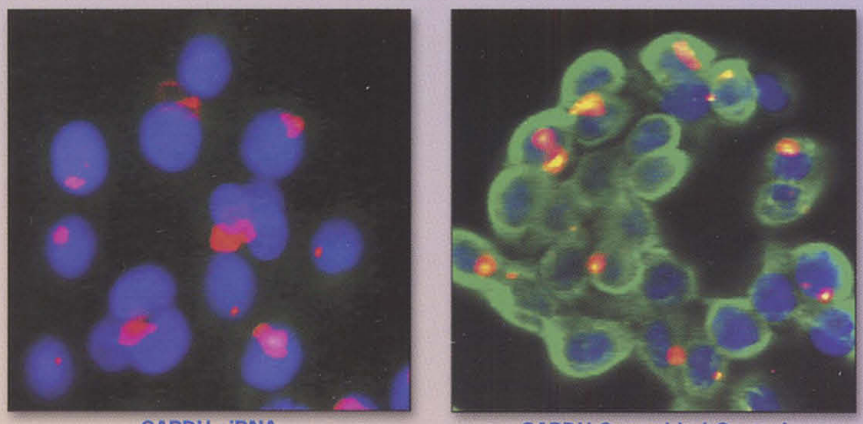
# Silence Your Genes

## Accelerate Your Research

### A Complete Selection of Optimized Tools for RNAi

The RNA interference (RNAi) field has exploded in the past two years and Ambion has been a leader in this rapidly emerging field. Our research has paid off in a variety of tools, protocols, and information to make your RNAi research more productive. The *Silencer*™ product line includes a variety of kits for making, labeling and transfecting siRNA, as well as siRNA controls. Ambion scientists continue to develop the reagents and protocols you need to perform cutting edge research. Visit our web site to learn about the latest tools for RNAi research.



GAPDH siRNA | GAPDH Scrambled Control

**siRNA Silencing of GAPDH Gene Expression.** siRNA to human GAPDH (Cat #4602) and a scrambled control were fluorescently labeled with Cy™3 using the *Silencer*™ siRNA Labeling Kit (Cat #1632), transfected into HeLa S3 cells, and analyzed by fluorescence microscopy. **LEFT:** siRNA silencing of GAPDH expression. **RIGHT:** Control siRNA had no effect on GAPDH protein levels. RED: Cy3 labeled siRNA; GREEN: Anti-GAPDH antibody detected with fluorescein labeled secondary antibody; BLUE: DAPI stained nuclei.

### The RNAi Resource

www.ambion.com/RNAi

**LABEL**
*Silencer*™ siRNA Labeling Kit

**DESIGN**
Web-based Tools

**MAKE**
*Silencer*™ siRNA Construction Kit
Custom siRNA Synthesis
p*Silencer*™ siRNA Expression Vectors

**TRANSFECT**
*Silencer*™ Transfection Kit
siPORT™ siRNA Transfection Agents
*Silencer*™ siRNA Controls

**ANALYZE**
RT-PCR Tools
Northern Analysis Kits
Tools for Array Analysis
RPA Kits

For links to siRNA design tools, RNAi research summaries, and detailed product information, visit the RNAi Resource at:

**www.ambion.com/RNAi**

Ambion®
THE RNA COMPANY®

**US: 800-888-8804 • EUROPE: + 44 (0)1480 373 020**

For a complete list of distributors visit **www.ambion.com**

# Total RNA.
# Total Quality.


## Stratagene's Total and Poly (A)+ RNA

is subjected to stringent quality assurance. Stratagene was the first to institute strict quality control standards on all the RNA we sell. Our comprehensive collection of human, mouse and rat Total and Poly (A)+ RNA must pass tests to assure that it is free of contaminating RNases, and functional testing by Northern analysis and by RT-PCR. In addition to our tissue RNA, Stratagene introduced Universal Human and Mouse Reference Total RNA, which enables you to cross reference microarray analysis data across different microarrays and between different labs.

See www.stratagene.com for our growing list.

## Convenience and Quality

- *High-quality, pure RNA from specific tissues*
- *Eliminates tedious, time-consuming lab procedures*
- *Highest level of quality control*
- *Well-documented donor and tissue pathology information*
- *Matched sets of normal and diseased tissue from the same donor*
- *Custom manufacturing available*

**Stratagene raised the bar for RNA quality.**

RNA

TOTAL AND POLY(A)+ RNA

***STRATAGENE USA and CANADA***
ORDER: (800) 424-5444 x3
TECHNICAL SERVICES: 800-894-1304

***STRATAGENE EUROPE***
**Belgium, France, Germany, The Netherlands, Switzerland, United Kingdom**
*European Toll-Free Numbers*
**ORDER:** 00800 7000 7000
**TECHNICAL SERVICES:** 00800 7400 7400
**Austria**
0800 312 526

**www.stratagene.com**

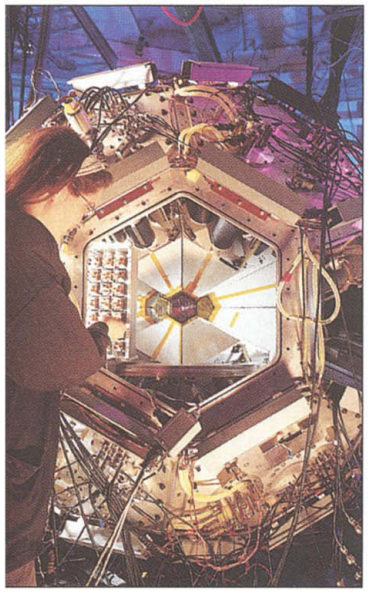
Visit www.stratagene.com for a complete list

STRATAGENE®

# Science

Volume 298 22 November 2002 Number 5598





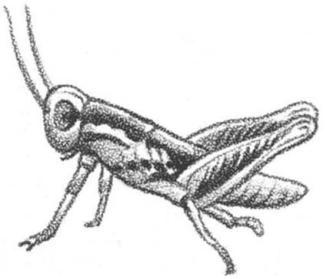
## NEWS

### NEWS OF THE WEEK



### NEWS FOCUS





## SCIENCE'S COMPASS



### POLICY FORUM



### BOOKS *ET AL.*



### PERSPECTIVES



### ESSAY

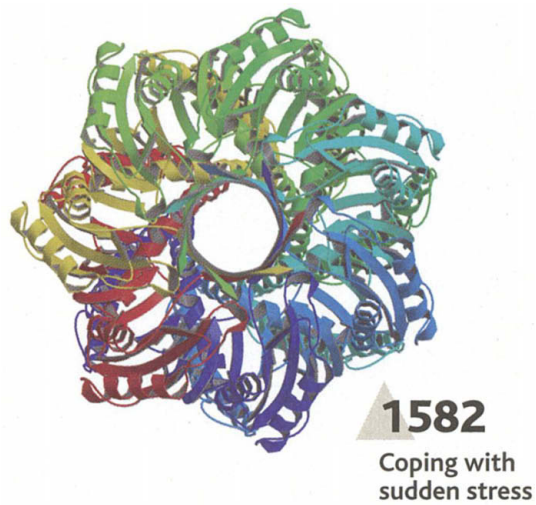


### REVIEW



## BREVIA





1582
Coping with sudden stress

## RESEARCH ARTICLES

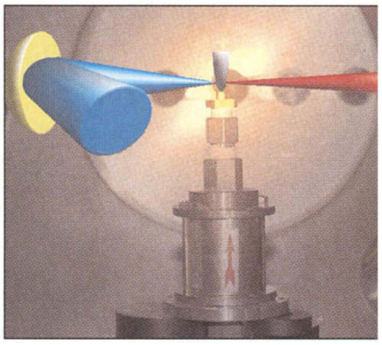


## REPORTS



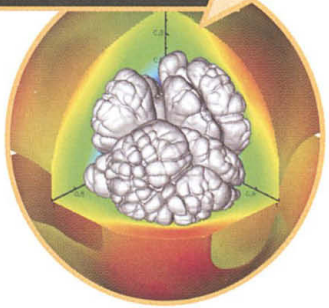
COVER 1610

A Chinese native dog, showing one of many morphological types. Although extreme variation in morphology is seen among dog breeds worldwide, they may all have originated about 15,000 years ago from the single East Asia gene pool. [Photo: Y. Zhang, D. Pan, and L.-Y. Luo]



1596
Accelerating electrons with laser pulses

**New on *Science* Express** Turbulent flame triggers supernova



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals Mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices.  Domestic individual membership and subscription (51 issues): $120 ($66 allocated to subscription). Domestic institutional subscription (51 issues): $390; Foreign postage extra: Mexico, Caribbean (surface mail) $55; other countries (air assist delivery) $85. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. Publications Mail Agreement Number 1069624. **Printed in the U.S.A.**

**Change of address:** allow 4 weeks, giving old and new addresses and 8-digit account number. **Postmaster:** Send change of address to *Science*, P.O. Box 1811, Danbury, CT 06813–1811. **Single copy sales:** $10.00 per issue prepaid includes surface postage; bulk rates on request. **Authorization to photocopy** material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that $15.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for *Science* is 0036-8075/83 $15.00. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

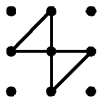
At every stage in the discovery and development of new medicines, the pressure is on to get results.

You need to be able to make your processes faster, more targeted, more economical, more effective. You need integration of individual processes. You need scalability from lab to production. And you need continual innovation, so you always stay one step ahead.

Amersham Biosciences helps you do all that. We understand your needs. We understand the pressures you are under. We understand your processes.

We focus on improving individual steps. We make the overall process more efficient. We continually improve our technology and deliver new innovation. **We help you to do more.**

discover more
determine more
deliver more




www.amershambiosciences.com

Amersham Biosciences UK Limited, Amersham Place,
Little Chalfont, Buckinghamshire, HP7 9NA
AD 21-02

# Scienceonline

## www.scienceonline.org

**Daily coverage of research and policy by *Science*'s news team: Read about it first on www.sciencenow.org**

**CONTENT HIGHLIGHTS AS OF 22 NOVEMBER 2002**

## science magazine www.sciencemag.org

### *SCIENCE* EXPRESS www.sciencexpress.org

**Mutations in the *DJ-1* Gene Associated with Autosomal Recessive Early-Onset Parkinsonism** V. Bonifati *et al.*

Mutations in the *DJ-1* (PARK7) gene have been identified in two families with a rare early-onset form of Parkinson's disease.

▼ **NPAS2: A Gas-Responsive Transcription Factor** E. M. Dioum *et al.*
1567 Activity of the heme-containing mammalian transcription factor NPAS2 is regulated by carbon monoxide levels in vitro.

**Thermonuclear Supernovae: Simulations of the Deflagration Stage and Their Implications** V. N. Gamezo, A. M. Khokhlov, E. S. Oran, A. Y. Chtchelkanova, R. O. Rosenberg

Modeling of a Type Ia supernova explosion shows that a central turbulent flame ignites the stellar boom.

### TECHNICAL COMMENTS

**Are 100,000 "SNPs" Useless?**

Bailey *et al.* (Reports, 9 August 2002, p. 1003), in a study of segmental duplications within the human genome, noted that unrecognized duplications can lead to paralogous sequence variants being falsely identified as single nucleotide polymorphisms (SNPs)—and estimated, based on their analysis, that "about 100,000 paralogous sequence variants currently contaminate dbSNP," the public SNP database. Hurles comments that nonallelic gene conversion among duplicated segments has been shown to be "capable of generating allelic diversity," and that such variations, far from being mere artifacts of genome assembly, could be etiologically significant even though they might escape detection by "haplotype-based whole genome association studies of complex disease." Bailey and Eichler, in a response, agree that gene conversion is a likely source for "some of the 'SNP' abundance" in the public database, but argue that artifacts in the public assemblies provide "the most prosaic explanation" for the observed enrichment of SNPs in the database.

The full text of these comments can be seen at www.sciencemag.org/cgi/content/full/298/5598/1509a

## science's next wave www.nextwave.org

career resources for scientists

**CANADA: Cutting-Edge Vaccine Research** H. Wilson

The Veterinary Infectious Disease Organization is a unique training site for graduate students.

**US: Vintners Go High-Tech** A. Sreenivasan

Wine growers in California use new technologies to improve their crops.

**UK: Predictive Risk Modeling** B. Purse

Geographical Information Systems are useful for disease control measures.

**NETHERLANDS: Going Dutch—But Who Will Pay the Research Bill?** H. Meijers

Parliament faced tough financial decisions last week.

**GERMANY: High-Tech Farming** S. Kratz

Geography provides helpful tools for comparing conventional and organic farming methods.

**SINGAPORE: Ethics Before Science** J. Wong

New ethical and legal guidelines govern the use of human tissue for research.

### KNOWLEDGE ENVIRONMENTS

## science's sage ke www.sageke.org

science of aging knowledge environment

**NEWS SYNTHESIS: Perennially Young?** K. Morgan

Some plants endure for centuries, but the organisms might not completely escape time's punishment.

**NEWS FOCUS: Having It All After All** R. J. Davenport

p53 surplus staves off cancer but doesn't speed aging.

**NOTEWORTHY THIS WEEK: Lean, Yes—But Mean?** R. J. Davenport

Growth hormone thins and strengthens the elderly, but at a cost.

**NOTEWORTHY THIS WEEK: BAD Time for Suicide** M. Beckman

Growth factors save cells by foiling mitochondrial disrupter.

## science's stke www.stke.org

signal transduction knowledge environment

**REVIEW: Regulation of Growth Factor Receptors by Gangliosides** E. A. Miljan and E. G. Bremer

Membrane composition influences receptor activity.

**ST on the Web**

New sites added to Educator Sites and Labs and People.




**ONLINE STAFF**

*SCIENCE*NOW MANAGING EDITOR Erik Stokstad; EDITOR Greg Miller

*SCIENCE*'S NEXT WAVE EDITORIAL: EDITORIAL DIRECTOR Ellis Rubinstein; EDITOR Crispin Taylor; PORTAL EDITORS Elizabeth Pain (UK), Eick von Ruschkowski (Germany), Kirstie Urquhart (Europe), Ric Weibl (US); CONTRIBUTING EDITORS Lesley McKarney (Canada), Robert Metzke (Netherlands), Jennie Wong (Singapore); PROJECT EDITORS Jim Austin, Sibrina Collins, Katie Cottingham, Laure Haak; MARKETING: MARKETING MANAGERS Karen Horting (Global), Hazel Crocker (Europe); PROGRAM DIRECTOR Lisa Kozlowski; MARKETING ASSOCIATE Angela Walker; PROGRAM ASSOCIATES Shajuan Martin, Tammy Minor, Kara Shuster

AIDSCIENCE SENIOR EDITOR Roberto Fernandez-Larsson

*SCIENCE*'S STKE EDITOR Bryan Ray; MANAGING EDITOR Nancy Gough; ASSOCIATE EDITORS Elizabeth M. Adler, Lisa Chong; PUBLICATIONS ASSISTANT Christopher Kenny

*SCIENCE*'S SAGE KE EDITORIAL DIRECTOR Ellis Rubinstein; EDITOR-IN-CHIEF George M. Martin; EDITOR Kelly LaMarco; SENIOR NEWS EDITOR Evelyn Strauss; ASSOCIATE EDITOR R. John Davenport

ELECTRONIC MEDIA MANAGER Don Hemenway; INTERNET PRODUCTION MANAGER Betsy Harman; ASSISTANT PRODUCTION MANAGER Wendy Stengel; SENIOR PRODUCTION ASSOCIATES Sheila Myers, Lisa Stanford; ASSOCIATES Carla Cathey, Eugene Moxley, Louis Williams; LEAD APPLICATIONS DEVELOPER Carl Saffell

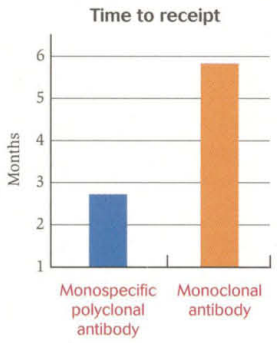
# Custom Antibodies and Peptides

## Online ordering and online tracking. Now, even more control at your fingertips

You can rely on Invitrogen's Custom Monospecific Polyclonal Antibody Production and Peptide Synthesis Services to get you the quality peptides and antibodies your research demands. Now you have even more control, with secure online ordering and on-demand tracking.

### The information you need

Getting the right antibodies and peptides is only one part of your experiment. Calling to check where your supplier is in the production process shouldn't be another. That's why we've developed secure online ordering and antibody production tracking. Simply log on anytime. Find out exactly where your order is and the status of your projects. Quickly. No hassles, no worries, no guessing. So you can get on with the rest of your day.




### Get better antibodies and peptides, faster

Invitrogen's custom monospecific polyclonal antibodies provide the high specificity of monoclonals. Production takes only 12 to 14 weeks, far less time than monoclonals. You get lower production costs and big savings. Custom peptides–up to 60 residues–are yours in just 7 days. Plus, they're analyzed via HPLC and mass spec to verify purity and sequence integrity. Additional services include modifications, labeling, and purification up to 98%. All at costs far below other suppliers.

### Security at your fingertips

Why give up control of an important piece of your work? With Invitrogen's online ordering and tracking, you're secure in the knowledge that the best antibodies and peptides are at your fingertips. To learn more, visit **www.invitrogen.com/customs**.

Invitrogen™
life technologies

**Corporate Headquarters:**
Invitrogen Corporation
1600 Faraday Avenue
Carlsbad, California 92008 USA
Tel: 1 760 603 7200
Tel (Toll Free): 1 800 955 6288
Fax: 1 760 602 6500
E-mail: tech_service@invitrogen.com

**European Headquarters:**
Invitrogen Ltd
Inchinnan Business Park
3 Fountain Drive
Paisley PA4 9RF, UK
Tel: +44 (0) 141 814 6100
Fax: +44 (0) 141 814 6260
E-mail: eurotech@invitrogen.com

For an office near you go to:
**www.invitrogen.com**

# THIS WEEK IN Science

edited by Phil Szuromi

## Describing the Densest Matter

Nucleon-nucleon interactions make it difficult to compress ordinary matter here on Earth beyond an approximate saturation density of about $2.7 \times 10^{14}$ grams per cubic centimeter. However, this limit is exceeded by objects in space such as neutron stars (densities about nine times the saturation density) and supernovae (densities about four times the saturation density). Danielewicz *et al.* (p. 1592) have developed a new theoretical equation-of-state model, which relates densities to pressure and temperature conditions, for supersaturated matter based on recent high-density nuclear collision experiments. They limit the range of possible pressure and temperature conditions that may exist in neutron stars and supernovae, which not only constrains the concentrations of neutrons versus protons in these objects but also their dynamical behavior.

## 1596 Laser Accelerators

The probing of grand unification theories and fundamental interactions within atoms will require the ability to go beyond the energies of particle accelerators available today. However, with the maximum attainable energies of conventional accelerators being limited by the breakdown fields of the materials used in construction, other routes are being developed, especially the use of laser-plasma interactions. Malka *et al.* (p. 1596), using intense femtosecond laser pulses interacting with a jet of helium gas, show that a new acceleration mechanism opens up the forced laser wake field regime, where emitted electrons can attain energies greater than 200 million electron volts.

### And in Brevia ...

A study of a perennial grass found around hot springs by Redman *et al.* (p. 1581) revealed that it harbors a fungus that confers heat resistance, and that neither organism can live in the hot soils without the other.

## Bacteria and Groundwater Arsenic

In an attempt to prevent cholera and other water-borne diseases, Bangladesh encouraged the use of groundwater, which had the unintended effect after several years of exposing a large part of the population to arsenic present as a contaminant. The uncertain origin of the arsenic has hampered remediation efforts. In a study in southern Bangladesh, Harvey *et al.* (p. 1602; see the news story by Stokstad) rule out several suggested mechanisms and show that young organic carbon is being carried into aquifers by the extraction of groundwater for agriculture. Dissolved carbon is likely feeding bacteria, which liberate arsenic bound in solids in the aquifer back into the groundwater.

## Digging into Dog Domestication

The origins of how humans and dogs developed their association, and when and where this occurred, is the subject of three reports (see the news story by Pennisi). Dogs and wolves (and some primates) are social animals that must comprehend and respond to their own species. Hare *et al.* (p. 1634) compared the performance of wolves and dogs in interpreting human signals (such as looking, pointing, and tapping) that relate to food location. Unlike wolves, dogs exhibit this skill that helped them interpret human communication. Some studies argue that the domestication of dogs from wolves occurred as a single event, and others favor multiple events and distinct Old and New World origins. The fossil record offers evidence that domestication occurred about 13,000 years ago in the Near East, whereas molecular clock data imply an earlier date. Leonard *et al.* (p. 1613) analyzed mitochondrial DNA (mtDNA) from ancient aboriginal North and South American dog remains and argue for an single Asian origin for dogs. Dogs migrated to the Americas with their human companions via the Bering Strait about 12,000 to 14 000 years ago, but these indigenous breeds appear to have been replaced by larger European breeds during the colonial period. Savolainen *et al.* (p. 1610; see the cover) collected mtDNA sequences from 38 Eurasian wolves and 654 domestic dogs sampled across Asia, Europe, Africa, and the Arctic America to assess the number and location of dog domestications. The higher genetic diversity in dogs from East Asia compared to Southwest Asia and Europe suggests that dogs originated in East Asia. This phylogenetic analysis, when interpreted in light of archaeological data, suggests that domestic dogs originated around 15,000 years ago, with several origins from wolves.

## Primitive Primates

The origins and evolution of the euprimates—those primates that share many modern primate characteristics such as larger brains, grasping hands, convergence of the eyes for improved binocular vision, and fingernails—has been obscure in part because of limited earlier fossil material. Euprimates appear about 55 million years ago and evolved eventually to include the anthropoids and hominoids. Bloch and Boyer (p. 1606; see the Perspective by Sargis) now describe an earlier fossil plesiadapiform based on a nearly complete skull and large part of its skeleton. The fossil exhibits traits that in some ways are more primitive than the euprimates, but also has several derived features, including clear nails and the ability to grasp. These results that suggest that these groups shared a common origin and that grasping evolved before orbital convergence.

## Pulled Sideways

Bacteria lack rigid cell walls and must respond rapidly to salt-induced gradients in osmotic pressure. In *Escherichia coli*, the mechanosensitive channel proteins MscL and MscS open in re-

Published online in *Science* Express

CONTINUED ON PAGE 1513

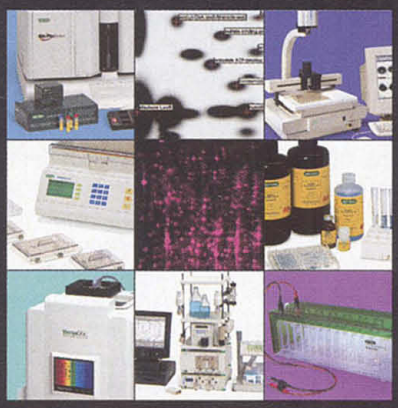
CREDITS: (TOP TO BOTTOM) REDMAN *ET AL.*; SARGIS

Life Sciences

# Tools for a New Generation of Protein Hunters

**Whether you're scouting targets or on the trail of a major breakthrough, Bio-Rad is the best place to launch your proteomics pursuit.**

For more than 40 years, Bio-Rad has led the way in protein separation, purification, and analysis. During that time, we have leveraged our expertise to provide the most inclusive line of protein discovery technologies in the field.



Today, Bio-Rad's ProteomeWorks™ system integrates everything from sample preparation and 2-D electrophoresis to mass spectrometry and bioinformatics, providing a comprehensive proteomics research solution. Bio-Rad also leads the way in protein profiling with the Bio-Plex™ system, which can simultaneously quantitate up to 100 proteins and peptides in a single sample.

Plus, our highly trained technical support staff, available via phone or the Web, are always ready to help. So when you need expert sales and service advice, you'll never have to hunt far.

Visit us on the Web at **discover.bio-rad.com**
Call toll free at 1-800-4BIORAD (1-800-424-6723);
outside the US, contact your local sales office.

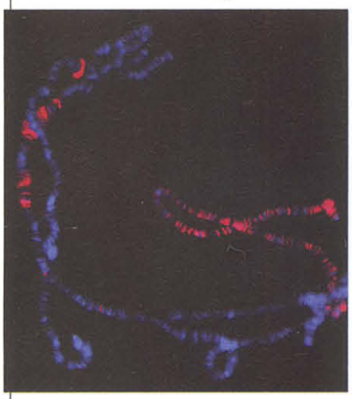
BIO-RAD

sponse to pressure applied perpendicularly to the membrane, which has the effect of pulling laterally on the membrane-embedded proteins. Bass *et al.* (p. 1582; see the Perspective by Bezanilla and Perozo) provide the crystal structure of MscS and describe how the transmembrane helices might reorient themselves as a result of being pulled sideways. The authors also propose how changes in transmembrane electrical potential might trigger movement of positively charged arginines and voltage-gate the osmolyte flux.

## Pass the Photosynthesis Genes

Photosynthesis completely transformed Earth by introducing oxygen into the atmosphere. Raymond *et al.* (p. 1616; see the news story by Pennisi) made a comparative sequence analysis of genomes from the five branches of photosynthetic bacteria known today to address the origin and evolution of photosynthesis and found that it entailed lateral gene transfers. This work draws attention to an emerging caveat, namely, many core genes for specific metabolic processes are uncharacterized, yet they appear to be of paramount importance to the evolution of certain cellular innovations.

## Controlling Chromatin Spreading



CREDIT: PARK *ET AL.*

Dosage compensation involves the propagation in cis of altered chromatin architecture and gene activation states over much of the X chromosome. The male-specific lethal (MSL) complex, which includes the *roX1* and *roX2* noncoding RNAs, is responsible for such spreading on the X chromosome in the fruit fly *Drosophila*, but the mechanism by which the spreading occurs is not fully understood. Park *et al.* (p. 1620) show that a limiting concentration of the *roX* RNAs relative to the MSL complex is critical for effective spreading to occur. This condition apparently ensures that MSL complexes are completed by the addition of nascent *roX* RNA while the RNA is still tethered to the DNA template, thereby limiting spreading and dosage compensation to the X chromosome.

## RNA Polymerase I in Action

The kinetics of the RNA polymerase I RNA (pol I), the enzyme that transcribes ribosomal RNA, have been revealed by combining photobleaching microscopy of living cells with computational modeling. Dundr *et al.* (p. 1623; see the news story by Couzin) followed the entry of its subunits into the nucleolus, complex assembly, and elongation. The pol I subunits rapidly exchanged between the nucleoplasm and transcription site in the nucleolus, and the polymerase complex bound to the promoter as distinct subunits rather than as a preassembled unit. The assembly of the polymerase is a relatively inefficient process that occurs via metastable intermediates.

## Seeing and Touching an Object

When observers combine different sources of information perceptually, do they preserve or discard the original sources? Hillis *et al.* (p. 1627) show that cues are combined within the visual modality in such a way that certain information is lost, and differences that should be obvious are simply not seen. However, this loss does not occur when cues from different modalities, vision and touch, are combined.

## B Cell Immunodeficiency

Several cytokine receptors utilize the common cytokine receptor γ chain (γc), and mutations in γc result in the condition known as X-linked severe combined immunodeficiency (XSCID). Lack of signaling through the interleukin-7 (IL-7) and IL-15 receptors leads to a loss of natural killer and T cells in XSCID patients, although the cause of the B cell defect is not established. Ozaki *et al.* (p. 1630) observed that B cells from mice lacking IL-21 receptor had altered antibody production. When combined with a loss of IL-4 signaling, a severely impaired immunoglobulin G response was observed that is strikingly similar to that seen in XSCID individuals.

- Adenovirus Construction & Amplification
- Plasmid Purification
- Specialized Oligonucleotides
- Gene Expression Profiling
- Peptides & Antibodies
- Adenovirus & Baculovirus Based Protein Production

# MERLIN®

## custom services

*Your partner on the way to discovery*

# The Most Complete Range of Research Services Available

Q·BIOgene


**USA & Canada**
Qbiogene, Inc.
2251 Rutherford Road
Carlsbad, CA 92008 USA
US Toll Free: 800-424-6101
Outside US: 760-929-1700
Fax: 760-918-9313

**EUROPE & FRANCE**
Qbiogene Research Services S.A.
Allée C.Colomb
91035 EVRY – FRANCE
Tel: +33 (0)160-878-200
Fax: +33 (0)160-878-201

**GERMANY & AUSTRIA**
Qbiogene
Waldhoferstrasse 102
69123 HEIDELBERG
Tel: +49 (0)6221-409058
Fax: +49 (0)6221-411062

www.qbiogene.com ♦ merlin@qbiogene.com

## Amplification


# Systems Integration

**Discover Bio-Rad's range of solutions for all your amplification needs.**

### iCycler Flexibility
- Intuitive interface
- Interchangeable reaction modules
- Upgrade to real-time PCR (96-well)

### iCycler Reaction Module Options
- 96-, 60-, 384-, and dual 48-well formats
- Innovative gradient design (96-well)

### Amplification Tools
- Hot start *Taq* polymerase
- Core PCR reagents
- PCR tubes and plates
- Unsurpassed customer service


iCycler™ thermal cycler with dual 48-well reaction module

iTaq™ DNA polymerase

96-well reaction module

384-well reaction module

60-well reaction module

The polymerase chain reaction (PCR) process is covered by patents owned by Hoffman-LaRoche. Use of the PCR process requires a license.

Visit us on the Web at **discover.bio-rad.com.**
Call toll free at 1-800-4BIORAD (1-800-424-6723);
outside the US, contact your local sales office.

BIO-RAD


# Jerini Peptide Technologies

## The largest variety in custom synthesis formats

JERINI

••• *Peptide Technologies*

Jerini Peptide Technologies
A Division of Jerini AG

phone: +49 30 97 89 31 17
fax: +49 30 97 89 31 05
email: mensing@jerini.com

**www.jerini.com/peptide**

### Rapid and economical synthesis of large peptide sets

- proprietary parallel high speed technology
- up to 100 000 peptides
- most competitive prices
- all materials quality controlled

### Specialty peptides

- protein synthesis
- challenging syntheses and modifications
- peptidomimetics
- guaranteed quality and reliability
- references in first-class academia and industry

**Innovation and reliability in custom peptide synthesis**


# Trust.

For forty years, one name has been synonymous with quality and reliability in cell culture media, sera, and reagents.

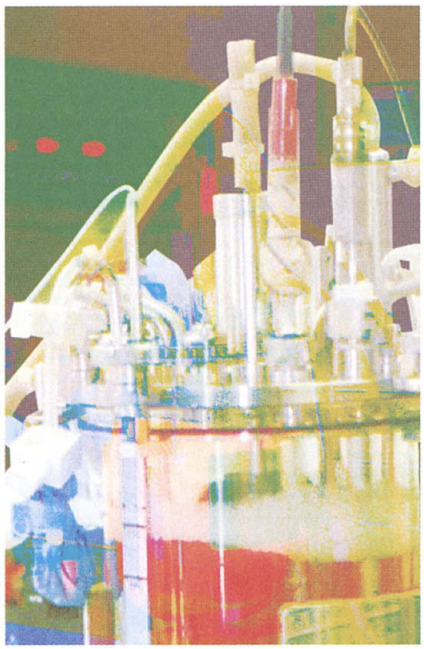
GIBCO™ products. Inspiring confidence since 1962.

GIBCO™
Invitrogen Corporation

**United States Headquarters:**
Invitrogen Corporation
1600 Faraday Avenue
Carlsbad, California 92008
Tel: 1 760 603 7200
Tel (Toll Free): 1 800 955 6288
Toll Free Fax: 1 800 331 2286
Email: tech_service@invitrogen.com

**European Headquarters:**
Invitrogen Ltd
Inchinnan Business Park
3 Fountain Drive
Paisley PA4 9RF, UK
Tel: +44 (0) 141 814 6100
Fax: +44 (0) 141 814 6260
Email: eurotech@invitrogen.com

**Go to www.invitrogen.com/gibco**



# GIBCO™ Chemically-Defined Nutrient Media

**Contains No Components of Animal or Human Origin, Providing Unrivaled Consistency**

When you're choosing nutrient media for growing cells that may ultimately be used in genomic, clinical research, or biopharmaceutical applications, there's no room for compromise.

That's why you should be aware that some commercially available nutrient media labeled "chemically-defined" actually contain proteins.

GIBCO™ CD media are both chemically-defined and protein-free in the truest sense. They contain *no* components of animal or human origin: no proteins, hydrolysates, or elements of unknown composition. All components have a known chemical structure. Because they offer the highest degree of definition of constituency, these innovative media provide unrivaled consistency and reduce the possibility of contamination by adventitious agents.

These media are optimized to minimize adaptation time from existing culture and to simplify the scale-up process.

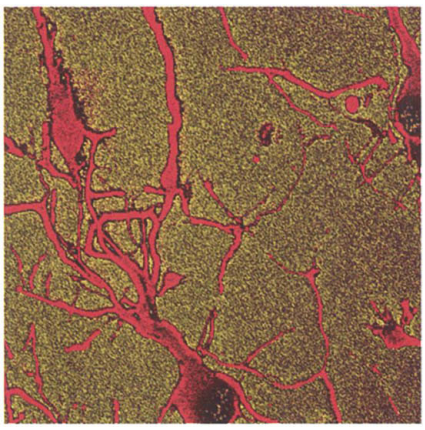
- CD Hybridoma Medium
- CD CHO Medium
- CD 293 Medium


## Opti-MEM® I Reduced Serum Medium

**Ideal for Vaccine and Virus Production**

Reduce serum requirements by at least 50% with Opti-MEM® I Reduced Serum Medium, a preferred medium for virus production. Highly versatile Opti-MEM® decreases dependence on serum while producing virus yields equivalent to or better than those produced by classical media plus serum.

- Promotes growth of a wide variety of mammalian cell types
- Significantly reduces serum requirements
- Extends the useful life of a serum batch
- Suitable for growth and maintenance of adherent and suspension cultures

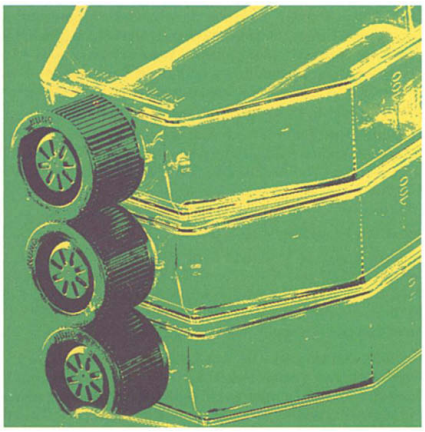


## Neuronal Culture Products

**Improve Growth of Primary Neurons**

Connect with media, supplements, and growth factors expressly developed to advance neuroscience research. Neurons grown in GIBCO™ media facilitate better control in studies of development, mechanisms of signaling, electrophysiology, pharmacology, plasticity, *in vitro* growth requirements, gene expression, and neurotoxicity.

- Neurobasal™ Media meet the neural cell's special requirements
- B-27 Supplements in three application-specific formulations
- N-2 Supplement
- G-5 Supplement
- Neurotrophins and other growth factors



## GlutaMAX™ Media

**Prevent L-glutamine Degradation**

Avoid instability. Use GlutaMAX™ Media in cloning assays, toxicity testing, high-density bioreactors, and metabolic studies.

- Prevent L-glutamine decomposition
- Available in many widely used media formulations
- Minimize toxic ammonia build-up

**www.invitrogen.com/gibco**

www.sciencemag.org

# Science

1200 New York Avenue, NW
Washington, DC 20005
Editorial: 202-326-6550, FAX 202-289-7562
News: 202-326-6500, FAX 202-371-9227
Permissions: 202-326-7074, FAX 202-682-0816
Subscriptions: 800-731-4939 or 202-326-6417, FAX 202-842-1065

Bateman House, 82-88 Hills Road
Cambridge, UK CB2 1LQ
(44) 1223-326500, FAX (44) 1223-326501

EDITOR-IN-CHIEF **Donald Kennedy**
EXECUTIVE EDITOR **Monica M. Bradford**
DEPUTY EDITORS **R. Brooks Hanson, Katrina L. Kelner**
NEWS EDITOR **Colin Norman**

**EDITORIAL/COMPASS** SUPERVISORY SENIOR EDITORS Barbara Jasny, Guy Riddihough, Phillip D. Szuromi; SENIOR EDITOR/PERSPECTIVES Orla Smith; SENIOR EDITORS Gilbert J. Chin, Pamela J. Hines, Paula A. Kiberstis (Boston), Beverly A. Purnell, L. Bryan Ray, Linda R. Rowan; ASSOCIATE EDITORS Lisa D. Chong, Marc S. Lavine, H. Jesse Smith, Valda Vinson; ONLINE EDITOR Stewart Wills; ASSOCIATE ONLINE EDITOR Tara S. Marathe; ASSOCIATE BOOK REVIEW EDITOR Sherman J. Suter; ASSOCIATE LETTERS EDITOR Etta Kavanagh; INFORMATION SPECIALIST Janet Kegg; CONTRIBUTING EDITOR Kevin Ahern; EDITORIAL MANAGER Cara Tate; SENIOR COPY EDITORS Jeffrey E. Cook, Harry Jach, Monique Martineau, Barbara P. Ordway; COPY EDITOR Trista Wagoner; EDITORIAL COORDINATORS Carolyn Kyle, Ellen E. Murphy, Beverly Shields; PUBLICATION ASSISTANTS Chris Filiatreau, Joi S. Granger, Jeffrey Hearn, Elise Laffman, Scott Miller, Gail Murphy, Brian White, Anita Wynn; EDITORIAL ASSISTANTS Lisa Johnson, Dorothy Matthews, Yolanda Matthews, Patricia M. Moore, Tunisia L. Riley; EXECUTIVE ASSISTANT Sylvia S. Kihara; ADMINISTRATIVE SUPPORT Patricia F. Fisher

science_editors@aaas.org (for general editorial queries)
science_letters@aaas.org (for letters to the editor)
science_reviews@aaas.org (for returning manuscript reviews)
science_bookrevs@aaas.org (for book review queries)

**NEWS** SENIOR CORRESPONDENTS Eliot Marshall, Jean Marx; DEPUTY NEWS EDITORS Robert Coontz, Jeffrey Mervis, Leslie Roberts; ASSOCIATE NEWS EDITOR Laura Helmuth; CONTRIBUTING EDITORS Elizabeth Culotta, Polly Shulman; NEWS WRITERS Jennifer Couzin, Martin Enserink, Constance Holden, Jocelyn Kaiser, Richard A. Kerr, Andrew Lawler (Boston), David Malakoff, Elizabeth Pennisi, Charles Seife, Robert F. Service (Pacific NW), Erik Stokstad, Erica Goldman (intern); CONTRIBUTING CORRESPONDENTS Marcia Barinaga (Berkeley, CA), Kathryn Brown, Barry A. Cipra, Jon Cohen (San Diego, CA), Daniel Ferber, Ann Gibbons, Robert Irion, Mitch Leslie (NetWatch), Charles C. Mann, Virginia Morell, Evelyn Strauss, Gary Taubes, David Voss, Ingrid Wickelgren; COPY EDITORS Laura Atwood, Linda B. Felaco, Daniel T. Helgerman; ADMINISTRATIVE SUPPORT Scherraine Mack, Fannie Groom; BUREAUS: Berkeley, CA: 510-652-0302, FAX 510-652-1867, Boston, MA: 617-542-5098, San Diego, CA: 760-942-3252, FAX 760-942-4979, Pacific Northwest: 503-963-1940

**PRODUCTION** DIRECTOR James Landry; SENIOR MANAGER Wendy K. Shank; ASSISTANT MANAGER Rebecca Doshi; SENIOR SPECIALIST Vicki J. Jorgensen; SPECIALISTS Tara L. Kelly, Jessica K. Moshell, Amanda K. Skelton

**PREFLIGHT OPERATIONS** DIRECTOR David M. Tompkins; MANAGER Marcus Spiegler

**ART DESIGN** DIRECTOR C. Faber Smith; ART DIRECTOR Alan T. Stonebraker; ASSOCIATE ART DIRECTOR Joshua Moglia; ILLUSTRATORS Cameron Slayden, Katharine Sutliff; ASSOCIATES Holly Bishop, Debra J. Morgenegg, Preston Morrighan; Julie White PHOTO RESEARCHER Leslie Blizard

***SCIENCE* INTERNATIONAL**

**EUROPE** (science@science-int.co.uk) EDITORIAL: INTERNATIONAL MANAGING EDITOR Andrew M. Sugden; SENIOR EDITOR/PERSPECTIVES Julia Fahrenkamp-Uppenbrink; SENIOR EDITORS Caroline Ash, Stella M. Hurtley, Ian S. Osborne, Peter Stern; ASSOCIATE EDITOR Stephen J. Simpson; EDITORIAL SUPPORT Cheryl Sharp, Emma Westgate; ADMINISTRATIVE SUPPORT Janet Mumford, Jill White, Lara Crowe, Mark Chadwick; NEWS: EUROPEAN NEWS EDITOR Richard Stone; DEPUTY NEWS EDITOR Daniel Clery; CORRESPONDENTS Michael Balter (Paris: (33) 1-49-29-09-01, FAX (33) 1-49-29-09-00), Gretchen Vogel (Berlin: (49) 30-2809-3902, FAX (49) 30-2809-8365) John Bohannon (intern)

**ASIA** Japan Office: Asca Corporation, Eiko Ishioka, Fusako Tamura, 1-8-13, Hirano-cho, Chuo-ku, Osaka-shi, Osaka, 541-0046 Japan; (81) 6-6202-6272, FAX (81) 6-6202-6271; asca@os.gulf.or.jp JAPAN NEWS BUREAU: Dennis Normile (contributing correspondent, (81) 3-3335-9925, FAX (81) 3-3335-4898; dnormile@twics.com); CHINA REPRESENTATIVE Hao Xin, (86) 10-6307-4439 or 6307-3676, FAX (86) 10-6307-4358; science@public3.bta.net.cn; INDIA Pallava Bagla (contributing correspondent (91) 11-271-2896; pbagla@ndb.vsnl.net.in )

**INFORMATION FOR CONTRIBUTORS**
See pages 163 and 164 of the 5 April 2002 issue or access www.sciencemag.org/feature/contribinfo/home.shtml

EXECUTIVE PUBLISHER **Alan I. Leshner**
PUBLISHER **Beth Rosner**

**FULFILLMENT & MEMBERSHIP SERVICES** (membership@aaas.org) DIRECTOR Marlene Zendell; MEMBER SERVICES: MANAGER Michael Lung; SENIOR SPECIALIST Mary Curry; COORDINATOR Jantell Stone; SPECIALISTS Laurie Baker, Pat Butler, Elizabeth Early, Kristina Mazzocchi; MARKETING: DIRECTOR SITE LICENSE SALES Tom Ryan; MANAGER Gregory Urquhart; PRODUCTION MANAGER Lauri Sirois; SENIOR ASSOCIATE Deborah Stromberg; INTERNATIONAL MARKETING MANAGER Wendy Sturley; INTERNATIONAL MARKETING EXECUTIVE Emilie Stott; RESEARCH MANAGER Renuka Chander; BUSINESS AND FINANCE MANAGER Teressa Ellis; ADMINISTRATIVE SUPPORT Zadia McKinnon; COMPUTER SPECIALIST John Williams

**SUBSCRIPTION SERVICES** For change of address, missing issues, new orders and renewals, and payment questions: 800-731-4939 or 202-326-6417, FAX 202-842-1065. Mailing addresses: AAAS, P.O. Box 1811, Danbury, CT 06813 or AAAS Member Services, 1200 New York Avenue, NW, Washington, DC 20005

**REPRINTS** Ordering/Billing/Status 800-635-7171; Corrections 202-326-6501

**MEMBER BENEFITS** For Credit Card: MBNA 1-800-847-7378; Car Rentals: Hertz 1-800-654-2200 CDP#343457, Dollar 1-800-800-4000 #AA1115; AAAS Travels: Betchart Expeditions 1-800-252-4910; Life Insurance: Seabury & Smith 1-800-424-9883; Other Benefits: AAAS Member Services 1-202-326-6417.

**BUSINESS OPERATIONS AND ADMINISTRATION** DIRECTOR Deborah Rivera-Wienhold; SENIOR ANALYST Randy Yi; FINANCIAL ANALYSTS Lisa Donovan, Jessica Tierney-Rubin; RIGHTS AND PERMISSIONS: ASSOCIATE Emilie David; ASSISTANT Karen Lentz; MARKETING: DIRECTOR John Meyers; DIRECTOR OF INTERNATIONAL MARKETING AND RECRUITMENT ADVERTISING Deborah Harris; INTERNATIONAL SUBSCRIPTIONS MARKETING MANAGER Wendy Sturley; RECRUITMENT MARKETING MANAGER Allison Pritchard; ASSOCIATES Mary Ellen Crowley, Amanda Donathen; ELECTRONIC MEDIA: MANAGER Don Hemenway; INTERNET PRODUCTION MANAGER Lizabeth Harman; ASSISTANT PRODUCTION MANAGER Wendy Stengel; SENIOR PRODUCTION ASSOCIATES Sheila Myers, Lisa Stanford; PRODUCTION ASSOCIATES Carla Cathey, Eugene Moxley, Louis Williams; LEAD APPLICATIONS DEVELOPER Carl Saffell; ADMINISTRATIVE SUPPORT Joyce Scott

**PRODUCT ADVERTISING** (science_ advertising@aaas.org) NORTHEAST AND E. CANADA Elizabeth Wardell: 860-668-9025, FAX 413-480-0008• MIDWEST Rick Bongiovanni: 330-405-7080, FAX 330-405-7081 • WEST COAST/W. CANADA B. Neil Boylan: 415-458-1630, FAX 415-458-1631 • MID-ATLANTIC AND SOUTHEAST SALES Christopher Breslin: 443-512-0330, FAX 443-512-0331 • UK/SCANDINAVIA/FRANCE/ITALY/BELGIUM/NETHERLANDS Andrew Davies: 44 (0)1-782-750-111, FAX 44 (0)1-782-751-999 • GERMANY/SWITZERLAND/AUSTRIA Tracey Peers: (44) 1-782-752-530, FAX (44) 1-782-752-531 JAPAN Mashy Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852 ISRAEL Jessica Nachlas 001 972-3-5449123 • TRAFFIC MANAGER Carol Maddox; SALES COORDINATOR Deiandra Underwood

**RECRUITMENT ADVERTISING** (science_classifieds@aaas.org); PRODUCTION MANAGER Jennifer Rankin; ASSISTANT PRODUCTION MANAGER Deborah Tompkins; U.S.: SALES MANAGER Gabrielle Boguslawski: 718-491-1607, FAX 202-289-6742; WEST COAST SALES MANAGER Kristine von Zedlitz; EAST COAST SALES MANAGER Jill Steinberg; INTERNET SALES MANAGER Beth Dwyer; ASSISTANT SALES MANAGER Daryl Anderson; SENIOR SALES COORDINATOR Erika Bryant; SALES COORDINATORS Rohan Edmonson, Caroline Gallina, Shirley Young; SALES REPRESENTATIVES Kathleen Clark, Sussy Castilla, Christina Geiger, Bren Peters-Minnis; ASSISTANT Emnet Tesfaye; ASSOCIATE Christine Hall; PUBLICATIONS ASSISTANTS Robert Buck, Jane Vaughn; INTERNATIONAL SALES EXECUTIVES Anna McBryde, Richard Walters; INTERNATIONAL SALES ASSISTANT Claire Last; INTERNATIONAL RECRUITMENT ADVERTISTING MANAGER Tracy Holmes; AUSTRALIA/NEW ZEALAND: Keith Sandell: (61) 02-9922-2977, FAX (61) 02-9922-1100 JAPAN: Mashy Yoshikawa: (81) 3-3235-5961, FAX (81) 3-3235-5852

**AAAS BOARD OF DIRECTORS** RETIRING PRESIDENT, CHAIR Peter H. Raven; PRESIDENT Floyd E. Bloom; PRESIDENT-ELECT Mary Ellen Avery; TREASURER David E. Shaw; CHIEF EXECUTIVE OFFICER Alan I. Leshner; BOARD Lewis M. Branscomb; John E. Burris; Nina V. Fedoroff; Karen A. Holbrook; Richard A. Meserve; Norine E. Noonan; Robert C. Richardson; Lydia Villa-Komaroff

Published by the American Association for the Advancement of Science (AAAS), *Science* serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

AAAS was founded in 1848 and incorporated in 1874. Its mission is to advance science and innovation throughout the world for the benefit of all people. The goals of the association are to: foster communication among scientists, engineers and the public; enhance international cooperation in science and its applications; promote the responsible conduct and use of science and technology; foster education in science and technology for everyone; enhance the science and technology workforce and infrastructure; increase public understanding and appreciation of science and technology; and strengthen support for the science and technology enterprise.

*Advancing science • Serving society*


START
ENTER

# Just push the button and walk away.

## Plasmid DNA mini-preps have never been easier.

**MacConnell Mini-Prep systems** help take the "prep" out of DNA preparation. These compact powerhouses purify plasmid DNA directly from bacterial cultures using agarose gel electrophoresis and recovery by electroelution. And it's all done quickly and easily with pre-manufactured sample cassettes to save you time, labor and money every time you use them. **For fast, accurate results at the touch of a button, call MacConnell or visit our web site for more information.**

The Mini-Prep 24

The Mini-Prep 48

### High Purity

Suitable for automated fluorescent sequencing straight from the instrument.

### Easy Operation

Allows direct loading of culture with no centrifugation.

### Improved Yield

Up to 6 µg of plasmid DNA per prep.

### Fast

Up to 48 (2-ml) preps per hour.

### Economical

Costs less than $1 per prep.

6195 Cornerstone Court
San Diego, California 92121
Fax: 858-452-6753

**1-800-466-7949**
www.macconnell.com

MACCONNELL RESEARCH

# READER AND ADVERTISER RESOURCES

## *Science* Careers:

### WWW.SCIENCECAREERS.ORG

**Employer Profiles**

Trying to find out more about that company you want to work for? Check out the Employer Profiles page on ScienceCareers.org to find out more about companies and link to their current job openings or website.

### FOCUS ON CAREERS

**Ad Supplement Archives**

Miss one of the *Science* Careers ad supplements? You can access all of the 2002 Focus on Careers supplements online at ScienceCareers.org. Click on Advice and Perspectives to find the online archive.

## Product News:

### LAB TECHNOLOGY TRENDS

SPECIAL AD SECTION IN THE 29 NOVEMBER ISSUE

**The Future of Global Biotechnology**

This special advertising section will cover the "Future of Global Biotechnology" session at a recent Frost & Sullivan conference, along with information from BIO—the Biotechnology Industry Organization.

Look for it in the 29 November issue.

### *SCIENCE* BENCHTOP

**Archives Now Sorted by Topic Area**

Find both current and past ad sections online at the *Science* Benchtop. The archives are now available arranged by topic area including:

- DNA and Biochips
- Drug Discovery
- Proteomics

Go to www.scienceonline.org and select Electronic Marketplace, then *Science* Benchtop. Check it out today!

## AAAS Members

### AAASMEMBER.ORG

**Science Books & Films**

SB&F, an AAAS publication in its 38th year, is the only critical review journal devoted exclusively to print and nonprint materials in all of the sciences for all age groups. As an AAAS member, you get free online access at www.aaasmember.org.

## Trade Shows & Conferences

**LOOK FOR *SCIENCE'S* 2003 EVENTS CALENDAR, TO BE PUBLISHED IN THE 13 DECEMBER ISSUE OF *SCIENCE*.**

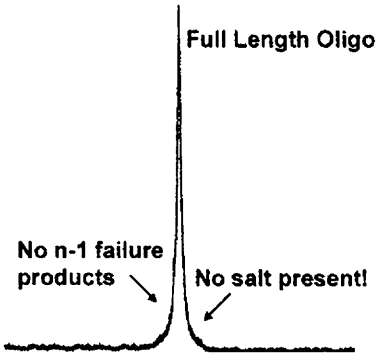
**FIND OUT MORE AT WWW.SCIENCEMEETINGS.ORG.**

For *Science* sales representatives' contact information, please see the previous page.

AAAS

*Science* is published by The American Association for the Advancement of Science. To subscribe to *Science* and become a member of the AAAS, go to **www.aaas.org**.

# The Purest Oligos Just Got Even Better



MALDI Spectrum of HPSF 30-mer.

# They're FREE!

Our HPSF® oligos have set the standard for the highest quality and purity, while serving all your needs with PCR primers, dual-labeled probes and a full line of modifications. This high quality, coupled with rapid turnaround times, convenient online ordering and MALDI-TOF validation make them the best oligos available.

For a limited time, new customers can receive two unmodified DNA oligos*, absolutely free, or if you prefer, get our new t-shirt with your first order. So go ahead, improve your results with our superior HPSF® oligos today, risk-free, and discover the difference that quality makes.

*18-35 bases. 0.01 µmol scale only. Please cite code #1115S

www.mwgbiotech.com 877-694-2832 info@mwgbiotech.com

MWG
THE GENOMIC COMPANY
*Always a Result ahead.*

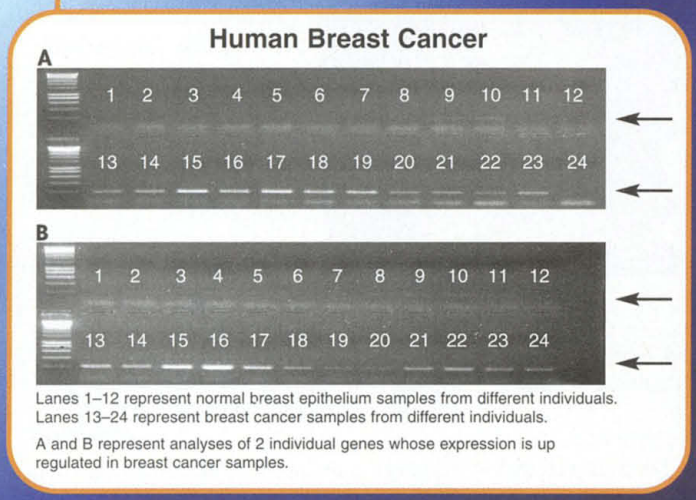
# 3 hours Rapid-Scan™

GENE EXPRESSION PANELS

180 minutes

10800 seconds

**No matter how you look at it, it's only 3 hours to a comprehensive gene expression profile.**




Lanes 1–12 represent normal breast epithelium samples from different individuals.
Lanes 13–24 represent breast cancer samples from different individuals.

A and B represent analyses of 2 individual genes whose expression is up regulated in breast cancer samples.

***Highly Sensitive***
detect low abundance transcripts

***Semi-Quantitative***
each issue covers a multi-log dilution

***Broad Spectrum***
survey up to 48 distinct tissues/stages

## HUMAN

24-Tissue Human Panel
24-Tissue Human Breast Cancer Panel
12-Region Human Brain Panel

## MOUSE

24-Tissue Mouse Panel
48-Single Region Mouse Brain Panel

## DROSOPHILA

12-Tissue/Stage Drosophila Panel

ORIGENE TECHNOLOGIES, INC.

Visit us at www.origene.com or call us at 301.340.3188

nunc™

# Can your lab touch its toes?

**Flexibility means productivity. That's why we designed new NUNC 1 mL Filter Plates for both standard and custom applications.**

Plates are available fritted for filtration, with glass fiber for binding or unfritted for custom applications

Can be processed via centrifugation, vacuum manifolds or positive pressure devices

Ideal for research scale or automated high throughput

Designed for faster filtration in a low-profile plate

Compatible with NUNC DeepWell™ Plates

Constructed from chemically resistant polypropylene in a standard 96-well format

Ideal for DNA plasmid purification and other lab applications

**Every case of NUNC Glass Fiber Filter Plates includes a free step-by-step Plasmid Purification Protocol, including formulas for making your own buffers and solutions — the same buffers and solutions other manufacturers package into high-priced kits. NUNC filters out what you don't need. All that's left is quality. For more information, call 1-866-686-2548.**

**1 mL FILTER PLATES**

**Nalge Nunc International** · USA · Tel +1 585 586 8800 · nnitech@nalgenunc.com · www.nuncbrand.com
**Nunc A/S** · Denmark · Tel +45 4631 2000 · infociety@nunc.dk · www.nuncbrand.com
**Nunc GmbH & Co. KG** · Germany · Tel +49 6111 86740 · info@nunc.de · www.nunc.de
**Nalge Nunc International KK** · Japan · Tel +81 3381 63355 · info@nalgenunc.co.jp · www.nalgenunc.co.jp

**www.nuncbrand.com**

Apogent.

# AstraZeneca Pharmaceuticals *proudly announces the* 2002 Excellence in Chemistry Award Winners


*Pictured from left to right: Robert H. Grubbs, Patrick G. Harran, James P. Morken and Jim Folmer (Committee Chairperson)*

*Awardees:*

**Professor Patrick G. Harran**
*University of Texas, Southwestern Medical Center at Dallas*

**Professor James P. Morken**
*University of North Carolina, Chapel Hill*

*Distinguished Lecturer:*

**Professor Robert H. Grubbs**
*California Institute of Technology*

AstraZeneca
Excellence in
Chemistry Award
2002

*At AstraZeneca, we recognize that advances in medicine rely on innovations in chemistry. As a commitment to future advances, each year we award talented academic researchers who, early in their careers, have made outstanding contributions to synthetic, mechanistic, or bioorganic chemistry. In selecting these awardees, our senior scientists consult a world-leading chemist, who also serves as the distinguished lecturer. This year marks the eighteenth year of the AstraZeneca Excellence in Chemistry Award.*

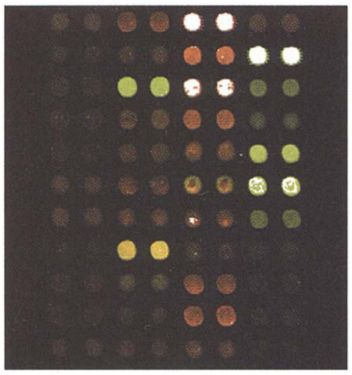
*With best wishes for continued innovation and excellence in chemical research, AstraZeneca congratulates this year's award winners.*

AstraZeneca

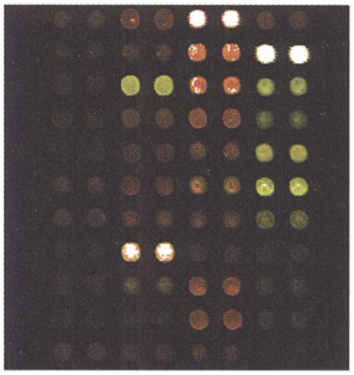
www.astrazeneca.com

# Can you pick out the degraded samples?

## Don't feel bad. Nobody else can, either.



*



**

**The new Array 350RP labeling kit is the only product you need for labeling all of your most precious samples, whether they are degraded or intact.** It produces excellent differential data with tiny amounts (0.5-2.0µg) of intact or partially-degraded eukaryotic or prokaryotic total RNA. It produces equally good results with tiny amounts (25-100ng) of mRNA or amplified RNA. And it does all this with excellent reproducibility and an easy protocol.

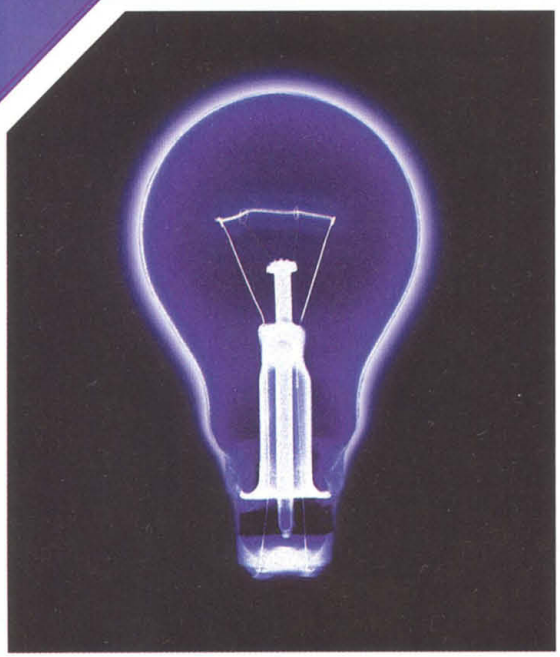
* **Intact.** 750 nanogram human total RNA samples, placenta vs. pancreas, **labeled with new Array 350RP™ kits.**

** **Degraded.** Same experiment, but RNA samples were degraded prior to **labeling with new Array 350RP™ kits**.

**For more information or to purchase a trial kit, call us at 877.888.3DNA or visit our website www.genisphere.com.**

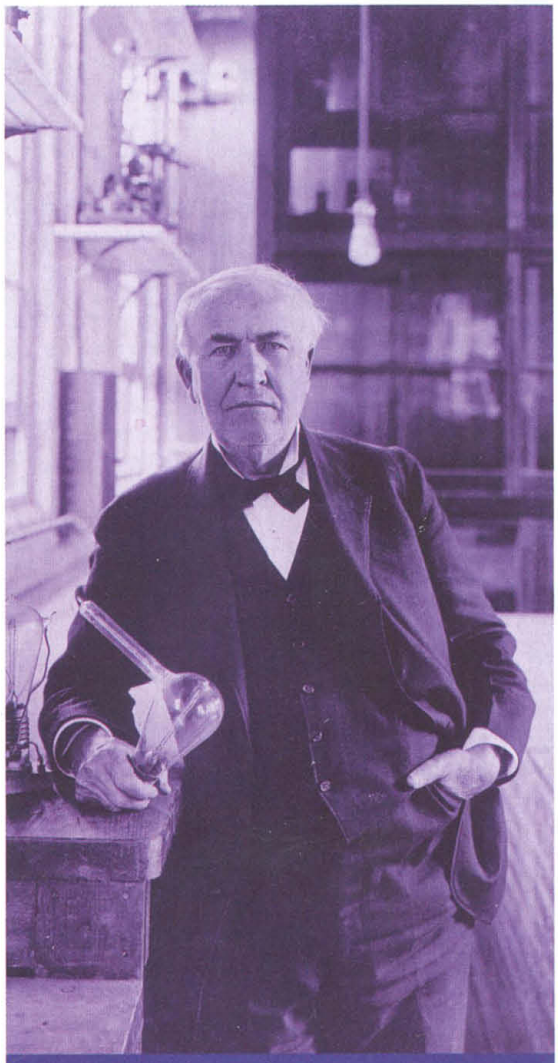
Genisphere®

LABELING SYSTEMS + MICROARRAY SERVICE LABORATORY



# *In 1880*

## ANOTHER LIGHT BULB WENT ON.



*Thomas Alva Edison with the Edison effect bulb, c.1918*

In 1879, Thomas Alva Edison invented the first practical light bulb. And in 1880, he had another bright idea: to found a journal called *Science*, in order to advance scientific discovery.

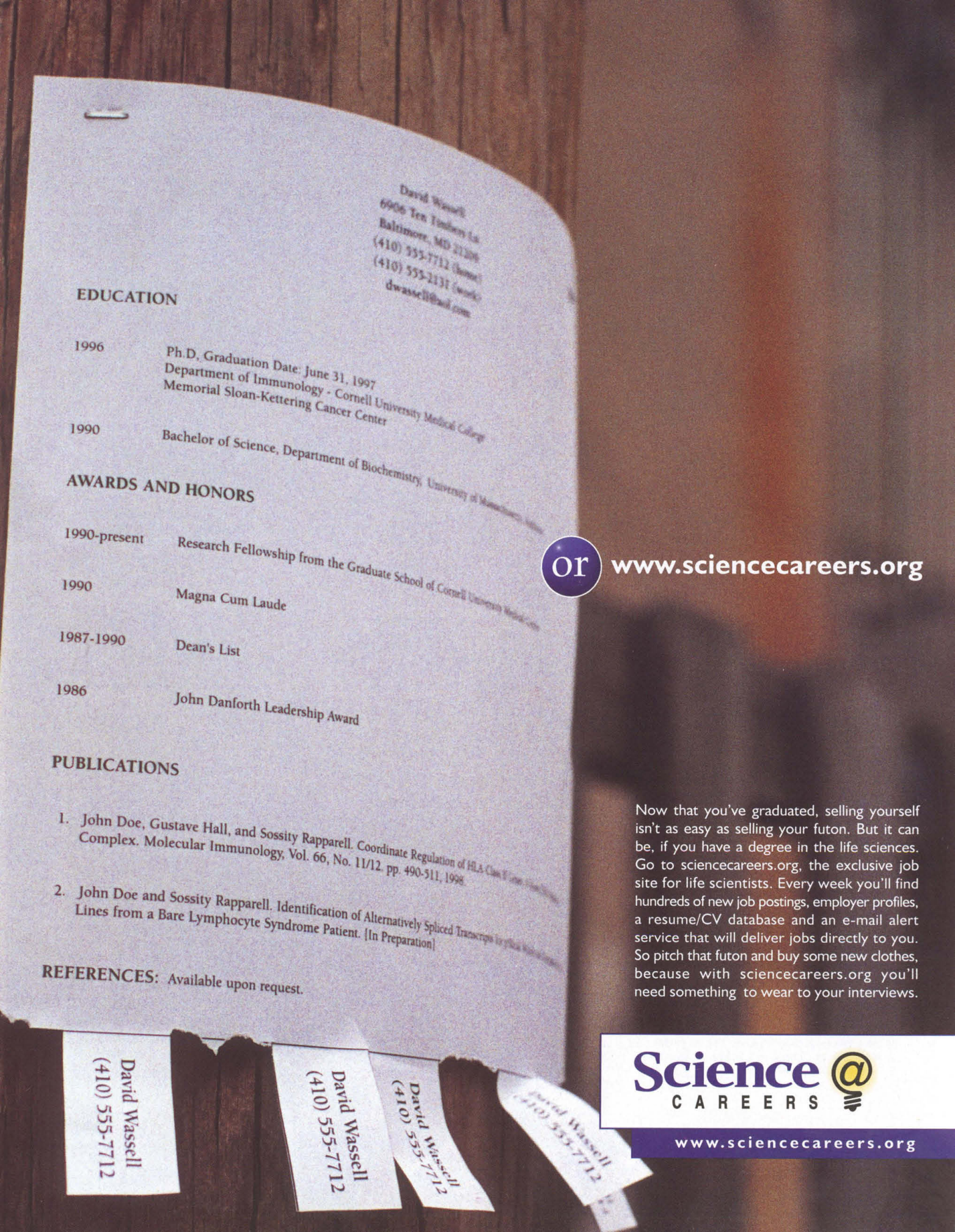
Today, AAAS publishes *Science*, one of the world's most widely cited science journals, for more than 143,000 members and weekly subscribers. AAAS members join us at the frontier of knowledge with the latest scientific reports, seminal research, and breaking news—while also supporting improved science education, sound science policy, and international cooperation.

Since 1848, AAAS has worked to advance science and serve society—with the help of members, including Thomas Edison. Join us. Together we can do even more.

To join AAAS or renew your membership, access join.aaas.org or call in the U.S. 202-326-6417 or international +44 (0) 1223 326 500.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

*Advancing science • Serving society*


David Wassell
6906 Ten Trailers Ln
Baltimore, MD 21209
(410) 555-7712 (home)
(410) 555-2131 (work)
dwassell@aol.com
EDUCATION
1996
Ph.D, Graduation Date: June 31, 1997
Department of Immunology - Cornell University Medical College
Memorial Sloan-Kettering Cancer Center
1990
Bachelor of Science, Department of Biochemistry, University of
AWARDS AND HONORS
1990-present
Research Fellowship from the Graduate School of Cornell University
1990
Magna Cum Laude
1987-1990
Dean's List
1986
John Danforth Leadership Award
PUBLICATIONS
1. John Doe, Gustave Hall, and Sossity Rapparell. Coordinate Regulation of HLA
Complex. Molecular Immunology, Vol. 66, No. 11/12. pp. 490-511, 1998.
2. John Doe and Sossity Rapparell. Identification of Alternatively Spliced Transcripts
Lines from a Bare Lymphocyte Syndrome Patient. [In Preparation]
REFERENCES: Available upon request.
David Wassell
(410) 555-7712
David Wassell
(410) 555-7712
David Wassell
(410) 555-7712
David Wassell
(410) 555-7712
or
www.sciencecareers.org
Now that you've graduated, selling yourself isn't as easy as selling your futon. But it can be, if you have a degree in the life sciences. Go to sciencecareers.org, the exclusive job site for life scientists. Every week you'll find hundreds of new job postings, employer profiles, a resume/CV database and an e-mail alert service that will deliver jobs directly to you. So pitch that futon and buy some new clothes, because with sciencecareers.org you'll need something to wear to your interviews.
Science @
CAREERS
www.sciencecareers.org