Pyrococcus Polymerase	Catalog #
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* Patents Pending

** Vent™ is a trademark of New England Biolabs

1. Bryant, F.O. and Adams, M.W.W. (1989) *J. Biol. Chem.* 264:5070-5079.
2. Fiala, G. and Stetter, K.O. (1986) *Arch Microbiol.* 145:56-61.
3. Eckert, K.A. and Kunkle, T.A. (1990) *Nucleic Acids Res.* 18:3739-3744.
4. Chien, A., Edgar, D.B. and Trela, J.M. (1976) *J. Bac.* 127:1550-1557.

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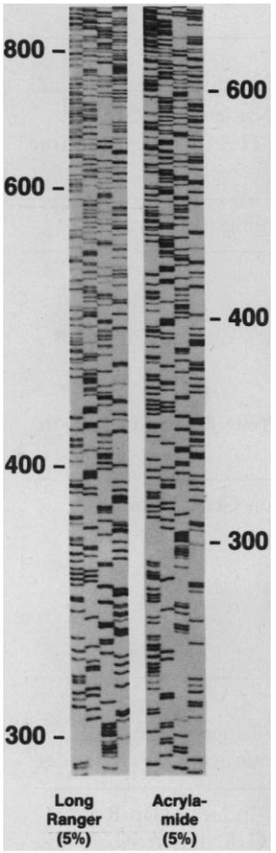

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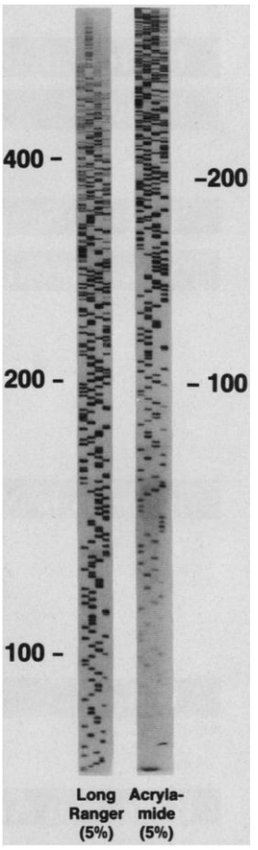

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COVER Light microscope image of the dorsal view of the mite *Proctolaelaps regalis* (×20). The red spot at the caudal end of each mite is pigment that is retained in the posterior hindgut before excretion. This pigment has its origin in the eye of *Drosophila* flies, on which the mite feeds. This mite is a potential vector for the horizontal transfer of genes between different species of *Drosophila*. See page 1125. [Image by M. A. Houck, University of Arizona]

This Week in

SCIENCE

Biotic exchanges

Natural phenomena, such as upheaval, movement, and rearrangement of landmasses and waterways or major changes in climate, have mixed together biota that were once separate and independent. With increasing frequency, human activities are also causing the breakdown of barriers between biota. Vermeij analyzes and summarizes characteristics of many of the marine and terrestrial biotic exchanges that have taken place during the past 20 million years (page 1099). In general, exchanges have been highly asymmetric. For example, as a result of the linking of the Mediterranean Sea and the Red Sea by the Suez Canal in 1869, hundreds of Red Sea animals—molluscs, crabs, and fishes—were transported to and are now found in the Mediterranean, but only three molluscs and six fishes are known to have gone the other way. Sometimes physical phenomena, such as currents, can account for asymmetric exchanges, but this is not the case for all examples. In a number of instances, species of the invading biota have evolved superior competitive, defensive, or reproductive capacities or the recipient biota has experienced many extinctions, making it especially vulnerable to invasion.

Antigreenhouse and greenhouse on Titan

The giant planets and their moons are not considered relevant models for most phenomena that pertain to terrestrial planets. Yet the largest satellite of Saturn, Titan, has some features in common with Earth. Specifically, the heat balance of the Titan atmosphere, like that of the atmosphere of Earth, is affected by both greenhouse and antigreenhouse effects (page 1118). The thermal structure of the Titan atmosphere is described by McKay *et al.* Opaque gases in the atmosphere—mostly hydrogen, but also methane and nitrogen—absorb and thereby trap outgoing thermal infrared emissions, and this leads to warming much like the greenhouse warming promoted by water and carbon dioxide in Earth's atmosphere. The opposite effect—antigreenhouse cooling—is brought about by Titan's upper atmosphere, which has an optically thick organic haze that absorbs most of the incident sunlight but only weakly absorbs outgoing thermal infrared wavelengths. (The Earth's ozone layer causes a small antigreenhouse effect; dust layers from giant impacts or from nuclear explosions can have larger antigreenhouse result on Earth.) The net effect of greenhouse and antigreenhouse phenomena is to increase Titan's effective temperature.

Vanishing friction

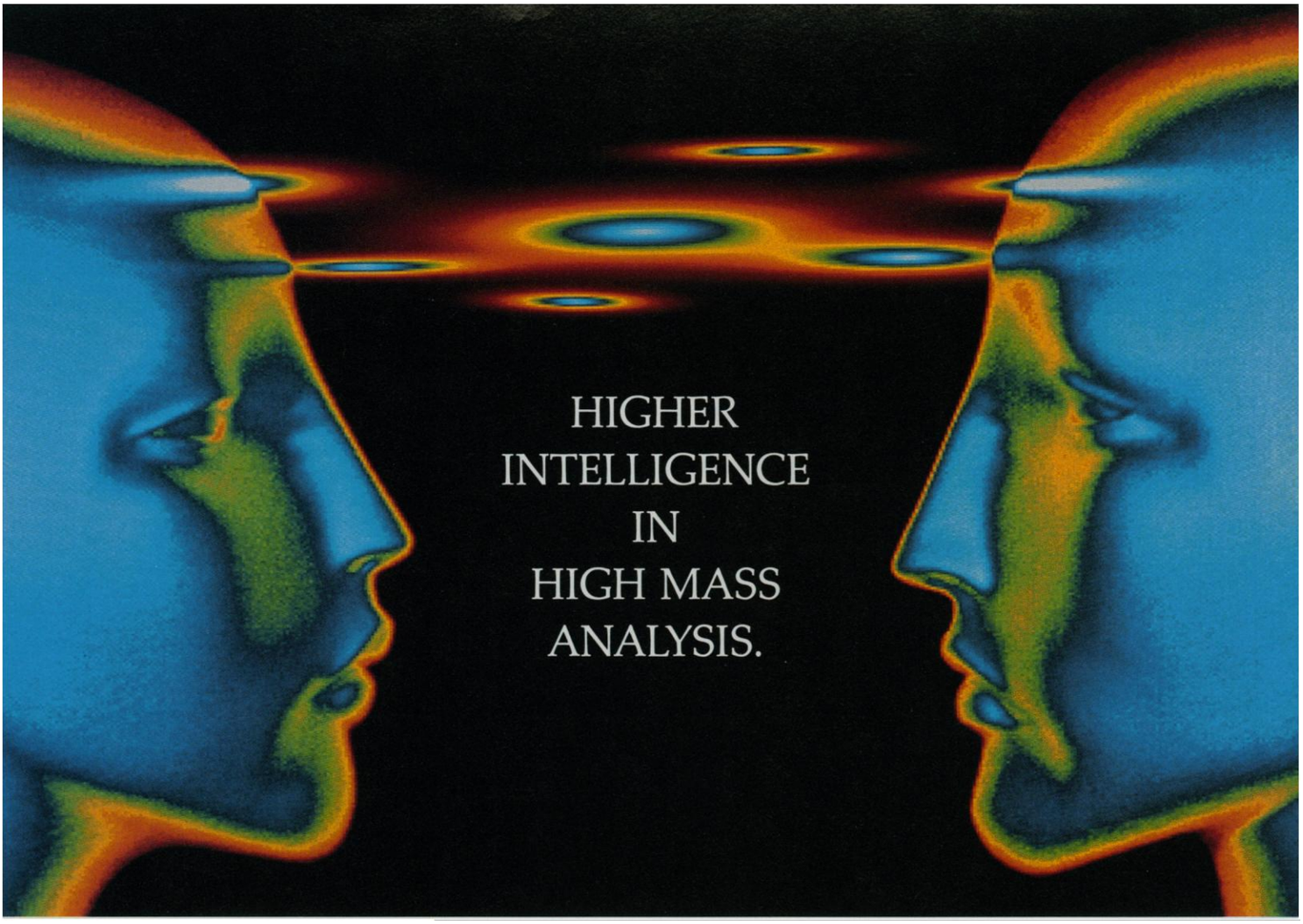
Polymeric gels possess an inherent resistance to the flow of water and other solvents. The frictional resistance that develops between solvent and polymer is a function of the viscosity of the solvent and the pore size of the polymer. Although it was expected that friction would be independent of temperature in a permanently cross-linked gel of poly(*N*-isopropylacrylamide) this proved not to be the case. Instead, friction diminished by three orders of magnitude as the gel approached a critical temperature (page 1121). Tokita and Tanaka report that as friction diminished, the gels became slightly opaque; the gel's volume and shape did not change but there may have been microscopic density fluctuations—swelling in some portions and shrinking in others—in the gel so that water could pass with greater ease. Similar microscopic changes probably occur in other gel systems and may be of use in or relevant to technical applications (phase separations) and biologic transport systems.

PDGF in vessel occlusion

Restenosis is the occlusion and narrowing of coronary arteries. It is a common complication—occurring some 30 to 40% of the time—of bypass surgery and of other surgical procedures aimed at removing occlusions. The blockade forms at sites in vessels where manipulations were carried out or where the vessel was injured; at such sites neointimal smooth muscle cells accumulate. It had not been known what induced muscle cells to accumulate in injured vessels, but a study by Ferns *et al.* implicates the growth factor PDGF in this process (page 1129). A rat model system was used for studying how smooth muscle cell accumulation was altered in the presence of antibodies to PDGF in carotid arteries damaged by balloon catheterization. The antibodies inhibited the pathologic accumulation of smooth muscle cells, presumably preventing their PDGF-induced migration from the arterial media to neointima.

Neuronal receptor regulation

Kainate receptors (which are a type of non-NMDA receptors) in the brain are turned on by glutamate and similar substances; they are thought to play a part in memory, to be involved in epilepsy and certain neurodegenerative diseases, and to mediate fast postsynaptic excitatory transmissions and long-term potentiation. How are these receptors regulated? What induces the opening and closing of their channels? Two studies reported this week implicate the enzyme cAMP-dependent protein kinase A and endogenous phosphatases in the control of kainate channels. The protein kinase phosphorylates the channels or some intermediary protein; the phosphatases perform the reverse function, dephosphorylation. Wang *et al.* show with pharmacologic agents that phosphorylation and dephosphorylation of receptors occur in normal mouse hippocampal neurons growing in culture (page 1132). Greengard *et al.* examined dynamic changes in channels—how often channels opened, how long they stayed open, how strong were the responses—in rat hippocampal neurons treated with kinase activators and inhibitors (page 1135). ■ RUTH LEVY GUYER



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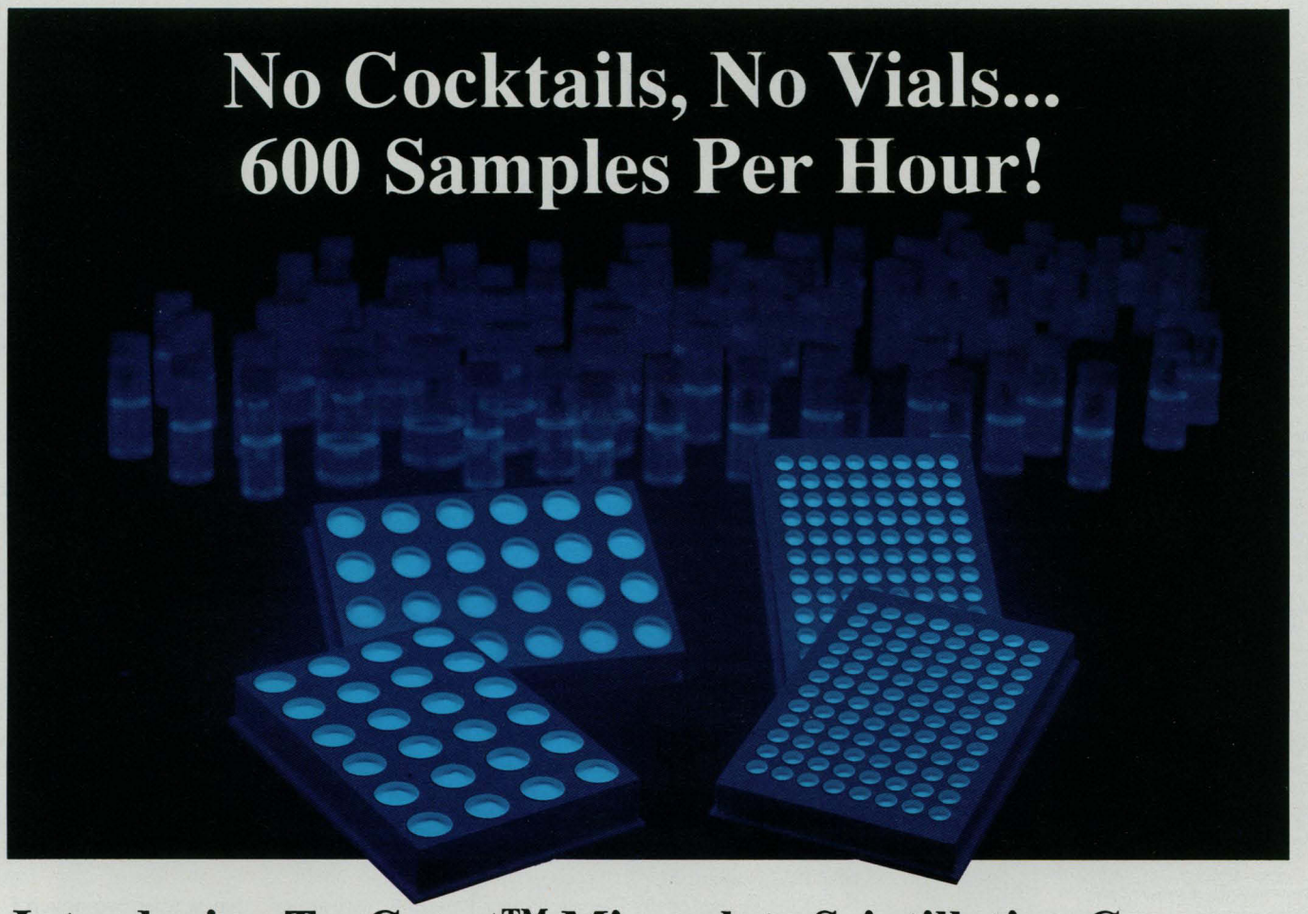

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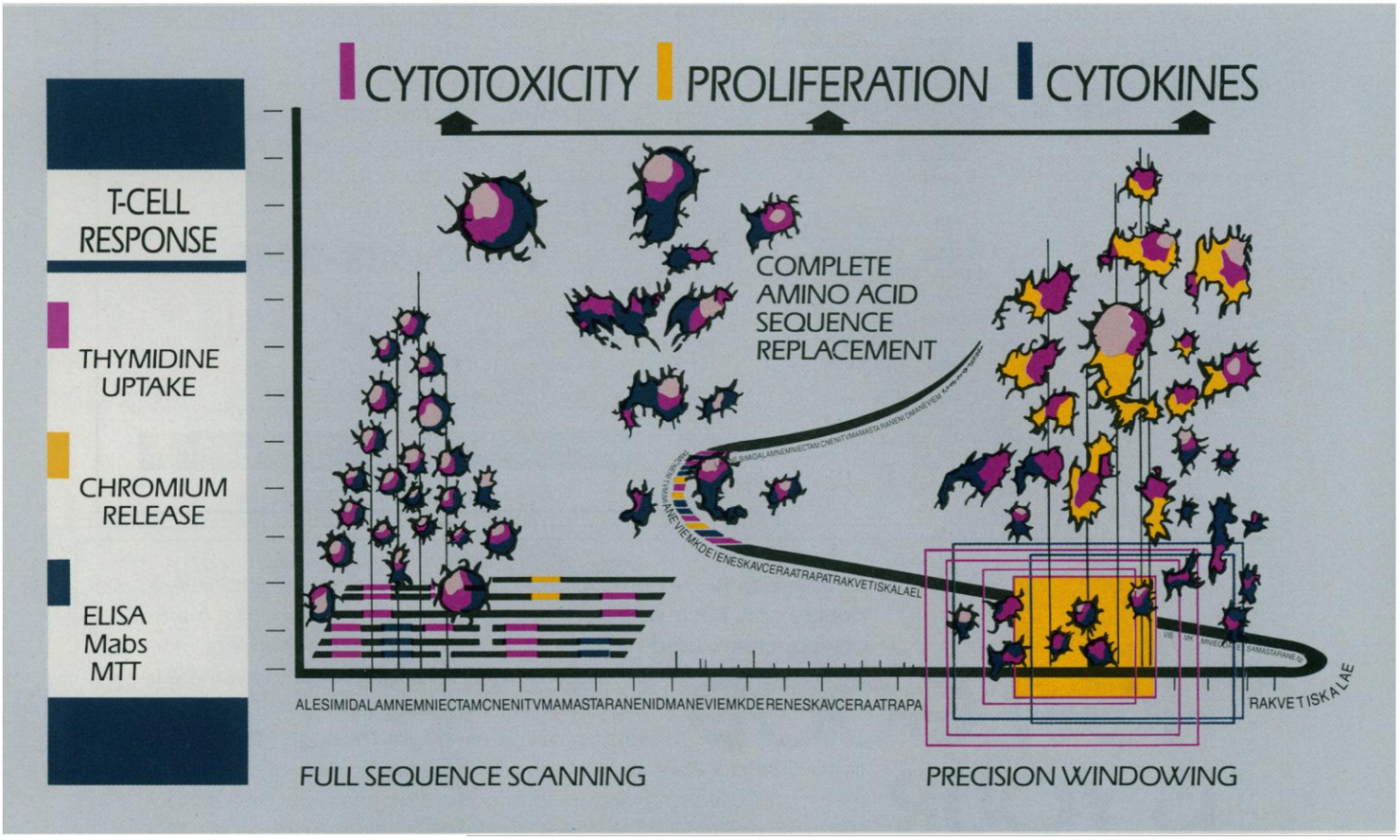

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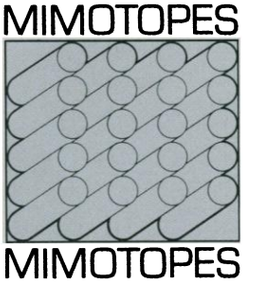

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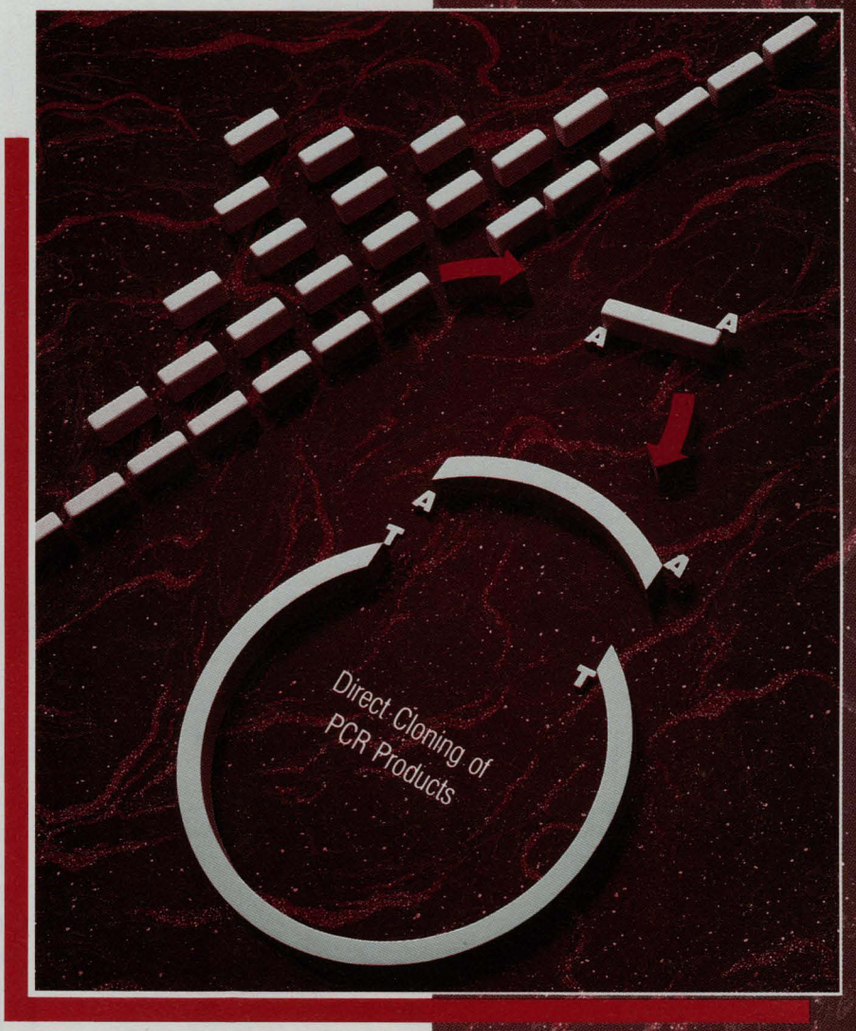

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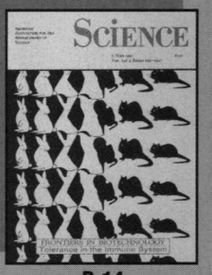

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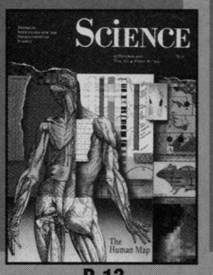

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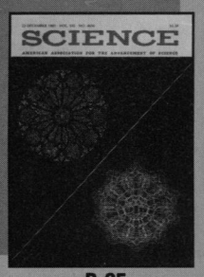

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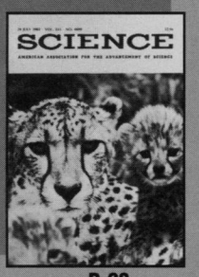

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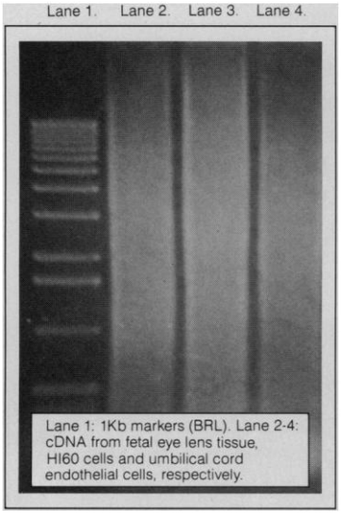

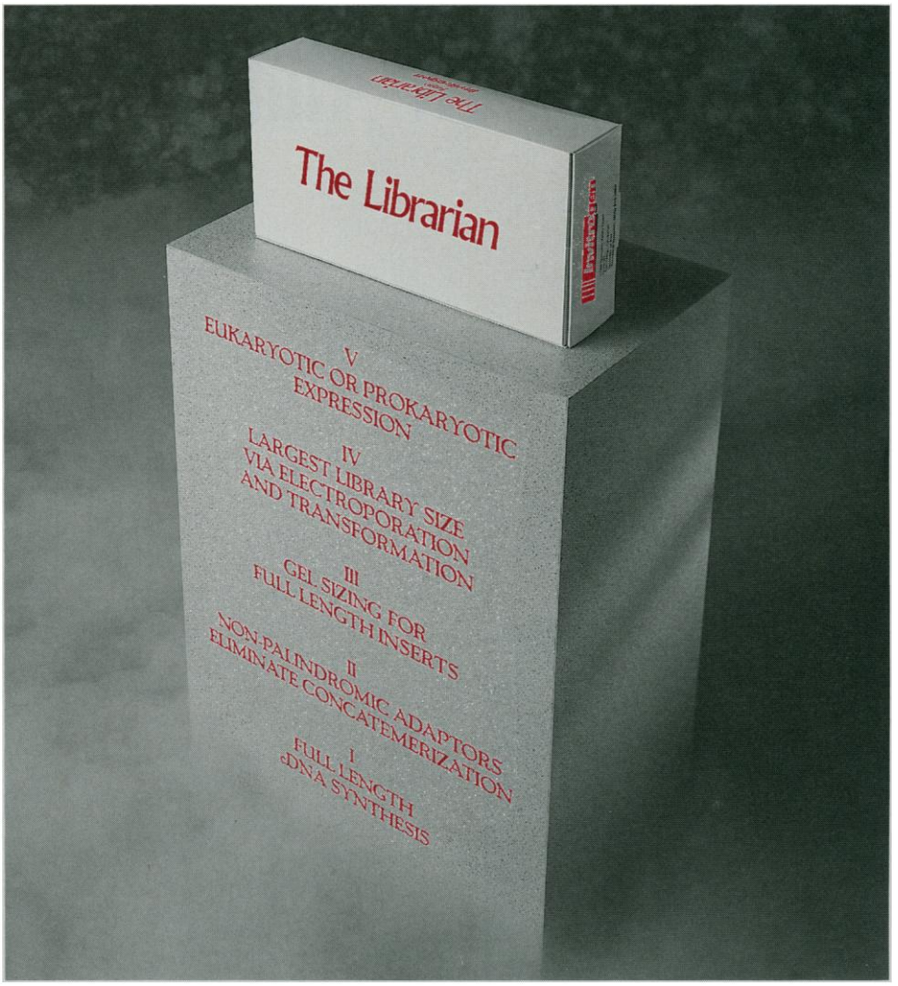

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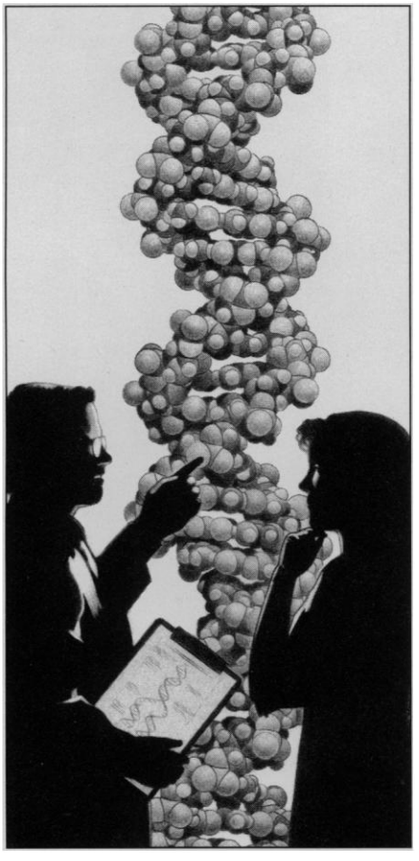
LEADING EXPERTS SHARE INSIGHTS WITH MOLECULAR BIOLOGISTS, MEDICAL RESEARCHERS, FORENSIC SCIENTISTS AND OTHER LIFE SCIENTISTS

The Genetic Analysis Revolution



SCIENTIFIC SEMINAR SERIES

New technologies in DNA analysis offer exciting possibilities for dozens of life science applications. Applied Biosystems is sponsoring this series so that scientists of worldwide reputation can offer you a preview of new applications and techniques in DNA analysis. The seminars will also provide opportunities for interaction with presenters.

The information presented at "The Genetic Analysis Revolution" may constitute a critical edge for your research in today's demanding scientific environment. Call today to register for this important event.

SPEAKERS

- **Kevin Sullivan,** Ph.D., Senior Scientific Officer, British Home Office; pioneering techniques in DNA fingerprinting (all locations)
- **Richard Gibbs,** Ph.D., Baylor College of Medicine; genetic mutation detection and HIV sequence variation (Philadelphia)
- **Scott Diehl,** Ph.D., Medical College of Virginia; pioneer in mapping genes associated with human disease (Rockville)
- **Richard M. Myers,** Ph.D., University of California, San Francisco; molecular basis for mental disease (San Francisco)
- **Steven M. Wolinski,** M.D., Northwestern University Medical School; HIV-1 pathogenesis research (Chicago)
- **Kenneth K. Kidd,** Ph.D., Yale University School of Medicine; DNA sequence variation, genetics of mental disease (Boston)
- **David Gelfand,** Ph.D., VP Scientific Affairs, Cetus Corporation; discoverer of *Taq* polymerase (New York)
- **Haig Kazazian, Jr.,** M.D., Johns Hopkins University; genetic disease characterization at the molecular level (RTP)

Speakers appearing at all locations:

- **J. Fenton Williams,** Ph.D., Customer Support Manager, Perkin-Elmer-Cetus
- **Alex Andrus,** Ph.D., Senior Scientist, ABI
- **Sandy Koepf,** Research Associate, ABI
- **Mel Kronick,** Ph.D., Senior Scientist, ABI
- **Lincoln J. McBride,** Ph.D., Staff Scientist, ABI
- **Gerald Zon,** Ph.D., Director of DNA Therapeutics, ABI

TOPICS TO INCLUDE:

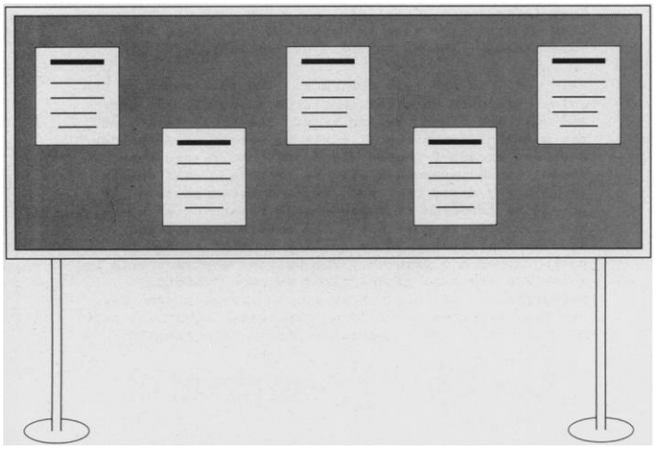
Strategies and Methods for Detecting Genetic Mutations
DNA Fingerprinting in Forensics, Agriculture and Medicine
HIV Sequence Variation
Quantitative Gene Expression Studies
Human Genome Mapping, Sequencing and Data Computation
Antisense Oligonucleotide Therapeutics
Oligonucleotides: Synthesis, Labeling, Purification and Analysis
Second Generation PCR Technology and Applications

Washington, D.C.: Monday, November 4
Philadelphia, PA: Tuesday, November 5
San Francisco, CA: Friday, November 8
Chicago, IL: Monday, November 11
Boston, MA: Tuesday, November 12
New York, NY: Wednesday, November 13
RTP, NC: Thursday, November 14

For more information and to register, please call Applied Biosystems' Seminar Registration Hotline toll-free at 1-800-874-9868 x 7600.

Applied Biosystems

CALL FOR POSTER PAPERS



AAAS☆92

American Association for the Advancement of Science Annual Meeting

Hyatt Regency Chicago
6–11 February 1992
Chicago

Share your research and gain visibility with your colleagues in the scientific community at the world's most prestigious general science meeting.

The poster sessions at AAAS☆92 provide an informal, visually oriented way for you to present contributed papers to a multidisciplinary assembly of your peers. Appropriate topics for posters include any of the 19 symposium tracks or two seminars in the AAAS☆92 program. (See list at right; a more detailed program will appear in the 4 October issue of *Science*.)

If your abstract is accepted, you will be assigned to a poster session and provided with a 4' × 8' bulletin board on which to display graphics and large, easy-to-read text for two hours, during which you can discuss your work one-to-one with interested colleagues. Accepted abstracts will also be published and distributed to all AAAS☆92 registrants.

On the following pages you will find complete instructions on how to submit an abstract for a poster presentation. You'll also find a meeting registration form and a hotel reservation form. (*Note:* Poster presenters are required to register for AAAS☆92.)

Student Research Awards

To encourage the development of young scientists and to recognize their achievements in all fields of scientific research, AAAS will feature exceptional research by college, university, and high school students in a special poster session at AAAS☆92. A panel of distinguished scientists will evaluate the student posters and award cash prizes for the top three presentations in *each* of three broad categories: physical sciences, life sciences, and social sciences. (Awards for each category are: 1st prize—$500; 2nd prize—$250; 3rd prize—$100.) Students who wish to be considered for this distinction should include the words "Student Award Entry" above their abstracts (see instructions on the following page).

Appropriate Topics for Posters

AAAS☆92 Symposium Tracks

Climate & Global Change
Crisis in Health Care
Energy for the 21st Century
Environmental Modeling & Policy
Ethics & Research Policies
Fantastic Voyages: From Columbus to the Cosmos
Feeding the World
Industry and the Changing Work Force
Math, Communication, & Information Processing
Medicines & Technologies of the Future
Molecular Genetics & Evolution
Native American Origins
Patterns of Life in Urban & Rural America
Physics: From Fermi to the Future
Preserving World Peace
Psychology & Child Development
Science & Math Education: Striving for Excellence
Science for Everyone
Waging War Against Pollution

AAAS☆92 Seminars

Cognitive Neuroscience
Molecular Modeling & Computational Chemistry

Deadline for Abstracts: 1 November 1991

Turn the page for instructions on how to submit abstracts.

Instructions for Submitting Abstracts

Endorsement: An abstract for a poster presentation will be considered only if it is submitted or endorsed by a AAAS member or fellow; however, that member or fellow need not be the person who actually presents the paper. AAAS members are encouraged to solicit abstracts from their students and to endorse those that they consider to be worthy of presentation.

Registration: The person presenting the paper must be registered for AAAS☆92. Presenters of papers relating to either of the two seminars must also be registered for the corresponding seminar. (Use the registration form on the following page.)

Format of Abstracts: Type the text of the abstract to fit within a 5" square in the center of an 8.5" x 11" sheet of white paper. 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 on the right. Do not double-space the body of the text. Do not draw a box around the abstract, nor cut out the abstract. **Above the 5" square,** type the name of the symposia track or seminar to which the abstract most closely relates (see list on previous page). If the poster will be presented by an undergraduate, graduate, or high school student, and you wish it to be considered for the student awards, type the words "Student Award Entry" under the track or seminar name. **Below and to the left of the square,** type the name, address, and phone number of the poster presenter to be contacted regarding status and scheduling. **Below and to the right of the square,** type the name, affiliation, and complete membership number (from *Science* mailing label) of the member or fellow endorsing the abstract and provide his/her signature.

Mailing Instructions: Send original plus one photocopy of the abstract to: AAAS '92 Contributed Papers, AAAS Meetings Office, 1333 H Street, NW, Washington, DC 20005.

Deadline for Abstracts: 1 November 1991

Name of symposium track or seminar to which abstract relates

Type "Student Award Entry" if eligible for student awards.

5"

5"

Indent Five Spaces and Type Title in Upper and Lower Case Letters and Underline. AUTHOR'S NAME IN UPPER CASE (Institution Name in Upper and Lower Case Within Parentheses), SECOND AUTHOR (Institution), etc.

Skip one line and type abstract. The full width of the column of typed material should be 5 inches (12.7 cm) and must not extend beyond that. The total length of the material, from top of title to bottom of footnotes, must not exceed 5 inches (12.7 cm). Abstracts that exceed these parameters will be returned. All special symbols and signs that must be hand lettered (e.g., π) should be rendered in reproducible black ink as clearly and carefully as possible. The entire submission should be of camera-ready quality so that it can be photographed and printed. The printed abstract will be about 2/3 the size of the typed version. Avoid paragraphing, as this wastes space. However, you may use your allotted space to neatly letter equations and diagrams as you deem necessary, as in this example:

$$R_{\mu\nu} = \frac{\partial \Gamma^{\lambda}_{\mu\lambda}}{\partial x^{\nu}} - \frac{\partial \Gamma^{\lambda}_{\mu\nu}}{\partial x^{\lambda}} + \Gamma^{\sigma}_{\mu\lambda}\Gamma^{\lambda}_{\nu\sigma} - \Gamma^{\sigma}_{\mu\nu}\Gamma^{\lambda}_{\lambda\sigma}$$

You may also use your allotted space for footnotes.*

*Skip one line and type footnotes, if any.

Name of Presenter
Presenter's Street Address
Presenter's City/State/Zip
Presenter's Country
Presenter's Phone Number

Name of Endorser (Member or Fellow)
Endorser's Institution/Affiliation
Endorser's AAAS Membership Number
Endorser's Signature

AAAS☆92 Hotel Reservation Form ✦ *AAAS Annual Meeting, 6–11 February 1992, Chicago*

Send confirmation to:

Name _____ (last name) (first name)

Institution/company _____ (if part of address)

Address _____

City/state/zip/country _____

Phone _____ Fax _____

Other occupant(s) of room _____ (name)

_____ (name) / _____ (name)

Special housing needs due to a disability: ❑ Wheelchair accessible room

❑ Nonsmoking room Other _____

Late Arrivals (after 6 p.m.) must be guaranteed with a deposit for the first night plus 12.4% occupancy tax, either by a major credit card or check (payable to the appropriate hotel).

❑ Check enclosed ❑ Credit card _____ (credit card company)

Credit card # _____

Exp. date _____ Signature _____

✦ ***Reservations must be received at the appropriate hotel by 6 January 1992.*** (Housing requests received after this date are conditional on room availability.)
✦ The hotels will not refund deposits for cancellations received after 31 January 1992.
✦ Reservation changes and cancellations must be made directly with the hotel.
✦ Children stay free in same room with parents if no extra bed is required. (Age limit: Hyatt, up to 18 years; Fairmont, up to 12 years) ✦ Check-in time is 3:00 p.m.; check-out time is 12:00 noon.

Room Rates:

Check appropriate box for your choice of hotel and room. Add 12.4% occupancy tax to rates shown.

Hyatt Regency Chicago, Attn: Reservations, 151 East Wacker Drive, Chicago, IL 60601

- ❑ Single (1 person, 1 bed)..... $110
- ❑ Double (2 persons, 1 bed)..... $130
- ❑ Twin (2 persons, 2 beds)..... $130
- ❑ Triple (3 persons, 2 beds)..... $140
- ❑ Quadruple (4 persons, 2 beds)..... $150
- ❑ Suite..... $365 & up

Fairmont Hotel, Attn: Reservations, 200 North Columbus Drive, Chicago, IL 60601

- ❑ Single (1 person, 1 bed)..... $110
- ❑ Double (2 persons, 1 bed)..... $130
- ❑ Twin (2 persons, 2 beds)..... $130
- ❑ Suite..... $250 & up

Arrival & Departure:

List definite arrival/departure dates & times. Reservations are held until 6 p.m. *Arrivals after 6 p.m. must be guaranteed with a deposit for one night plus tax.*

Arrive _____ (date) ❑ Before 6 pm ❑ After 6 pm

Depart _____ (date) ❑ Before noon ❑ After noon

Mailing Instructions:

Mail this form to the hotel of your choice (addresses above), together with any necessary deposit.

AAAS☆92: The AAAS Annual Meeting

Hyatt Regency Chicago, 6–11 February 1992, Chicago

Advance Registration Form

Deadline: 10 January

REGISTRANT INFORMATION (Please type or print)

First name (as you would like it to appear on your badge)

Last name (as you would like it to appear on your badge)

Institution/company (will appear on badge, subject to abbreviation)

Mailing address

City

State

Zip code

Country

Daytime phone number

❑ Check here if you need special services due to a disability. (We'll call you before the meeting.)

Primary area of interest (check *one* box only):

- ❑ Agriculture
- ❑ Anthropology
- ❑ Astronomy
- ❑ Atmospheric & Hydrospheric Sciences
- ❑ Biological Sciences
- ❑ Chemistry
- ❑ Dentistry
- ❑ Education
- ❑ Engineering
- ❑ General Interest
- ❑ Geology & Geography
- ❑ History & Philosophy of Science
- ❑ Industrial Science
- ❑ Information, Computing, & Communication
- ❑ Mathematics
- ❑ Medical Sciences
- ❑ Pharmaceutical Sciences
- ❑ Physics
- ❑ Political, Economic, & Social Sciences
- ❑ Psychology
- ❑ Societal Impacts of Science
- ❑ Statistics

AAAS membership number (if member) _____
(appears above your name on *Science* subscription label)

If registering at student rate, check here ❑ and attach a copy of your student ID card.

If registering at postdoctoral or K-12 teacher rate, indicate the name and number of your chairperson or principal:

Chairperson/principal's name

Chairperson/principal's phone number

IMPORTANT FOOTNOTES

[1] **10 January deadline:** Registrations received after this date will not be processed, but you may register on site beginning 6 February. On-site rates are $25 higher than advance rates for Regular members/nonmembers and $10 higher for all others. **One-day registration** (for all sessions *except* seminars) will be available to Regular members ($70) and Regular nonmembers ($100) on site only.

[2] **Special rates:** To qualify for the student rate, you must attach a copy of your student ID card. To qualify for the postdoctoral or K-12 teacher rate, you must provide the name and phone number of your department chairperson or principal in the space above. *Registrations received without appropriate verification will be charged at the Regular rates.*

[3] **Membership dues** indicated herein are at 1991 rates, which are guaranteed through 11 February 1992 for registrants of AAAS☆92; $47 of dues are allocated to *Science.* Please allow 6-8 weeks for receipt of first issue of *Science.*

[4] **Cancellations** must be received in writing by 10 January 1992. *No refunds will be made for cancellations received after this date.* Refunds are subject to a $20 cancellation charge and will be processed after the meeting.

[5] **Checks** must be in United States currency and must be payable on a U.S. bank.

B C D E F G

MEETING REGISTRATION FEES[1] (Check one fee only)

	AAAS☆92 (without seminar)	Seminar (includes AAAS☆92)
Regular member	❑ $125	❑ $265
Regular nonmember	❑ $175	❑ $315
Student[2] member	❑ $ 20	❑ $125
Student[2] nonmember	❑ $ 45	❑ $150
Postdoctoral[2] member	❑ $ 50	❑ $155
Postdoctoral[2] nonmember	❑ $ 75	❑ $180
K-12 teacher[2]	❑ $ 50	❑ $155
Retired	❑ $ 50	❑ $155

Seminar registrants, please select *one* seminar:

❑ Cognitive Neuroscience ❑ Molecular Modeling

MEMBERSHIP DUES (Optional)

If you're not a AAAS member, you can join right now and take advantage of the member registration fees above. You'll also get a year's subscription (51 issues) to the journal *Science.*[3] Just check the appropriate dues below:

❑ Regular—$82 ❑ Student[2]—$47 ❑ Postdoctoral[2]—$57 ❑ Retired—$47 ❑ K-12 teacher[2]—$57

PAYMENT

Meeting registration fee[4] ..... $_____

Membership dues[3] (if joining now) ..... $_____

Total amount ..... $_____

❑ Check enclosed[5] ❑ VISA ❑ MasterCard
(no other cards accepted)

Credit card number

Exp. date _____ Signature _____

MAILING INSTRUCTIONS (10 January deadline[1])

Mail to: AAAS '92, P.O. Box 630285, Baltimore, MD 21263.
Or fax (credit card payments only) to 202-289-4021.