At Last!

A Robotic Liquid Handler That's Mastered the Art of Change.

New MultiPROBE® VersaTip™ technology automatically adapts pipetting tips to your assay procedures. Disposable tips, fixed washable tips, or both? Microliter or milliliter volumes? Liquid level sensing of ionic or nonionic solutions? Different disposable tip sizes and types? With MultiPROBE, you get it all in one system.

The new VersaTip automatically changes from fixed, washable tips to a variety of disposable tip sizes or types — within the same protocol and without any user-intervention. Now you can minimize consumable costs by using washable tips whenever possible, and at the same time optimize performance by automatically switching from small volume to larger volume disposable tips. In other words, MultiPROBE with VersaTip adapts to your application, instead of your having to adapt the application to it.

Drug Discovery Work
For drug discovery work, VersaTip will sense small sample volumes in microplates, and handle both ionic and nonionic solutions such as DMSO. With four- and eight-tip MultiPROBE systems, you can stop wasting precious compounds for all solubilization, distribution, and screening applications.

Molecular Biology
For molecular biology applications, VersaTip can automatically pick up micro tips to handle very small volumes, switch to larger tips when required, or use washable fixed tips whenever possible. Ultra-sensitive liquid level sensing tips further eliminate any risk for DNA cross-contamination.

Clinical Testing
For clinical testing, VersaTip will automatically adapt to the carry-over requirements of your assays. Four-tip systems with VersaTip can switch from disposable to washable tips, and transfer samples from any size test tube or vial, to microplates or other labware — all without user intervention. Combine this versatility with a large deck capacity and a bar code reader that can read 256 tubes in 90 seconds, and you have the most efficient robotic liquid handler your lab can own.

Now, there's no need to compromise. Demand the MultiPROBE with VersaTip — the first robotic liquid handler that adapts to your assays.
Searching for Cytokines and Antibodies?

The first place to look...

R&D Systems offers the most extensive line of cytokines and soluble receptors as well as antibodies to cytokines and cytokine receptors.

Cytokines & Soluble Receptors
- Over 130 available – human and mouse
- Full biological activity
- >97% pure

Antibodies
- Over 150 available – anti-human and anti-mouse
- Polyclonal and monoclonal
- Highly active and specific

For research use only. Not for use in diagnostic or therapeutic procedures.

U.S.A. and Canada
R&D Systems, Inc.
614 McKirney Place NE
Minneapolis, MN 55413, USA.
Tel: 612 379-2500
Fax: 612 379-6580

Europe
R&D Systems Europe Ltd.
4-10 The Quadrant, Barton Lane
Abingdon, OX14 3YS, UK.
Tel: +44 (0)1235 531074
Fax: +44 (0)1235 533420

Germany
R&D Systems GmbH
Bonsigratstrasse 7
65205 Wiesbaden, Germany
Tel: +49 06122 90980
Fax: +49 06122 909819

Japan
Funakoshi Co., Ltd.
9-7, Hongo 2-Chome
Bunkyo-ku, Tokyo 113, Japan
Tel: +81 (03) 5884-1633

International Distributors – Australia: (62) 088-25-1437. Austria: (43) 02 209 2 35 27. Chile: (56) 2-671-8369.


Circle No. 43 on Readers’ Service Card
AVANTI® MEANS HIGH ACCELERATION CENTRIFUGATION

AVANTI® MEANS HIGH PRODUCTIVITY CENTRIFUGATION
**BETTER QUALITY, INCREASED OPERATOR SAFETY**

Accelerate up to 110,000 × g in half the time of conventional high speed drives. Designed and tested as a system, Avanti J systems meet the world’s highest standards for quality and operator safety. Even at maximum g-force, high-speed centrifugation is a breeze, certified by CE marking, UL and CSA approval.

We have two High Performance Centrifuge systems to choose from — the Avanti J-25 Series and our fastest model, Avanti J-301. Both are engineering breakthroughs, and both offer longer warranties, diagnostic notification of instrument performance, and are designed for easy servicing.

Whichever Avanti J system you choose, you can be assured of a safe, quality drive with unmatched accel/decel rates, in a high-performance system that’s driven to productivity.

---

**EASIER SET-UPS, FASTER SEPARATIONS**

Break away from the pack. At up to 110,000 × g, Avanti J systems offer a range of separations broader than that of conventional high speeds. Plus, Avanti J systems are as easy to use as they are powerful. Every system is optimized by analog or digital display of set parameters and one-touch functions that accelerate your throughput while cutting run time.

We have two High Performance Centrifuge systems to choose from — the Avanti J-25 Series and our fastest model, Avanti J-301. Both are engineering breakthroughs, and both offer longer warranties, diagnostic notification of instrument performance, and are designed for easy servicing.

Whichever Avanti J system you choose, you can be assured of a fast, easy way to produce more separations in less time.
NEWS & COMMENT

Scientists With Clout
Generous Funding Wins a Seat at the Genome Top Table

Cluster Mission to Rise From the Ashes

School Achievement: Asia and Europe Top in World, But Reasons Are Hard to Find

Mars Loss Could Sink Planetary Probes

EU Stops Fiddling While Cows Burn

A Rare Glimpse of an Early Human Face

RESEARCH NEWS

The Case of the Missing Migrants
A Brewing Controversy Over Bird-Friendly Coffee

Homing In On a Prostate Cancer Gene

Illusion Reveals Pain Locus in Brain

Tumor Cells Fight Back to Beat Immune System

New Way to Read the Record Suggests Abrupt Extinction

Hedgehog's Patterning Call Is Patched Through, Smoothly

Quasar Pairs: A Redshift Puzzle?

PER Protein in Silkmoths Marches to Different Drummer

PERSPECTIVES

Apomixis: The Asexual Revolution
J.-F. V. Calzada, C. F. Crane, D. M. Stelly

Hats Off to the Tricorn Protease
C. Schneider and F. U. Hartl

Heavy Ozone—A Difficult Puzzle to Solve
D. Krankowsky and K. Mauersberger

The 110% Solution
D. Voss

ARTICLE

Microwave Spectroscopy at the Dissociation Limit
A. Carrington

REPORTS

The Coulomb Blockade in Coupled Quantum Dots

Diffuse Extreme-Ultraviolet Emission from the Coma Cluster: Evidence for Rapidly Cooling Gases at Submegakelvin Temperatures

DEPARTMENTS

THIS WEEK IN SCIENCE

EDITORIAL

Materials Research and Applications

LETTERS


S.H. Li, W. Messier

SCIENCESCOPE

RANDOM SAMPLES

BOOK REVIEWS

Krakatau, reviewed by T. J. Case • Supernovae and Nucleosynthesis, G. J. Mathews • Browsings

GORDON RESEARCH CONFERENCE

PRODUCTS & MATERIALS
Cretaceous-Tertiary (K-T) boundary near the town of Zumaya, Spain. The boundary occurs immediately below the ledge (lower center) formed by the erosion-resistant Tertiary strata. The boulders in the foreground lie in the pre-K-T gap. Statistical analysis of the fossil distributions in this and other Bay of Biscay sections reveals a complex of extinction patterns in the latest Cretaceous. See page 1360 and the News story on page 1303. [Photo: Peter D. Ward, University of Washington]

Extreme-Ultraviolet Flux from the Virgo Cluster: Further Evidence for a 500,000-Kelvin Component
S. Bowyer, M. Lampton, R. Lieu

Stratospheric Mean Ages and Transport Rates from Observations of Carbon Dioxide and Nitrous Oxide
K. A. Boering, S. C. Wofsy, B. C. Daube, H. R. Schneider, M. Loewenstein, J. R. Podolske, T. J. Conway

An Explanation for Symmetry-Induced Isotopic Fractionation in Ozone
G. I. Gellene

Oceanic Carbon Dioxide Uptake in a Model of Century-Scale Global Warming
J. L. Sammiento and C. L. Le Quéré

Red-Emitting Semiconductor Quantum Dot Lasers
S. Fafard, K. Hinzer, S. Raymond, M. Dion, J. McCaffrey, Y. Feng, S. Charbonneau

Chemiluminescence in the Agglomeration of Metal Clusters
L. König, I. Rabin, W. Schulze, G. Ertl

Glacial to Interglacial Fluctuations in Productivity in the Equatorial Pacific as Indicated by Marine Barite
A. Paytan, M. Kastner, F. P. Chavez

Stability of Perovskite (MgSiO3) in the Earth's Mantle
S. K. Saxena, L. S. Dubrovinsky, P. Lazor, Y. Cerienus, P. Häggkvist, H. Manfaldi, J. Hu

Sudden and Gradual Molluscan Extinctions in the Latest Cretaceous of Western European Tethys
C. R. Marshall and P. D. Ward

Melanoma Cell Expression of Fas(Apo-1/CD95) Ligand: Implications for Tumor Immune Escape

Structure of the A Site of Escherichia coli 16S Ribosomal RNA Complexed with an Aminoglycoside Antibiotic
D. Fourny, M. I. Recht, S. C. Blanchard, J. D. Puglisi

1371 Major Susceptibility Locus for Prostate Cancer on Chromosome 1 Suggested by a Genome-Wide Search

1374 RAC Regulation of Actin Polymerization and Proliferation by a Pathway Distinct from Jun Kinase
T. Joneson, M. McDonough, D. Bar-Sagi, L. Van Aelst

1377 Uncoupling of Obesity from Insulin Resistance Through a Targeted Mutation in αP2, the Adipocyte Fatty Acid Binding Protein
G. S. Horamisigl, R. S. Johnson, R. J. Distel, R. Ellis, V. E. Papapouannou, B. M. Spiegelman

1379 Liver Failure and Defective Hepatocyte Regeneration in Interleukin-6-Deficient Mice

1383 Neuroprotection by Aspirin and Sodium Salicylate Through Blockade of NF-κB Activation
M. Grilli, M. Pizzi, M. Memo, P. F. Spano

1385 Tricron Protease—The Core of a Modular Proteolytic System
T. Tamura, N. Tamura, Z. Cejka, R. Hegerl, P. Lotschpeich, W. Baumeister

1389 Control of C. elegans Larval Development by Neuronal Expression of a TGF-β Homolog
P. Ren, C.-S. Lim, R. Johnsen, P. S. Albert, D. Pilgrim, D. L. Riddle

Resistance to Leishmania major in Mice
P. Demant, M. Lipoldova, M. Svozilova; Response: M. Güler, K. Murphy, J. Gorham

Role of β-Chemokines in Suppressing HIV Replication
C. E. Mackewicz, E. Barker, J. A. Levy; Response: F. Cocchi, A. L. DeVico, A. Garino-Demo, P. Lusso, R. C. Gallo

On the Web
Get your daily news fix from Science's news team: http://www.sciencenow.org/
Introducing AmpliTaq Gold™

For PCR performance with higher yield, better specificity and more reliable results, discover AmpliTaq Gold™.

This new version of AmpliTaq® DNA Polymerase provides the specificity of Hot Start PCR, without all the extra steps. In most cases, you can substitute AmpliTaq Gold directly in existing PCR amplification protocols—without re-optimization.

You’ll find AmpliTaq Gold saves time and money with dramatically lower drop-out rates, improved specificity, and easier multiplexing.

It also gives you consistently better PCR results. Because AmpliTaq Gold remains inactive until heated, conditions that lead to primer-dimer formation and mispriming are eliminated.

And of course, you have the continued assurance of knowing that AmpliTaq Gold is backed by PE Applied Biosystems’ exclusive PCR Performance Guarantee.

So discover AmpliTaq Gold, and discover high performance PCR. To request information, call 1-800-327-3002. Outside the U.S. and Canada, contact your local PE Applied Biosystems representative. On the Internet, visit our home page at http://www.amplitaqgold.com, or e-mail pebio@perkin-elm.com.

PE Applied Biosystems

Where There’s Gold, You’ll Find Performance.
Artificial molecules
A quantum dot is a semiconductor structure in which electrons are confined within a small volume and have discrete energy levels resembling those of atoms. Livermore et al. (p. 1332) have constructed coupled quantum dots in which electrons can tunnel between dots, thus creating "artificial molecules." The conductances observed in both the weak and strong tunneling limits agree with predictions from many-body theory.

Glowing clusters
Chemical reactions may be accompanied by emission of visible light, or chemiluminescence, if the energy created by the reaction is stored initially in an excited state that later decays. König et al. (p. 1353) report that formation of metal clusters can be accompanied by chemiluminescence. During cluster agglomeration in a noble gas matrix, formation of unstable intermediates is proposed to lead to emission of excited fragments, which decay while emitting visible light.

Fresh air?
Transport of air from the troposphere into and out of the stratosphere, and its residence time in the stratosphere, can determine the rates at which ozone-destroying compounds reach the ozone layer and the effects of aircraft emissions. However, details of the global transport of air are difficult to obtain. Boering et al. (p. 1340) measured various gases on board the NASA ER-2 aircraft at tropospheric and stratospheric altitudes between 1992 and 1996 and showed that air enters the stratosphere continuously throughout the year and is distributed rapidly. The measurement allowed the determination of the mean age of stratospheric air, which is related to the residence time of pollutants in the stratosphere.

Insulin resistance, diabetes, and obesity
Obesity can lead to insulin resistance and diabetes, and the two appeared inseparable in animal models. Hotamisligil et al. (p. 1377) now report that in mice lacking the gene encoding AP2, the fatty acid-binding protein from adipocytes, dietary obesity fails to cause insulin resistance or diabetes. Somehow, AP2 must be critical for the metabolic pathway that leads from obesity to insulin resistance. The results provide a focus possibly intervening in the process that causes abnormal glucose homeostasis and symptoms of diabetes as a consequence of obesity.

Aspirin and glutamate
The neurotransmitter glutamate can actually be toxic to neurons if its levels are elevated for too long—as may occur during stroke. Grilli et al. (p. 1383) describe how aspirin, at doses already in frequent use for the treatment of arthritis, can help to protect rat neurons in primary culture and in hippocampal slices from glutamate-induced neurotoxicity.

Tumor evasion
Activated T cells are normally eliminated after an immune response is completed by expression of the Fas ligand (FasL, also called Apo-1 or CD95 ligand), and immune-privileged sites in the body such as the eye also express FasL. Hahne et al. (p. 1363; see the news story by Williams, p. 1302) show that unlike normal skin cells, malignant melanoma cells express FasL to avoid the immune response. Injection of mouse melanoma cells expressing FasL led to rapid tumorigenesis in normal mice but not in mice deficient in Fas.

Restoring the liver
Adult liver cells (hepatocytes) can replicate rapidly, thus allowing the liver to recover from toxic-induced damage and to regenerate in a few days after surgical procedures that remove most of its mass. Cressman et al. (p. 1379) have shown that interleukin-6 (IL-6) is a critical cytokine in this recovery. Mice lacking the gene for IL-6 were unable to regenerate liver tissue unless IL-6 was administered exogenously after tissue removal. The necessity of IL-6 is an important consideration in strategies that produce decreases in cytokine activity in order to control liver damage, such as those used in treating cirrhosis.

Hats off
There has been a recent explosion in knowledge about how the cell uses selective proteolysis to control a variety of functions. Tamura et al. (p. 1385; see the Perspective by Schneider, p. 1323) describe the discovery of a protease complex likely to form part of a multicatalytic complex. The protease subunits have a distinctive structure in electron micrographs and resemble a three-cornered (tricorn) hat.

Stress signal
When the nematode Caenorhabditis elegans finds its environment inhospitable, it develops into a dauer larva adapted for survival in adverse conditions. Ren et al. (p. 1389) show that response to the pheromone that induces the dauer phase includes alterations in transcription of a growth factor related to transforming growth factor–β. The transcriptional modulation occurs within certain chemosensory neurons of the larva.
Leave No Stone Unturned.

You know the answers you need are out there. Lost under masses of data. To uncover them, leverage the world’s most complete collection of scientific information right from your desktop with Knight-Ridder Information. Search everything from technical and patent literature to industry information...online with DIALOG®, on CD-ROM, on the Web, or use our document delivery service. Whether you’re searching individually or organization-wide, you’ll have the freedom to transform information into insight, the impulse of science. You don’t need to turn the world upside-down.

Find out more with Knight-Ridder Information – more easily, more quickly, more productively.

Call toll-free in the US: 800-334-2564.
In Canada and California: 415-254-8800. Europe e-mail: enquiries@dm.krinfo.ch
Or visit us at http://www.krinfo.com.
High-Efficiency Lambda Cloning

Lambda ZAP® Vectors for Easy Library Screening and Amplification

Stratagene’s Lambda ZAP® vectors combine the high efficiency of lambda cloning—for easier library screening and amplification—with the convenience of a plasmid system. In addition, the insert size bias inherent in plasmid libraries is not found with libraries constructed in lambda phage. Stratagene offers several derivatives of the Lambda ZAP vector, each tailored to meet your specific cloning needs. The Lambda ZAP II vector has six unique cloning sites that accommodate inserts from 0-10 kb in length, and recombinants can be screened with either DNA or antibody probes. In vivo excision of the pBluescript® plasmid allows for rapid characterization of inserts in a plasmid system without time-consuming phage preparations or subcloning steps. In addition, entire libraries can be excised for screening and analysis.

The Uni-ZAP XR® vector, Lambda ZAP II vector digested for unidirectional cloning, ensures that all clones are in the proper orientation for protein expression. The ZAP Express™ vector allows unidirectional cloning, both eukaryotic and prokaryotic expression, and increased cloning capacity up to 12 kb. For studying signal transduction, cell growth and differentiation, gene expression, secretion and metabolism, Stratagene provides a complete line of HybriZAP® two-hybrid system products for generating cDNA or genomic libraries.

REFERENCES


Construct Directional cDNA Libraries with Stratagene’s cDNA Synthesis Kits

Stratagene’s cDNA Synthesis Kit is the only cDNA synthesis kit quality controlled to produce a library with 2 x 10^9 primary clones. The method of choice for construction of directional cDNA libraries is the cDNA Synthesis Kit from Stratagene. This kit is designed to make directional cDNA libraries in your choice of innovative Lambda ZAP® cloning vectors. The kit uses 5-methyl-dCTP during first-strand synthesis, eliminating the need for site-specific methylases. All of Stratagene’s cDNA synthesis kits are provided with Pfu DNA polymerase, instead of Klenow polymerase, to create blunt-ended cDNA before adaptor ligation. Studies show that using Pfu DNA polymerase to end polish cDNA creates more efficient adapter ligation, resulting in more primary clones. Fragments that have been cloned into any Lambda ZAP vector can be quickly excised to generate subclones or entire libraries in versatile phagemid vectors. This means no more time-consuming subcloning experiments.

For construction of high-quality directional cDNA libraries, Stratagene provides kits that include your choice of powerful Lambda ZAP vector, the cDNA Synthesis Kit and ZAP-cDNA Library Construction Kit. All components are also available separately.

Don’t Settle for Less!
The Highest Efficiency Packaging Extract

Gigapack® III packaging extracts offer the highest packaging efficiencies available plus a convenient, single-tube format and simplified protocol. Gigapack III Gold extract is the only packaging extract that guarantees efficiencies of 2 x 10^9 pfu/ug DNA. Gigapack III Gold extract lacks all known E. coli restriction systems, allowing packaging of methylated DNA at efficiencies 15-fold higher than those obtained with restriction-positive extracts.

Since 1984, Gigapack extract has offered the same consistent high performance. Stratagene’s Gigapack III Gold extracts are the best extracts for high-efficiency construction of cDNA and genomic libraries. Don’t trust your valuable libraries to anything less than Gigapack III Gold packaging extracts.

ZAP-cDNA® Gigapack® III Gold Cloning Kit #200450
ZAP Express™ cDNA Gigapack® III Gold Cloning Kit #200451
HybriZAP® cDNA Gigapack® III Gold Cloning Kit #235612

*U.S. Patent Nos. 5,128,256 and 5,286,636. and European Patent No. 286200B
**Patent Pending
ProScale — a revolutionary way to achieve rapid, predictable results for protein purification. By integrating unique chemistry, intelligent software and hardware, ProScale gives you a logical and efficient path to optimize purification. From research to process development, all the way to production, ProScale offers you a no-fail formula for success with your protein.

Plus, ProScale is the only system that comes with proven, scalable HyperD* media. Matched with HyperD, our BioSys™ protein purification workstations are designed to deliver more purified protein, in less time, while retaining maximum activity.

Our intelligent ProScale software takes much of the guesswork out of method development and optimization, thereby saving you time and effort. By running simulation experiments within the software, much of your trial-and-error work is eliminated.

Take the guesswork out of protein purification and put ProScale in your lab. For additional information, just call your local Beckman representative or visit our Web site at http://www.beckman.com.

* HyperD is a trademark of BioSepra, Inc.
Picture Perfect

KODAK Products and Techware — the perfect match for scientific imaging.

When it comes to your biological imaging and analysis product needs, there's no better choice than KODAK products from Sigma-Aldrich Techware.

A single phone call is all it takes to gain immediate access to many KODAK Scientific Imaging Systems products...as well as over 10,000 other brand name laboratory equipment and supply products.

In addition to a wide selection of top quality laboratory products, Sigma-Aldrich Techware backs each purchase with unequalled service and support, including:

- Same day shipping
- Comprehensive technical support
- Competitive pricing

If your research calls for biological imaging and analysis products that are picture perfect, choose KODAK products from Sigma-Aldrich Techware—your single, most convenient source for brand name laboratory equipment and supplies.

SIGMA®
Where Science and Service Come Together.

Call collect: 314-771-5750,
Toll Free: 800-325-3010,
or contact your local Sigma office.
World Wide Web: http://www.sigma.sial.com
Detect, measure and characterize with KPL’s high-performance, non-radioactive kits and reagents.

You don’t need another lecture on the usage and disposal problems associated with radioactivity. But you do need to know about viable, reliable alternatives. KPL offers over 600 products for applications in ELISA; Western, Southern and Northern blotting; and immunohistochemistry.

- Nucleic Acid Labeling and Detection Systems
- Substrates for Microwell ELISA, Immunoblotting and Immunohistochemistry
- Western Blot Systems
- HistoMark® Biotin Streptavidin Kits
- Secondary Antibodies to Human and Animal Immunoglobulins
- BacTrace® Antibodies to Selected Bacteria

Because we make our own products, we can provide customers with immediate access to in-depth expertise via our Technical Service line and FastFacts™. And we’re happy to discuss custom and bulk orders.

Granted, sometimes you have no choice but to use radioactive methods. However, most times you do. That’s when you should count on KPL.

For a catalog and more information, call 1-800-638-3167.
LETTERS

Small amounts
A report about possible "increase in potency of weakly estrogenic compounds when used in combination" is said to have "aroused considerable interest." One physician's early diagnosis and reporting of arsenic poisoning from well water in India—and the wider response to the problem—are described. (Right, a bicycle brigade of patients/data collectors in West Bengal.) A Mayan mural might depict "some species of blue macaw." Organisms as small as 0.01 micrometer in diameter may exert "an enormous influence on Earth's surface chemistry." And an "impressive" experiment using two marbles is proposed.

Activation of Estrogen Receptors

The report by S. F. Arnold et al. (7 June, p. 1489) demonstrating an increase in potency of weakly estrogenic compounds when used in combination has aroused considerable interest. A number of aspects of the report, however, are unclear.

First, the chemicals that were used (the pesticides endosulfan, dieldrin, toxaphene, and chlordane) are not the most obvious choice: for example, Sharpe et al. used 4-octylphenol and butyl benzyl phthalate in their demonstration of reproductive effects in rats (1). Second, in the latter part of the report, concerning human endometrial cancer cells, the focus switches to an interaction between two polychlorinated biphenyls (PCBs), rather than sticking with the same pesticides. In neither case is a justification given for the selection or rejection of compounds in the study's design.

Third, the significance of the findings is unclear: even the potentiated action is less than that of estradiol by a factor of 10^3. Fourth, the results of one of the tests used, inhibition of estradiol binding, could equally well correspond to an estrogenic antagonistic as to an agonist effect in vivo.

Michael Joffe
Department of Epidemiology and Public Health, Imperial College School of Medicine at St. Mary's, Norfolk Place, London W2 1PG, United Kingdom
E-mail: mjoffe@ic.ac.uk

Response: Joffe inquires about the selection of the compounds used in our study of the synergistic action of weakly estrogenic chemicals. The pesticides (endosulfan and others) were chosen because they had been shown to function individually as estrogens in mammalian cells and to stimulate greater-than-additive responses when combined (1). The hydroxylated-PCB-stimulated estrogen-specific responses in mice (2) and turtles (3), and a combination of the two hydroxylated PCBs produced synergistic responses in the turtle (3). The pesticides and the PCBs interacted with the estrogen receptor in competitive binding assays, suggesting that the estrogenic activity observed was occurring at the level of the receptor (1, 2).

Another factor in the selection of the compounds that we did not present in our original report was mentioned in another paper (4). The pesticides tested in our study, and related PCBs, were identified in alligator eggs from Lake Apopka, Florida (5). The presence of contaminants in eggs has been associated with the reported disrupted reproductive and developmental physiology of alligators (6). In fact, using an estrogen receptor assay from alligator, we showed that the individual chemicals had little or no activity (7). However, a combination of all the chemicals at concentrations found in the eggs produced synergistic binding activity with the alligator estrogen receptor.

By studying the activity of "naturally" occurring combinations, we can begin to understand the activity of chemical mixtures. In fact, because of the varied endocrine defects reported in the literature that

References
have been associated with environmental agents (6), it is likely that synergy in estrogen signaling and also in other endocrine systems is partly responsible for the reported effects.

John A. McLachlan
Tulane-Xavier Center for Bioenvironmental Research,
Tulane University MC,
1430 Tulane Avenue, SL3,
New Orleans, LA 70112, USA
E-mail: jmclach@mailhost.tcs.tulane.edu

References

"Quantum Voodoo"
There is a very old method of communicating faster than the speed of light. You take a red marble and a green marble, and—without looking—place them in two different boxes. Your assistant takes one box and saunters off to the East Coast. You take your box and proceed to the West Coast. Then at a previously agreed upon time, you open your boxes. You will both “instantaneously” know what color marble your partner is looking at—even though you’re thousands of miles apart! This experiment is even more impressive if you assume that until one of you actually looks at a marble, either one “could” be either color. (Try disproving that some time!)

I see now that quantum mechanicians are experimenting with making “the quantum state of a particle ... disappear, then reappear elsewhere ... without physically making the trip” (G. Taubes, Research News, 25 Oct., p. 504). These are, indeed, exciting times.

Eric Geislinger
Transonic
1402 SW Upland Drive,
Portland, OR 97221, USA
E-mail: trnsonic@teleport.com

Flights from Reason?
The quote (Random Samples, 11 Oct., p. 183) from Norman Levitt’s book The Flight from Science and Reason (1) exhibits a flight from reason equivalent to that apparent in many postmodernistic critiques of “science.” Specifically, “the idea that the cultural critic can meaningfully analyze ...” anything or everything does not follow from the premise that “everything that people do is ‘cultural.’” It may be “distinctly weird to listen to pronouncements on the nature of mathematics from the lips of someone who cannot tell you what a complex number is,” but it does not follow that those pronouncements have no empirical validity. The explicit methods of study that constitute “science” were created to address the question of how we can establish empirical validity. This question arises only because all human understanding is “culture.”

W. Penn Handwerker
Department of Anthropology,
University of Connecticut,
Storrs, CT 06269-2176, USA
E-mail: handwerk@uconnvm.uconn.edu

References

New Swedish solutions for purifying peptides of any source using any technique

INTRODUCING
• ten new reversed phase chromatography columns
• two new ion exchange chromatography columns
• a new size exclusion chromatography column
• one completely new system for peptide, oligonucleotides and other biomolecules (AKTA is the Swedish word for real, it’s pronounced Akta)
Arsenic Poisoning in West Bengal

In the article "India's spreading health crisis draws global arsenic experts" by Pallava Bagla and Jocelyn Kaiser (News & Comment, 11 Oct., p. 174), there is no mention of Kshitish C. Saha, who was, to my knowledge, the first to detect and report cases of arsenic poisoning in West Bengal (1). Saha, who retired in 1987 as a professor and head of the Department of Dermatology at the School of Tropical Medicine in Calcutta, correctly diagnosed a rare dermatological disorder, arsenical dermatoses, in 1983 and went on to treat hundreds of arsenic-affected patients (2). After detecting a case of what he believed was arsenic-caused skin cancer, he began to analyze the arsenic content of the hair, skin, nails, and urine from his patients. His later research focused on establishing that arsenic was the cause of the poisoning. In 1987, he won the Glaxo Oration Award from the Indian Association of Dermatology, Venerology, and Leprology. His study of 1214 patients with chronic arsenical dermatoses from 61 villages in seven districts of West Bengal from 1983 to 1987 (3) created a solid foundation for arsenic research in West Bengal. He has now documented more than 200,000 cases. In fact, the photograph of nodular keratosis on a patient's feet that accompanies the News & Comment article shows one of them (3).

Deba P. Saha
Department of Biotechnology, K-15-1-1800, Schering Plough Research Institute, Kenilworth, NJ 07033, USA
E-mail: deba.saha@scorp.com

References

As a member of the World Health Organization (WHO) team that recently visited some of the arsenic-contaminated areas in West Bengal, India, I would like to comment on the article by Bagla and Kaiser. India's official response to the tragedy may have been "low-keyed," but it was not indifferent. The WHO team met with key central government (of India) and state government (of West Bengal) personnel. Everyone, including the state ministers of the departments of health and public works, is genuinely concerned with the alarming situation and is taking the appropriate steps to avert or mitigate the extent of the tragedy. Among the remedial measures contemplated by the government agencies, the following are especially noteworthy: (i) conducting a comprehensive and systematic survey of the number of tube wells (deep unconfined aquifers used as drinking water supplies) and monitoring the arsenic concentrations in the aquifers and the number of people exposed to chronic arsenic poisoning; (ii) conducting a comprehensive epidemiological study and other research and development activities, such as finding methods of arsenic removal; (iii) setting up treatment plants that ensure the supply of arsenic-safe drinking water; (iv) setting up specialized clinics for the diagnosis and treatment of arsenic skin lesions, including cancer; (v) instituting training programs for medical and paramedical staff working in the affected areas for the early detection and treatment of chronic arsenic exposure; and (vi) launching mass awareness campaigns.

Finding the solution to the arsenic calamity in West Bengal will require concerted efforts on the part of many organizations, scientists, and physicians. The scientific expertise in India and abroad should provide

Are you working with natural peptides? Synthetic peptides? Recombinant peptides? Peptide fragments? Or all of them? Whatever peptide you work with, your options for purifying them just increased.

With ten new columns for reversed phase chromatography, you’re nearly certain of finding the selectivity you need in our extensive range. All of these new RPC columns deliver high resolution; combined, they’ll take you from purification and analysis to peptide mapping.

We can support you with advice and solutions for other peptide purification techniques as well. Are you separating peptides with poor solubility? Our new size exclusion column withstands high pH and solvents. Do you need an extra technique to help you with a difficult-to-separate peptide? We have two new ion exchange columns that permit very high resolution and withstand high pH ranges.

What’s more, all 13 columns are supported by ÄKTA™ purifier—a revolutionary new purification system for peptides, oligonucleotides and other biomolecules. Its preset protocols let you resolve all major purification tasks quickly and easily. Its control system lets you instantly transfer your methods to purification systems at all scales.

Want to know more about our peptide purification solutions? Call us: 1 (800) 526 3593 from the USA; +81 (0)3 3492 6949 from Japan; or +46 (0)18 16 50 11 from Europe and the rest of the world; or meet us on the Internet at http://www.biotech.pharmacia.se.
the knowledge and technical support for the government agencies to efficiently, effectively, expeditiously, and economically tackle this silent epidemic.

Kunnath S. Subramanian
Environmental Health Directorate,
Health Canada, Ottawa, Ontario,
Canada K1A 0L2

In Defense of Nannobacteria

Enough! As one of the discoverers of mineralized nannobacteria on Earth (1), I must come to their defense. They are so abundant in samples I have studied that I believe they may make up most of Earth’s biomass. Yet they appear to be nearly unknown to many biologists, hence the questions about putative Martian nannobacteria (Letters, 20 Sept., p. 1639; Reports, 16 Aug., p. 924).

Nannobacteria with cells 0.1 to 0.4 micrometer in diameter have been cultured by Allan Pentecost from the hot spring waters at Viterbo, Italy (2). Nannobacteria 0.05 micrometer in diameter have been found in thickly packed colonies on decaying leaves in the San Marcos River in Texas (3). K. K. Akerman et al. have found forms they term “nannobacteria” in blood (4). If these are not nannobacteria, then what are they? Until we know, perhaps the term “protophont” or “quasibiont” might be used.

Microbiologists should be aware that there are vast numbers of organisms detectable by scanning electron microscope in the 0.01- to 0.2-micrometer range happily precipitating all sorts of minerals, acting saprophytically to precipitate organic hard parts, and generally exerting what appears to be an enormous influence on Earth’s surface chemistry.

Robert L. Folk
Department of Geological Sciences,
University of Texas,
Austin, TX 78712, USA

References
2. __________ et al., unpublished manuscript.

Cold Neutron Production

We disagree with the statements in Andrew Lawler’s article “U.S. neutron scientists settle for less” concerning the availability of cold neutrons at pulsed neutron sources (PSs) (News & Comment, 9 Aug., p. 728) that cold neutron production is merely a “theoretical possibility” and that the associated technology lags behind that for reactors.

Because pulsed sources produce high fluxes of “hot” neutrons in a natural way, perhaps not everyone is aware of the success with which cold neutrons are being produced and exploited at PSs. It is actually easier to produce cold neutrons at a PS than at a reactor. The overall heat load is much less for the same peak neutron flux, and the required moderators are small in dimension and can usually be inserted into the neighborhood of the spallation target in a simple way. Thus, a moderator change can be accomplished in a few weeks. The cold moderator design, construction, and installation can be done within normal operating budgets. This is in contrast to the case for reactors, where the installation of a cold moderator is a major project requiring separate funding and usually a significant shutdown for installation. Moreover, the spectral and pulse characteristics can be tailored to fit applications.

The existing pulsed spallation neutron sources owe much of their success to cold moderator technology. The scientific prob-

Glyko’s FACE® technology makes carbohydrate analysis fast, reliable, and affordable

Glyko’s FACE (Fluorophore Assisted Carbohydrate Electrophoresis) technology makes it possible for you to work with and analyze complex carbohydrates using the same technique you already use in your lab: polyacrylamide gel electrophoresis. Now, in less than one day, you can perform profiling, composition, or sequencing experiments using FACE chemistry kits. Everything you need is included: enzymes or release chemicals, fluorescent labeling reagents, electrophoresis standards, controls, running buffers, precast polyacrylamide gels, and complete protocols.

The FACE Imager and Analytical Software give you the ability to analyze, quantify, and document the results of n-linked and o-linked oligosaccharide profiling, monosaccharide composition and sequencing gels—without radio-labeling, staining, or exhaustive sample preparation.

FACE Recombinant Glycosidases Glyko continues to discover and clone more recombinant glycosidases than anyone else. Stringent quality control and high specific activity assure predictable reaction times and consistent results. Glyko recombinant glycosidases can be used for your cell biology, biochemistry, or sequencing experiments.

Buy a FACE kit before 15 Dec 96 and receive a FREE enzyme of your choice! For full details call toll free (U.S.) 1-800-33 GLYKO, phone 1-415-382-6653, or fax 1-415-382-7889

Also now available: our comprehensive new 96/97 Catalog of Products and Services.

VISIT OUR WEB SITE: http://www.glyko.com

©1996 Glyko, Inc., Novato, CA 94949. FACE is a registered trademark of Glyko, Inc.

Circle No. 55 on Readers' Service Card
lems that have been addressed have been in the same areas as those addressed using reactor-based cold sources. The areas in question, as is typical for neutron beam exploitation in general, are extraordinarily diverse and range from surface science and chemical spectroscopy to magnetism. The possibilities inherent in the time structure of PS cold moderator performance represent opportunities for optimization beyond those of steady-source moderators that are still being explored.

James D. Jorgensen
Group Leader for Neutron and X-ray Scattering,
Materials Science Division,
Argonne National Laboratory,
Argonne, IL 60439, USA

John M. Carpenter
Technical Director,
Intense Pulsed Neutron Source Division,
Argonne National Laboratory

Gabriel Acplli
NEC Research Institute,
4 Independence Way,
Princeton, NJ 08540, USA

“Quetzal” Coatings

The Mayan mural illustrated on the cover of the 12 July issue clearly illustrates the beauty of the blue dye used by the Mayans (Reports, 12 July, p. 223). The bird in the mural is identified as a “quetzal,” but its features—the stumpy curved bill, pale lore around the eyes, long tail, and sturdy legs—suggest that it is probably a macaw. Although no extant macaw matches the painting in every detail, the bird is most likely a macaw of the genus Anodorhynchus. All three extant Anodorhynchus species have blue plumage and pale lores. Two of them measure about 73 centimeters from head to tail (1); the bird as painted measures 70 centimeters from head to tail. Given the generally high level of Mayan artistic accuracy, it seems likely that the artist knew this bird well and did not simply create it from the imagination. The genus Anodorhynchus is today restricted to Brazil and Argentina (1). Thus, the Maya painting suggests that some species of blue macaw may have formerly inhabited Mexico. Differences between extant species of Anodorhynchus and the bird depicted (such as the presence of a crest and pale epaulets) might even suggest that Mexico once boasted its own, now extinct, species of blue macaw, lost perhaps to overhunting or habitat destruction. Alternatively, Mayans and the inhabitants of South America might have engaged in trade in these birds.

Shou-Hsien Li
Walter Messier
Department of Biological Sciences,
State University of New York,
Albany, NY 12222, USA

References

Corrections and Clarifications

In the report “A revised chronology for Mississippi River subdeltas” by T. E. Tornqvist et al. (20 Sept., p. 1693), the e-mail address of the corresponding author should have read, “t.tornqvist@frw.ruu.nl”.

In the letter “Science in China” by T. C. Tso (13 Sept., p. 1478), the reference numbers in the text should have read 1 through 4, not 2 through 5. In the second column of the letter, 12 lines from the bottom, “(1)” should not have appeared.

In the letter “Redundant genome sequencing” by J. E. Davies (30 Aug., p. 1155), the word “Mycobacterium” was misspelled twice, and the word “mycobacterial” was incorrectly spelled. These errors occurred during editing.

In the Research News article “Learning deficit identified in brain” by Marcia Barinaga (16 Aug., p. 867), the end of the first sentence should have read “the certain spoken sounds known as phonemes.” The end of the last complete sentence on that page should have read, “distinguish between syllables that begin with closely related phonemes.”

In the Research News article “Forging a path to cell death” by Marcia Barinaga (9 Aug., p. 737), Matthias Man of the European Molecular Biology Laboratory in Heidelberg, Germany, should have been included as a collaborator with the groups of V. Dixit and F. Krammer in the discovery of the FLICE protein.

The Random Samples item “Grassroots search for primes . . .” (9 Aug., p. 743), inaccurately described assembly language as the raw code read by a computer. Assembly language must be translated by an assembler into machine language (ones and zeros) before a computer reads it.

Letters to the Editor

Letters may be submitted by e-mail (at science_letters@aaas.org), fax (202-789-4698), or regular mail (Science, 1200 New York Avenue, NW, Washington, DC 20005, USA). Letters are not routinely acknowledged. Full addresses, signatures, and daytime phone numbers should be included. Letters should be brief (300 words or less) and may be edited for reasons of clarity or space. They may appear in print and/or on the World Wide Web. Letter writers are not consulted before publication.
Genome Systems, Inc. introduces a complete line of mouse knockout services to fit each investigator's unique requirements. Whether you need our complete knockout services or just a "taste", Genome Systems provides the answer.

**Isolation of 129/SvJ genomic clones from our BAC library:** All knockout experiments start with isolation of your gene. Genome systems is the only company that makes the libraries it screens. $995/screen. catalog # BAC-4921

**Engineering of the targeting vector:** We prefer to start with our own 129/SvJ DNA. However, if you have already isolated your gene, you can supply us with DNA from another 129 strain. We will subclone fragments, extensively map your gene and do all sequencing necessary to make a good targeting construct for homologous recombination. $10,000/experiment. catalog # MK-2110

**Electroporation and antibiotic selection of ES cells:** We will take your targeting vector, electroporate our "Go Germline" RW-4 ES cells and plate them on our primary MEF feeder cells. We do all tissue culture and antibiotic selection. You receive a minimum of 150 ES clones, in duplicate, for Southern analysis and eventual blastocyst injection or morula aggregation. $3,500/150 clone minimum. catalog # MK-2120

**Southern analysis of antibiotic selected ES clones:** We take ES clones and perform all Southern analysis so we can determine which clone contains the knocked out allele. $7,650/150 clones. catalog # MK-2130; or you provide the targeting construct $3,825/150 clones. catalog # MK2130A

**Karyotyping:** We will examine 20 metaphases and send back a numerical count and structural analysis of the chromosomes. $750 per clone. catalog # MK-2150

**Morula aggregation:** We use the latest technology to perform Morula aggregation to create highly chimeric mice. U.S. patent (#5,449,620) is licensed exclusively to Genome Systems. Send us your targeted ES cells and we will send you at least 3 highly chimeric male mice so you can obtain founder mice. $7,000/experiment catalog # MK-2140

---

Genome Systems, Inc.
8620 Pennell Drive
St. Louis, Missouri 63114, USA
(800) 430-0030 or, (314) 692-0033
Facsimile: (314) 692-0044

France: Appel gratuit, 0590-2104
Germany: Rufen sie uns an zum ortstarif, 0130-81-9081
UK: Call us free on, 0800-89-3733
email address: Genome@MO.net
World Wide Web: http://www.genomesystems.com
Industry Sees Rise in R&D Spending

U.S. companies are planning to boost R&D spending in 1997—but at a slightly slower pace than they have done this year. And companies around the world, which were asked about their plans for the first time, project an equally rosy outlook.

The new data come from the annual R&D trends survey conducted by the Industrial Research Institute (IRI), which represents 265 U.S. firms. This year’s results, released earlier this week, show that 29% of the 121 U.S. companies that responded expect to ratchet up their R&D spending by 6% or more, 17% expect to increase their hiring of new graduates by at least that magnitude, and 19% anticipate a similarly large jump in grants to university researchers. Last year, the comparable figures were 38%, 23%, and 24%. Overall, R&D spending is projected to rise by 5.6% in 1997.

Recent history shows the actual figures may be higher. Preliminary figures for the top 100 companies suggest that 1995 spending will be nearly double the projected 5%, says IRI executive director Charles Larsen, adding that 1996 looks “at least as strong.”

Outside the United States, the largest spending increases are forecast for Korea, with 77% of 110 companies predicting that their budgets will rise by at least 6%. And 60% of the firms predict similar increases in the hiring of new graduates. However, Larsen cautions that the Korean numbers have to overcome annual inflation rates of 10% to 12%, much higher than in most industrialized countries.

NASA Pledges to Fix Grant Bottleneck

NASA faces a rising chorus of complaints from academic researchers who say it takes too long—up to 5 months—to get their money once grant-winners have been chosen. The agency is now scrambling to ease such concerns by promising to follow a strict timetable.

At a recent meeting of outside NASA advisers, California Institute of Technology astronomer Annelea Sargent told NASA acting Deputy Administrator Jack Dailey that “there is a great deal of frustration in the community, and things have gotten much worse.” She cited a “huge bottleneck” in recent months in processing grant money after winning proposals have been chosen. NASA managers now are promising that the 1500 or so grantees—who receive on average $60,000 a year—will get their checks within about 2 months of selection, according to Henry Brinton, chief of NASA’s planetary science branch.

Brinton says NASA’s already poor record worsened this summer when control of grants was shifted from Washington headquarters to Goddard Space Flight Center in Maryland, but he adds that the delays should be smoothed out soon. Scientists say they’re optimistic. “We’ve had a very sympathetic reaction from NASA,” says Klaus Kelil, a planetary scientist at the University of Hawaii. Both Kelil and Sargent add that factors external to NASA have added to the problem, including the growing reluctance of university administrators to give cash advances to researchers waiting for grants.

Light in Saskatchewan: Canada Plans a Synchrotron

Canadian physicists are hoping to catch up with the rest of the industrialized world soon by building their own synchrotron light source. This week, a group of researchers was planning to ask the federal government to ante up $77 million for a Canadian Light Source, a 47-meter-diameter ring for accelerating electrons to be located in Saskatchewan.

While synchrotrons have been springing up all over the globe, even in Korea and Brazil, Canadian scientists have had to beg for beam time on international machines. But lately, they “aren’t too welcome anymore,” according to the Canadian synchrotron project’s chief proponent. “The feeling is that Canada is freeloading,” says Dennis Skopik, director of the Saskatchewan Accelerator Laboratory. So he and his colleagues drew up a plan for a 2.5 billion-electron-volt synchrotron that would produce a full spectrum of radiation, from ultraviolet to hard x-rays.

The proposal was approved by an international peer-review panel last spring and endorsed by Canada’s Natural Sciences and Engineering Research Council last month. NSERC’s Bob McAlpine says the project “opens up possibilities in many, many fields,” including protein crystallography and micro-machining. The University of Saskatchewan, the province, and other sources have pledged about $38 million for capital costs, estimated at $115 million. But sponsors need $77 million more, as well as $8 million per year in operating funds, from the feds.

The project could benefit from good timing. Canada’s Liberal government recently pronounced the nation’s deficit “tamed,” and the synchrotron could figure as a campaign goody for Saskatchewan in the general election expected next spring. Skopik says: “We hope to get this in next year’s budget,” which will be presented shortly before the election.

Minnesota Regents Soften Tenure Plan

Faculty at the University of Minnesota—irate over what they viewed as an attempt to gut the school’s tenure system—are cooling off now that the university’s Board of Regents appears to have backed off from an earlier plan. At an “emergency” meeting held on 7 November, the regents accepted a compromise proposal that covers only the law school.

The regents’ original plan, put forth in September and designed to cover the entire university, would have allowed layoffs of tenured academics in the event of program terminations and individual cuts in base pay. Faculty members were so worried that they began to sign “authorization” cards as a first step toward forming a union (Science, 20 September, p. 1653). Once 30% of the faculty had signed, state law required the regents to stick to the status quo until after a vote on unionizing, now set for early next year.

But because the law faculty had not signed enough cards, the regents were able to pass a new tenure code covering the law school. In doing so, the regents softened their position, however. The revised law school plan says that academics whose programs are cut would be given new jobs, and any cuts in base pay would be collegewide and subject to faculty approval. Fred L. Morrison, a law school professor, says this new tenure code is very similar to rules that faculty themselves had suggested last spring; “My sense is the rest of the university should be happy to go along with it.”

Faculty members haven’t thrown out their union authorization cards, however. Morrison and others say there is so much mistrust of the regents that the idea of unionizing, while distasteful to most, is by no means dead. Much depends on the policies of the next university chief. President Nils Hasselmo—who opposed the regents’ proposal—is leaving, and the regents are to select his successor next month.
Athenian Plague Probe

A mass grave containing at least 130 ancient Athenian corpses—discovered last year during the construction of an Athens subway line—may cast light on the cause of the mysterious Plague of Athens in about 430 B.C.

Patrick E. Olson, an epidemiologist at the Naval Medical Center in San Diego, recently began seeking permission to study samples from the Athenian remains to test a hypothesis that he and three collaborators made last spring—that the ancient wartime plague, which has puzzled scholars for centuries, was caused by the deadly Ebola virus (Science, 14 June, p. 1591). The group based its theory in part on contemporaneous descriptions of symptoms. But testing human remains from the period for Ebola DNA seemed impossible. “The area around Athens has been civilized for 3000 years, and we presumed that anything dated to the plague period would have been destroyed and rebuilt many times over,” says Olson.

The newly discovered burial ground, containing the remains of 130 to 150 bodies, lies in the city’s Kerameikos cemetery, which was used mainly in the 5th century. Funerary offerings, chiefly vases, allowed scholars to date the burial to 430 to 429 B.C.—smack in the middle of the plague. “The discovery, if indeed corresponding to a mass burial of the Athenian plague, is very significant,” says Demetrius U. Schlardi, an Athens- and Rome-based archaeologist who is cooperating with Olson.

Scientists don’t have much experience isolating DNA from such old specimens. But Olson says the Ebola virus replicates so widely in human tissues that it shouldn’t be hard to detect. Pathologists will be able to obtain genetic material if the longer bones still contain marrow. Organs would be better yet, because they can also be examined under a microscope.

If he obtains approval from authorities overseeing the archaeological excavations, Olson hopes to find a pathologist in Greece to assess how many bodies are testable. Then, tiny samples from a small selection of bodies could either be tested in Greece or flown to U.S. labs.

Sucking up meteorites? Miners’ magnets may collect fossil meteorites along with scrap metal.

Mining for Meteorites

This is the season when meteorite specialists scour the featureless white surface of Antarctica for meteorites. But geologists at Pennsylvania State University are launching a meteorite search closer to home—in mines.

Andrew Sicree, a doctoral student and curator of Penn State’s Earth and Mineral Sciences Museum, believes that deposits of coal, limestone, and trona (a rock used in glassmaking) might be sources of meteorites that landed on Earth millions of years ago, when these sedimentary rocks were forming. Most iron meteorites that land on the surface rust away within a few hundred years. But Sicree says they stand a chance of surviving if embedded in these rocks, because fluids in the sediments react with the iron to form a protective rind of pyrite or iron oxide. Sicree’s reasoning is sound, says Guy Consolmagno, an astronomer from the Vatican Observatory who hunts meteorites in Antarctica: “It’s worth checking to see if they’re there.”

Many mines suspend powerful magnets above their conveyor belts to remove “tramp metal” from the rock before it damages the crushers. Most of that metal is humanmade, ranging from pickaxes to lunch boxes, but Sicree thinks the magnets may be collecting iron meteorites too. So, he says, “we can search this rock on the cheap.” At least 20 mines have agreed to sort through the metal for “unknown or rocklike particles” and send any unusual specimens to Penn State for analysis.

The campaign has yet to yield its first meteorite, but Sicree believes it has a good chance of success. Assuming meteorites were falling at the same rate as today back when coal beds were forming, he calculates that an operation digging out 36 million tons of coal per year—as one large mine in Wyoming does—could unearth as much as 10 kilograms of meteorites.

Rumblings Over “Giscardoscope”

Controversy has been bubbling up over a plan for a volcano theme park in the hills of the French province of Auvergne. “Vulcania” would entail an expenditure of $80 million on a museum with 14,000 square meters of floor space, situated in the heart of a nature park near Clermont-Ferrand that is the site of a chain of extinct volcanoes. Initially proposed in 1992 as a small volcano museum, the idea quickly grew to royal proportions under the encouragement of France’s former President Valéry Giscard d’Estaing. Present plans include Disney World-style attractions with animated models of volcanoes and three-dimensional movies viewed with goggles.

(continued on page 1309)
Above photo: Southern blot analysis showing enrichment of IL-2 receptor, known to be activated in human Jurkat T-cells by PHA/PMA treatment. Lane 1: unsubtracted cDNA, treated cells. Lane 2: unsubtracted cDNA, untreated cells. Lane 3: subtracted cDNA, treated cells. A dramatic reduction of the abundant housekeeping gene, G3PDH, was also seen (data not shown).

Northern blot analysis of two selected representative cDNA clones from a testis-specific library. Testis cDNA was subtracted against a mixture of cDNAs from 10 different tissues. The subtracted testis-specific cDNA was cloned into a plasmid vector, and 10 randomly selected clones were used to probe Human Multiple Tissue Northern Blots containing 2 μg of poly A+ RNA from the indicated tissues. All 10 clones hybridized only to testis RNA. The exposure times needed to generate signal ranged from 5 hr (Panel A) to 7 days (Panel B), indicating that abundant and relatively rare cDNAs were obtained. Lanes 1-16: heart (1), brain (2), placenta (3), lung (4), liver (5), skeletal muscle (6), kidney (7), pancreas (8), spleen (9), thymus (10), prostate (11), testis (12), ovary (13), small intestine (14), colon (15), peripheral blood leukocyte (16).

Introducing the PCR-Select™ cDNA Subtraction Kit (#K1804-1), a revolutionary new method for finding differentially expressed genes. Actually, it has several important features. First, you selectively amplify only your genes of interest—in fact, no physical subtraction is needed. Further, this unique method allows you to equalize and subtract in one procedure, to dramatically increase the probability of obtaining cDNAs that correspond to rare transcripts—with greater than 1,000-fold enrichment. Thus, you can directly clone the subtracted cDNAs or use them as hybridization probes to screen cDNA or genomic libraries. And, it only requires 0.5–2.0 μg of poly A+ RNA. But, best of all, it works. For more information or to order, call 1-800-662-CLON or contact your local distributor.

Circle No. 49 on Readers' Service Card

DON'T EXPERIMENT WITH ANYTHING ELSE.

CLONTECH
1020 East Meadow Circle, Palo Alto, California 94303 USA
FAX: 800/424-1350 415/424-1064 • TEL: 800/662-CLON 415/424-8222
e-mail: tech@clontech.com • orders@clontech.com
©1996 CLONTECH Laboratories, Inc.

PCR is covered by patents owned by Hoffmann-La Roche and F. Hoffmann-La Roche A.G.
But environmental opposition is growing to the project, which has been dubbed the "Giscardoscope" by critics. On 27 October, a group of ecologists organized a protest march that drew about 1000 people to the planned Vulcana site, according to Bernard Devoucoux, who represents Auvergne on the regional council of France's Green Party. "We are not opposed to the center, but we don't want it in the park because we fear urban-type development," he says. Ecologists say the plan would disrupt the landscape, involving as it would a vast infrastructure, including hotels and new roads to deal with the expected 500,000 visitors a year. Also, there are concerns that the construction could pollute the aquifer of the region, says Devoucoux.

Volcanologist Jean-Louis Cheminée, a member of Vulcana's scientific council, believes that the ecologists are exaggerating the threats and defends the museum as being scientifically important for both specialists and the public at large. But others, such as volcanologist Jean-Claude Tanguy of the Institut de Physique du Globe de Paris at St. Maure, sympathize with the ecologists. He says "It's not important for this museum to be inside the nature park; it might as well be built near it," as critics propose.

**Slow Gene Linked to Breast Cancer**

Some women smokers with a variation of a gene that helps the body fight toxicants may be predisposed to breast cancer, according to a report in the 13 November *Journal of the American Medical Association*. The study, the authors say, is the first to look at genetic variability as a factor in a smoker's susceptibility to breast cancer.

The gene in this case codes for N-acetyltransferase 2, an enzyme that helps break down and detoxify aromatic amines, common carcinogens in tobacco smoke and cooked meat. There are several versions of the gene, some of which code for less efficient versions of the enzyme. About 55% of whites have one of the less efficient versions, called slow acetylators.

A team from the State University of New York, Buffalo, and the National Cancer Institute (NCI) looked at a group of white women to see whether having the gene coding for the fast version of the enzyme helped protect them against breast cancer. They looked at more than 600 women—about half with breast cancer—and found no correlation between the form of the gene and breast cancer in premenopausal women. But when the researchers looked at the postmenopausal women, they found that smokers with a slow acetylator gene were more likely to have breast cancer than smokers with the rapid version. The effect was even more pronounced among the 38 heavy smokers (more than a pack a day for 20 years): 17 (69%) of the 24 with the slow gene had cancer. Of the 14 with the fast gene, three (21%) had cancer.

The findings dovetail with other studies linking variations in certain genes with differences in organisms' ability to resist carcinogens, says Lance Liotta, chief of NCI's laboratory of pathology (Liotta was not involved in the study). His lab has found that the p53 tumor-suppressor gene helps people resist lung cancers from certain environmental poisons.

Such findings could prove useful to physicians. But women who get screened and find out they have the fast version shouldn't assume they won't get cancer from smoking, warns NCI molecular epidemiologist Peter Shields, one of the study's authors. "There's never a justification to smoke," he says.

**Good News for Beer Drinkers**

In the 1970s, several research groups identified substances in charred meats and fish as carcinogens. Now a Japanese research group has learned that the beer people often reach for when they're eating barbecue may have an inhibitory effect on at least one of those cancer-causing substances.

A team at Okayama University led by Hikoya Hayatsu, a professor of pharmaceutical sciences, reported at the annual meeting of the Japanese Cancer Association in Yokohama last month that small amounts of beer countered the mutagenic effects of Trp-P-2 (tryptophan pyrrolysate product number 2) on bacteria in a test-tube culture. Trp-P-2 is one of a class of potent carcinogens known as heterocyclic amines that are produced by burning meat, fish, and tobacco leaves, among other things. When as little as 0.1 ml, about two drops, of beer was combined with the Trp-P-2 and administered to salmonella bacteria, the mutation rate in the bacteria fell to half that seen when Trp-P-2 alone was added to the test tube.

Hayatsu says beer was already known to contain polyphenolic compounds, which inhibit mutagenesis. But he says beer proved to be a far better inhibitor than the compounds alone. "There must be another compound, or compounds, causing the effect we are seeing," he says. His team is now trying to isolate such compounds with an eye to testing them against other carcinogens in cooked meats.

Yoichi Konishi, a professor of pathology at Nara Medical University, says he finds the group's work persuasive, but cautions that it's "just the starting point" for research aimed at finding new ways to suppress cancer. Hayatsu couldn't agree more. During the past month, he's been trying to throw a little cold water on local press reports which leap on the research as proving beer's life-giving properties. "The content of Trp-P-2 is rather minor compared to other carcinogens that have been discovered in charred meat," Hayatsu says.
Introducing BioLite™: A luminescent labeling and detection assay kit for the quantification of cells, particles, and microorganisms.

BioLite™, a long-lived “glow” type signal assay kit, allows you to carry out high throughput cell adhesion, chemotactic or infection studies in the microplate format. With BioLite, you simply pre-label your cells, particles, or microorganisms of interest using the label provided. Perform your assay; wash any non-adherent, non-bound, or non-invasive labeled cells or microorganisms free; add the BioLite detection reagent; and measure the produced signal.

BioLite labeling is rapid, permanent, cell-type independent, and does not require long incubation times. The assay simplicity and high detection sensitivity with BioLite enables the use of microplate technology for easy handling and high throughput analysis. And, with a half-life of several hours, BioLite allows you to prepare multiple microplates at the same time for compound screening assays or to measure plates at multiple time points.

Combined with the TopCount™ microplate scintillation and luminescence counter, BioLite assays can be performed in either the 96- or 384-well microplate format for batch processing of cellular or microbiological assays. TopCount enables you to analyze 12 samples simultaneously. It also provides temperature control and stackers to hold up to 40 microplates.

Switch on BioLite for:
- Rapid, non-isotopic labeling and detection
- Long-lived luminescent signal (half-life of several hours)
- High sensitivity
- A label that binds equally well to all cell types
- A label that does not interfere with cell adhesion kinetics or membrane receptor function

1Patent pending

Packard Instrument Company, 800 Research Parkway, Meriden, CT 06450 U.S.A.
Tel: 203-238-2351 Toll Free: 1-800-323-1891 FAX: 203-639-2172
Web Site: http://www.packardinst.com Email: webmaster@packardinst.com

Packard International Offices:
Australia, Mt Waverley 61-3-9543-4266; Austria, Vienna 43-1-2702504; Belgium, Brussels 32-2-4668210; Canada, Ontario 1-800-387-9559; Central Europe, Schwadorf, Aus. 43 456 2230 015;
Denmark, Greve 45-42909023; France, Rungis (33) 1 46.86.27.75; Germany, Dreieich (49) 6103 385-151; Italy, Milano 39-2-33910796/7/8; Japan, Tokyo 81-3-3866-5850;
Netherlands, Groningen 31-50-5413360; Tilburg (013) 5423900; Russia, Moscow, 7-095-259-9632; Switzerland, Zurich (01) 481 69 44; United Kingdom, Pangbourne, Berks (44) 01734 844981.

Circle No. 45 on Readers’ Service Card
Looking into protein folding?

Begin with our purified, performance-tested GroEL and GroES chaperonins and antibodies.

Now you can get everything you need to study polypeptide folding and assembly from one convenient source: Sigma.

Our comprehensive selection of heat shock proteins includes chaperonin 60 (GroEL), chaperonin 10 (GroES), and a 1:1 mixture of the two. Purified to >95% as determined by SDS-PAGE, they’re also assayed for folding activity and ATPase activity.

To help you detect and study these proteins, we offer antibodies to GroEL and GroES. Mono-specific, they do not cross-react with other chaperonins. They’re tested in both immunoblotting and immunoprecipitation. And Anti-GroEL is also available labeled with peroxidase for direct immunoblotting.

Because we develop these products together and test them as a system, you can be sure of their performance, each and every time.

Look into protein folding with reliable, reasonably-priced Sigma reagents. And explore with confidence.

To learn more, call Technical Service, 1-800-262-9141 or your local Sigma office.
CyDye fluorescent reagents

Direct labelling for the brightest results

If you want the ease of direct non-radioactive labelling coupled with high sensitivity and bright, multicolour results, you need look no further than the extensive range of CyDye™ fluorescent probes from Amersham™.

Based on the cyanine fluor, the seven CyDye fluorors all offer intense colours with a narrow emission spectrum, allowing easy discrimination between multiple probes on the same sample. Over 180 CyDye products are available - either as individual reactive NHS-esters or as part of optimized kits. All are designed to meet the needs of specific applications including chromosome painting, DNA labelling, protein labelling and immunocytochemistry.

Make the right choice - the bright choice - CyDye from Amersham.

Three colour confocal laser scanning microscope analysis of islet from neonatal rat pancreas. FITC anti-insulin (green), Cy3 anti-somatostatin (red), and Cy5 anti-glucagon (blue).

Whole insect embryos directly labelled with Cy3 dye (red) and Cy5 dye (blue). Image courtesy of Dr. T.C. Brelje, University of Minnesota Medical School.
We’re proving that positive thinking can cure disease.

The first step in accomplishing anything is the belief that it can be done. We believe there are cures for today’s “incurable” diseases and we’re working fast to find them. At Pharmacia & Upjohn we share this belief with more than 30,000 colleagues worldwide.

Along the way, we’re finding better treatments for diseases like cancer, AIDS, diabetes, Parkinson’s, growth disorders and arthritis.

Believing there is a cure is the first step in finding it. By sharing that belief you too can join in the fight. That’s the power of positive thinking. That’s the power of Pharmacia & Upjohn.
Get the Message...

RNA Purification Products from Promega.

PolyATtract®
System 1000
- Isolation of high quality mRNA directly from cells or tissue
- Protocol complete in 45 minutes or less
- Start with as little as 10mg of tissue or 10⁶ cultured cells
- Advanced magnets-based isolation: no organic solutions

PolyATtract® Series 9600™ mRNA Isolation System
- Simultaneous isolation of mRNA from up to 96 samples
- From tissue or cells to cDNA in 3 hours

PolyATtract® System I-IV
- "Get the Message" from total RNA
- Magnetics-based isolation of mRNA from 100μg to 5mg of total RNA

RNAagents™ Total RNA Isolation System
- The best value in total RNA isolation
- Demonstrated performance in RT-PCR and Northern blotting
- Protocol complete in 90 minutes with as little as 5mg starting material

PolyATtract and RNAagents are trademarks of Promega Corporation and are registered with the U.S. Patent and Trademark Office. Series 9600 is a trademark of Promega Corporation.

Please contact Promega or your nearest Branch Office or Distributor to receive your RNA Purification products folder.
The World's Best Science Journal Just Got Better

INTRODUCING

Full Text Science Online

- IMMEDIACY
- INTERACTIVE
- SEARCHABILITY

SEE FOR YOURSELF

http://www.sciencemag.org
THE CREDIT CARD YOU'LL CARRY INTO THE NEXT CENTURY

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
MBNA® PLATINUM PLUS credit card

IT'S LIKE NO CREDIT CARD YOU CURRENTLY CARRY.

- A credit line up to $100,000, No Annual Fee, and a low introductory 5.9% Annual Percentage Rate (APR) for cash advance checks and balance transfers¹
- Toll-free MBNA Platinum Plus service 24 hours a day
- Platinum Passage—a 24-hour toll-free travel service that guarantees the lowest available published airfare at the time of booking
- Express delivery for card replacement at no additional cost. Free additional card for family and friends.
- Free Lost Card Registry

- Purchase protection against theft or damage
- $1,000,000 Common Carrier Travel Accident Insurance at no additional cost*
- Free Year-End Summary of Charges
- Emergency cash and airline tickets, up to your available credit line, with free express delivery
- Credit line increase decisions in 15 minutes or less

Get the new standard in credit cards.
CALL TOLL-FREE 1-800-457-3714
(Please mention priority code PVHX when calling)

¹ The Annual Percentage Rate (APR) for purchases and ATM and Bank cash advances is 15.65%, which may vary. The current promotional APR offer for cash advance checks and balance transfers is 5.9% through your first five statement closing dates, commencing the month after your account is opened. When your minimum monthly payment is not received by the close of the first complete billing cycle following its Payment Due Date, or when the promotional offer expires, whichever occurs first, your APR for both new and outstanding cash advance balances (consisting of cash advance check and balance transfer transactions) will be calculated using the Variable-Rate Information Disclosures accompanying your card. The current indexed APR for cash advance checks and balance transfers is 15.65%, which may vary. Transaction fee for Bank and ATM cash advances: $2% of each cash advance (minimum $2). Transaction fee for credit card cash advance checks: $2% of each cash advance (minimum $2; maximum $10). Transaction fee for the purchase of wire transfers, money orders, etc., lottery tickets, and casino gaming chips: $2% of each such purchase (minimum $2). Cash advances and balance transfers cannot be used to pay off or pay down any MBNA account. We may allocate your monthly payments to your promotional APR balance(s) before your nonpromotional APR balances.

* Certain restrictions apply to these and other benefits described in the Portfolio of Services sent soon after your account is opened.

The information about the costs of the card described in this advertisement is accurate as of 8/96. The information may have changed after that date. To find out what may have changed, call MBNA at 1-800-457-3714. TTY users, call 1-800-833-6202.

Platinum Passage travel services are provided to MBNA Platinum Plus Customers by, and are the responsibility of, an independently owned and operated travel agency. Visa is a federally registered service mark of Visa U.S.A. Inc., used pursuant to license. MBNA is a federally registered service mark of MBNA America Bank, N.A.

©1996 MBNA America Bank, N.A.
AAAIITP/96

Circle No. 27 on Readers' Service Card
New Telomerase PCR ELISA Offers Simplified, Nonradioactive TRAP Assay for Measuring Telomerase, A Potential Marker for Cancer Research

Boehringer Mannheim is now offering a Telomerase PCR ELISA for the highly sensitive, nonradioactive detection of telomerase activity in extracts from cell cultures and tissue samples.

Telomerase as an important parameter in cancer research

Telomeres, the specialized DNA/protein structures at the end of eukaryotic chromosomes, contain tandemly repeated DNA sequences that are believed to protect genomic DNA from degradation and deleterious recombination events. During normal somatic cell proliferation, telomeric ends are progressively shortened with each replication cycle, which may play a role in limiting the proliferative capacity of normal cells. Germline cells, many tumor cells, and "immortalized" cell lines are believed to circumvent this telomere shortening using telomerase, a ribonucleoprotein that adds new repeats to the ends of chromosomes. Telomerase activity has recently been identified in many cancers (e.g., prostate cancers [1], advanced-stage breast cancers [2], neuroblastomas [3], and primary lung cancer tissues [4]) that have been confirmed by other methods (e.g., histochemical staining). Thus, telomerase reactivation may allow cells to escape from the proliferative limitations of cellular senescence and could be further investigated as a potential marker for the development of malignant tumor cells.

Telomerase PCR ELISA improves upon previous TRAP assays

Telomerase activity is most frequently detected by the Telomeric Repeat Amplification Protocol (TRAP) of Kim et al. (5), in which the telomerase-reaction product is amplified by PCR. However, the conventional TRAP assay achieves full sensitivity only when performed with a hazardous radioactive label, and visualization of results requires time-consuming gel electrophoresis and autoradiography. The new Telomerase PCR ELISA combines a one-step/one-tube TRAP assay with nonradioactive detection in a highly sensitive photometric ELISA (Figure 1).

Easy-to-use ELISA delivers results in less time

The Telomerase PCR ELISA delivers results within 6 hours, eliminating the need for laborious, time-consuming gel electrophoresis and autoradiography techniques. Its ready-to-use TRAP reaction mix (telomerase substrate, amplification primers, nucleotides, Taq DNA polymerase, reaction buffer) eliminates the need to prepare multiple solutions and minimizes the risk of assay failure caused by contamination. Up to 96 TRAP reactions can be simultaneously analyzed with an ELISA plate reader.

Sensitive results correspond closely with those of radioactive TRAP assays

Besides avoiding the use of hazardous radioisotopes, the Telomerase PCR ELISA produces sensitive results comparable to those of the radioisotopic TRAP assay (Figure 2). The kit's optimized detection probe and hybridization conditions maximize both specificity and sensitivity. Additionally, optimized primer sequences eliminate the need for "hot start" PCR while avoiding amplification artifacts (e.g., primer dimers).

The Telomerase PCR ELISA is currently available

The Telomerase PCR ELISA (96 tests; Cat. No. 1854 666) is now available from Boehringer Mannheim Biochemicals representatives. Additional information can also be found at http://biochem.boehringer-mannheim.com.

References:

Additional information can also be found at http://biochem.boehringer-mannheim.com.
Join the Partnership

“I have played a diverse set of roles in the scientific and engineering community, and believe that we are at our best when we are linking our work to the goals of society. The Center will enhance our ability to do that, and I encourage all of you to be a part of this effort.”

H. Guyford Stever
Engineer
Former Director of the National Science Foundation

For the latest on the Center for Science and Engineering, contact the AAAS Development Office at NEWBUILDING@AAAS.ORG or (202) 326-6636. Visit us on the web at WWW.AAAS.ORG.

Yes, I want to support the mission of AAAS and the Center for Science and Engineering

Honor a colleague, mentor, or family member with a gift ...

- $1,000 will inscribe your name on the Center’s Wall of Honor.
- $5,000 also places your name on a handsome engraved plaque on the back of an auditorium chair.

Yes, I/We would like to support the Center for Science and Engineering with

☐ a gift of $ _________ or
☐ a pledge of $ _________

Enclosed is the first installment of $ _________, with balance to be contributed:

☐ annually ☐ semi-annually ☐ quarterly beginning _________

I make this gift
☐ in my name
☐ in honor/memory of: ________________
☐ and I will determine if my employer or my spouse’s employer will match this contribution to AAAS.

Signature

Printed Name

Address

City, State, ZIP

Phone

Please return to:
AAAS Development Office
Room 730
1200 New York Avenue, NW
Washington, DC 20005

American Association for the Advancement of Science

SC1196
A History of Modern Planetary Physics
Volume 1: Nebulous Earth: The Origin of the Solar System and the Core of the Earth from Laplace to Jeffreys
Stephen G. Brush

Nebulous Earth follows the development of Laplace's Nebular Hypothesis, its connection with ideas about the interior of the Earth, and its role in the establishment of the "evolutionary" worldview that dominated science in the latter part of the nineteenth century.

1996 324 pp. 44171-4 Hardback $54.95

Volume 2: Transmuted Past: The Age of the Earth and the Evolution of the Elements from Lyell to Patterson
Stephen G. Brush

"An excellent work that covers a limited topic thoroughly."
—Science Books & Films

Transmuted Past follows the development of theories of stellar evolution and nucleosynthesis in the twentieth century and describes radiometric methods for estimating the age of the Earth.

1996 144 pp. 55213-3 Hardback $44.95

Volume 3: Fruitful Encounters: The Origin of the Solar System and of the Moon from Chamberlin to Apollo
Stephen G. Brush

Fruitful Encounters follows the eventual refutation of the encounter theory and the subsequent revival of a modernized Nebular Hypothesis. Brush also discusses the role of findings from the Apollo space program, especially the analysis of lunar samples, culminating in the establishment of the "giant impact" theory of the Moon's origin in the 1980s.

1996 366 pp. 55214-1 Hardback $54.95

Available in bookstores or from

CAMBRIDGE UNIVERSITY PRESS

The MATHEMATICA® Book
Third Edition
Stephen Wolfram

With the release of the third edition of Mathematica software in 1996, Cambridge presents the manual that explains every feature. The Mathematica Book contains a complete description of how to take advantage of the software's ability to solve everything from algebra and calculus problems to matrices and transformations.

1996 1400 pp. 58888-X Paperback $44.95

Chaotic Dynamics
An Introduction
Second Edition
Gregory L. Baker and Jerry P. Gollub

Widely praised for its clarity and style, the previous edition of this text was the first to provide a quantitative introduction to chaos and nonlinear dynamics at the undergraduate level. This edition includes additional material on the analysis and characterization of chaotic data and applications of chaos.

1996 270 pp. 47106-0 Hardback $70.00
47685-2 Paperback $24.95

The Tectonic Evolution of Asia
An Yin and Mark Harrison, Editors

This volume is a collection of 21 contributions on the tectonic evolution of Asia. The book is divided into five parts: geodynamic models of the Cenozoic deformation in Asia, seismotectonics, geological evolution of the Himalaya-Karakorum Ranges, tectonics of the Cenozoic Indo-Asia collision, and Mesozoic-Paleozoic assembly of Asia.

World and Regional Geology Series 8
1996 678 pp. 48049-3 Hardback $200.00

Biological Sciences
Designing Conservation Projects
Julian Caldecott

The author, a field conservationist who has worked with NGOs, governments, and donor agencies, provides a first-hand account of conservation in action across tropical Asia, Africa and Latin America. The book provides an analysis of where modern conservation has come from, where it is going, and what to do next.

1996 321 pp. 47328-4 Hardback $64.95

Taking Animals Seriously
Mental Life and Moral Status
David DeGrazia

"...David DeGrazia is one of the best and brightest of the current generation of philosophers to tackle this question, as he clearly demonstrates in this careful and lucid philosophical analysis of the issues and arguments. All those who are concerned about these issues would benefit greatly from reading this book."
—Andrew N. Rowan, Tufts University School of Veterinary Medicine

1996 312 pp. 56140-X Hardback $59.95
56760-2 Paperback $18.95

Telling Lives in Science: Essays On Scientific Biography
Michael Shortland and Richard Yeo, Editors

This collection of original essays explores for the first time the nature and development of scientific biography and its importance in forming our ideas about what scientists do, how science works, and why scientific biography matters. It is written by historians of science and science biographers in a scholarly but accessible style.

1996 309 pp. 43323-1 Hardback $75.00
studies in explosive nucleosynthesis and multidimensional hydrodynamics.

This present work is characterized by careful, precise numerical studies coupled with deep insight. Arnett consistently points out the uncertainties and difficulties in the field rather than dwelling on what has become established or taken for granted. There is also a consistent attempt to reduce complex results to useful analytic approximations and to carefully summarize the notation and conventions used in the field.

For example, the introductory chapter on atomic abundances includes a useful and well-written summary of various abundance-determination methods and their limitations. This is one of the best overviews I have seen of this complicated range of subjects from stellar atmospheres, meteorites, cosmic rays, and supernovae. The following chapter provides a summary of the relevant nuclear physics and a useful compendium of the rules of thumb that should be of use to both nuclear physicists and astrophysicists.

Some of Arnett's best-known work has been in the area of nuclear reaction flows and energy generation coupled with hydrodynamics. The chapter on reaction networks provides a good summary of the accumulated wisdom of several decades of research into how best to analyze these systems, including pointers for avoiding some of the pitfalls. I would recommend this chapter as necessary reading by anyone contemplating the development of a nuclear-reaction-network code. The chapter on primordial nucleosynthesis provides a fresh perspective that emphasizes the importance of high entropy.

Arnett takes an unusual but enlightening approach in the chapter introducing stellar evolution. He relegates the usual discussions of polytropic stars and the equation of state to the appendices and instead develops analytic approximations for the interpretation of the various physical processes. These are quite useful for developing intuition. The following chapters on hydrogen burning, helium burning, explosive nucleosynthesis, and the evolution of massive (referred to as neutrino-cooled) stars continue in the same vein, providing analytic interpretations of complex numerical problems that both the novice and the expert could find quite illuminating.

The next three chapters, on astrophysical thermonuclear explosions, gravitational collapse, and supernovae, provide a great deal of insight into the workings of both type I and type II supernovae, particularly those aspects that involve explosive nucleosynthesis. Most of the discussion concerns type II supernovae, but there is a very useful summary of properties of type I supernovae and the associated thermonuclear flame. There is also a nice appendix describing the physics of supernova light curves.

The book ends with a discussion of models of galactic chemical evolution. Thus one is brought from nucleosynthesis yields to the final present abundances in the Galaxy. This chapter gives a good introduction to the essential ingredients of galactic chemical evolution models, particularly the analytic one-zone models. It ends with a nice reminder of the often understated uncertainties in such models.

This book should be in the library of any active researcher or newcomer in the fields of stellar evolution, nucleosynthesis, or galactic evolution. It could also be useful as a graduate text, although it is not really geared toward students. It is one of the best summaries of the relevant physics and analytic approximations for stellar evolution and nucleosynthesis I have found, offering excellent discussions of all the current areas of active research.

Grant J. Mathews
Department of Physics,
University of Notre Dame,
Notre Dame, IN 46556, USA

Browsings


A reissue of a collection of 19 review papers and 17 "brief reports" published shortly before the achievement of Bose Einstein condensation (see Science 269, 182 and 198 [1995]), with a new preface pointing to the now-increased activity in the field.


A dozen British and American students of fungi look backward at the changes that have affected their field and expound features of their study organizations.


A mix of exposition on the structure of matter (macromolecules, liquid crystals, bubbles and foams), historical tidbits, autobiography, and reflections on research and education as seen from a French point of view; based on talks given to French high school students by the Nobel-Prize-winning senior author.


Further reflections by the author of Consciousness Explained and Darwin's Dangerous Idea, including a skeptical consideration of the mental capacities sometimes attributed to non-human animals.


A study by a psychologist and an anthropologist of some two dozen Mormon families living in two communities in the Rocky Mountain area of the United States.


Some 60 papers, reviewed and revised since their original presentation, on the aftermaths of the 1989 Alaska disaster, ranging from tracking and treatment efforts through effects on particular species, especially fish, to "human impacts."


An account by a geneticist at the City of Hope National Medical Center of his 18 years of research on the disorder.
New England Biolabs introduces...

**ONE STEP NATIVE PROTEIN PURIFICATION**

Introducing IMPACT™, a new kit for obtaining pure native protein after a single affinity step. Developed from basic research at New England Biolabs on protein splicing, IMPACT™ uses a new class of proteins called "inteins" modified to undergo directed cleavage at 4°C when induced by thiol-reagents such as DTT. Simply clone your target protein into the provided expression vector to create a target protein-intein-chitin binding domain (CBD) fusion. Bind the fusion protein to a chitin bead column, wash, induce on-column intein cleavage by adding DTT and then elute your native target protein at >98% purity.

**So FAST It's Surreal**

Advantages of the IMPACT™ system
- One step affinity purification
- Procedure carried out at 4°C
- Yields protein with native sequence
- No polyhistidine tags
- No proteolytic cleavage of fusion protein
- Requires only chitin beads
- Can label target protein C-terminus

THE NEXT STEP

For more information, call 1-800-NEB-LABS or visit the NEB web site: http://www.neb.com

Circle No. 51 on Readers' Service Card
and $^3P_2$, which are split by spin-orbit coupling. I have observed four microwave resonances (18), three of which show triplet \( ^{14}\text{N} \) hyperfine structure, whereas the fourth is unsplit. It should be possible to establish the correlations between molecular levels and the three dissociation asymptotes, but more resonances must first be observed and their Zeeman behavior studied. The \( N \cdots N^+ \) system is even more complicated; the lowest dissociation limits resemble those of \( \text{He} \cdots \text{N}^+ \) but occur in three doubly degenerate pairs because of the homonuclear symmetry. I have observed 11 microwave resonances so far (17), which exhibit \( ^{14}\text{N} \) hyperfine splitting characteristic of either ortho or para nuclear spin states. Although the observed spectra must necessarily be electronic, a disconcertingly large number of possibilities exist. These include \( \Sigma \) to \( \Sigma, \Sigma \) to \( \Pi, \) and \( \Pi \) to \( \Pi \) transitions, involving doublet, quartet, or sextet spin states.

Perhaps my most exciting recent observation (19) is the detection of microwave resonances from the long-range complex \( \text{He} \cdots \text{H}_2^+ \). The ion-molecule reactions involving helium and hydrogen neutral or ionic species are benchmark reactions that have been extensively studied, both experimentally and theoretically. The \( \text{HeH}_2^+ \) so-called "collision complex" occupies a pivotal position in understanding these reactions, and a number of potential surface calculations have been described. These may be divided into those that deal accurately with the short-range parts of the potential (20) and those that deal accurately with the long-range interactions (21). The interpretation of this spectrum is going to require the best of both worlds. I have observed 10 resonances so far, and for the energy levels involved, the \( \text{H}_2^+ \) component appears to be an essentially free rotor within the complex. Resonances involving \( \text{ortho-H}_2^+ \), which exhibit a sextet proton hyperfine structure characteristic of two equivalent protons, and those involving \( \text{para-H}_2^+ \), which show, as expected, no hyperfine structure, can be very clearly distinguished. There must be further resonances to be discovered, and it must be possible to perform sufficiently accurate calculations for this three-electron system to provide an unambiguous interpretation of the spectrum. Success in that endeavor will also help provide a better understanding of the ion-molecule reaction dynamics.

**Conclusions**

These experiments are extremely time-consuming; I calculate that a blind search in which microwave frequency, electric field potential, and electrostatic analyzer voltages are varied systematically would take 300 days. Moreover, until the first microwave resonance line is observed, one cannot be sure that the near-dissociation energy levels are populated. Fortunately, the apparatus is extremely stable, and computer-controlled searches can be conducted, unattended, for several days. Some of the complex resonances, with microwave mode or nuclear hyperfine structure, may themselves require several days of signal averaging. In these circumstances, it is difficult to find a satisfactory compromise between completing the recording of existing spectra and searching for new species. I have no doubt that these techniques have the sensitivity and generality to tackle many more long-range complexes. I also note that although this work is concerned with microwave spectroscopy, the methods developed would be even more sensitive and general with shorter wavelength–tunable radiation sources, which would probe the more strongly bound levels.

The analysis of the spectra for each molecular species has required a new approach. They all have open-shell ground states with electron spin degeneracy, and most of them also have orbital degeneracy. There are no spectral regularities to aid in assignment, and usually the available theory does not help in the initial understanding. In heteronuclear species, it is not, at first, known what types of transitions are being observed nor what quantum numbers are useful. I am unable to represent the energy levels analytically or to define molecular constants. In the long run, therefore, only direct partnerships between theory and experiment can lead to successful conclusions. Given the resolution and accuracy of these experiments, almost unprecedented demands are being made on ab initio theory, which must be accurate for all inter-nuclear separations and molecular geometries. Ultimately, the main goal is not precise agreement of theory and experiment but further clarification of the molecular physics involved in long-range interatomic and intermolecular forces. This work represents an intimate contact point between spectroscopy, structure, and the dynamics of ion-atom or ion-molecule reactions at thermal energies.

**References and Notes**

5. See, for example, fig. 166 in G. Herzberg, Spectra of Diatomic Molecules (Van Nostrand, Princeton, NJ, 1950).
22. I thank my former collaborators in this work, whose names appear in the list of references. I owe particular debts to the present members of my group, namely A. Shaw, S. Taylor, and D. Grannie. On the theoretical side, I thank R. E. Moss, J. M. Brown, J. M. Hutson, P. J. Knowles, and M. M. Law for their advice or collaboration. I thank the Royal Society for a Research Professorship and recurrent financial support, and the Engineering and Physical Sciences Research Council for grants toward the purchase of apparatus.
firmed that RANTES, MIP-1α, and MIP-1β are major components of the HIV-suppressive activity against primary HIV and SIV isolates, which are those commonly assayed in the classical test of viral suppression, the endogenous test. Of note, the CAF-1 fluid, which showed only a modest suppressive activity (less than 50%), had the lowest content of RANTES, MIP-1α, and MIP-1β. Mackewicz et al. also find low levels of chemokine production by purified CD8+ T cells (figure 1 of the comment). Although the experimental systems are difficult to compare in the absence of sufficient technical details, these results are not consistent with those reported by us (1) and others (3, 7).

The “CAF” theory is founded on two major postulates that, until the positive identification of the factor, cannot be subjected to a rigorous scientific scrutiny: first, that the HIV-suppressive activity produced by CD8+ T cells results from a single factor; second, that all the different tests used to study “CAF” (endogenous, acute infection, and transcriptional) measure the activity of the same suppressive factor. The evidence thus far accumulated seems to contradict both of these assumptions.

With regard to the first postulate, CD8+ T cells produce a complex cocktail of factors, some of which have a well-documented HIV-suppressive activity. For example, the HIV-suppressive effect could be abrogated in our system only when a combination of antibodies against all the different suppressive factors present in the cocktail was used (1). Thus, previous results obtained with the use of a single cytokine-neutralizing antibody at a time (6) should be critically reevaluated.

With regard to the second postulate, it is increasingly evident that different assay systems measure different suppressive factors (or different sets of suppressive factors); an example is the selectivity of chemokines against different biological subtypes of HIV (RANTES, MIP-1α, and MIP-1β for NSI isolates; SDF-1 for SI isolates). The concept of two easily distinguishable suppressive activities was implicit in previous results obtained by Levy and his colleagues, who observed that CD8+ T cells derived from healthy seronegative individuals, unlike those from HIV-seropositive patients, suppress only in the endogenous test (mostly NSI viruses), but not in the acute infection test (SI viruses) (8). The best explanation for these findings is that CD8+ T cells from uninfected people release a more limited complement of HIV-suppressive factors.

Fiorenza Cocchi
Anthony L. DeVico
Alfredo Garzino-Demo

Institute of Human Virology, University of Maryland, Baltimore, MD 21201, USA

Paolo Lusso*
Institute of Human Virology, University of Maryland, and Dipartimento di Ricerca, Biologica e Tecnologica, San Raffaele Scientific Institute, 20132, Milano, Italy

Robert C. Gallo
Institute of Human Virology, University of Maryland, Baltimore, MD 21201, USA

REFERENCES

8 March 1996; 17 September 1996; accepted 25 September 1996

Make a quantum leap.

SCIENCE On-line can help you make a quantum leap and allow you to follow the latest discoveries in your field. Just tap into the fully searchable database of SCIENCE research abstracts and news stories for current and past issues. Jump onto the Internet and discover a whole new world of SCIENCE at the new Web address...

NEW URL

http://www.sciencemag.org

SCIENCE • VOL. 274 • 22 NOVEMBER 1996

1395
### 1997 Summer and International Schedules

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Conference</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 20 - 25</td>
<td>Angiotensin</td>
<td>April 20 - 25 Angiotensin</td>
</tr>
<tr>
<td>April 27 - May 2</td>
<td>Biological Structure &amp; Gene Expression</td>
<td>April 27 - May 2 Biological Structure &amp; Gene Expression</td>
</tr>
<tr>
<td>May 4 - 9</td>
<td>Biodegradable Polymers</td>
<td>May 4 - 9 Biodegradable Polymers</td>
</tr>
<tr>
<td>June 29 - July 4</td>
<td>Polymers</td>
<td>June 29 - July 4 Polymers</td>
</tr>
<tr>
<td>August 17 - 22</td>
<td>Environmentally Benign</td>
<td>August 17 - 22 Environmentally Benign Organic Synthesis</td>
</tr>
<tr>
<td>PLYMOUTH STATE COLLEGE</td>
<td>PROCTOR ACADEMY</td>
<td>SALVE REGINA UNIVERSITY</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Plymouth, New Hampshire</td>
<td>Andover, New Hampshire</td>
<td>Newport, Rhode Island</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mammary Gland Biology</th>
<th>Bioorganic Chemistry</th>
<th>Atmospheric Chemistry</th>
<th>Viruses &amp; Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floyd Schambacher</td>
<td>John Griffin &amp; Anthony Czarnik</td>
<td>Paul Wine &amp; Daniel Jacob</td>
<td>Dan Ganem &amp; Peter Palese</td>
</tr>
<tr>
<td>Zeolitic &amp; Layered Materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charles Krege</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analytical Pyrolysis</th>
<th>Developmental Biology</th>
<th>Nucleic Acids</th>
<th>Carbohydrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lars Carlson</td>
<td>Rudi Lehmann &amp; Eric Olson</td>
<td>Roy Parker &amp; Nancy Craig</td>
<td>Mario Pinto &amp; J.H. Van Boom</td>
</tr>
<tr>
<td>Ligand Recognition &amp; Molecular Gating (NEW)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kathryn Sandberg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radiation Oncology (NEW)</th>
<th>Bioenergetics</th>
<th>Heterocyclic Compounds</th>
<th>Polymer Colloids</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. Martin Brown</td>
<td>Shelagh Ferguson-Miller</td>
<td>William Pearson</td>
<td>Donald Sundberg</td>
</tr>
<tr>
<td>Excitatory Amino Acids &amp; Brain Function (NEW)</td>
<td></td>
<td>Purines, Pyrimidines &amp; Related Substances</td>
<td></td>
</tr>
<tr>
<td>Steve Heinemann</td>
<td></td>
<td>Barbara Ramsay-Shaw</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laser Diagnostics in Combustion</th>
<th>Molecular Membrane Biology</th>
<th>Parasitism</th>
<th>Condensed Matter Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marshall Long</td>
<td>Suzanne Pfeiffer</td>
<td>James McKerrow</td>
<td>Shobo Bhattacharya &amp; Matthew Fisher</td>
</tr>
<tr>
<td>Thin Films &amp; Crystal Growth Mechanisms</td>
<td></td>
<td>Statistics in Chemistry &amp; Chemical Engineering</td>
<td></td>
</tr>
<tr>
<td>John Venules &amp; J. Iwan Alexander</td>
<td></td>
<td>Lyle Ungar</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Genetics Vaccinations (NEW)</th>
<th>Matrix Metalloproteinas</th>
<th>Organic Thin Films</th>
<th>Red Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>David Weiner</td>
<td>Lynn Matrisian</td>
<td>Aci Ulman</td>
<td>Mark Groudine</td>
</tr>
<tr>
<td>Catalysis</td>
<td></td>
<td>Oscillations &amp; Dynamic Instabilities in Chemical Systems</td>
<td></td>
</tr>
<tr>
<td>Vincent Durante</td>
<td></td>
<td>John Tyson</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clusters, Nanocrystals &amp; Nanostructures</th>
<th>Staphylococcal Diseases</th>
<th>Nuclear Physics</th>
<th>Hormonal Carcinogenesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martin Jarrold</td>
<td>Steven Projan</td>
<td>Doug Beck</td>
<td>George Lucier</td>
</tr>
<tr>
<td>Microbial Population Biology</td>
<td></td>
<td>Organometallic Chemistry</td>
<td></td>
</tr>
<tr>
<td>Julian Adams</td>
<td></td>
<td>Patricia Watson</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Photosynthesis</th>
<th>Membranes: Materials &amp; Processes</th>
<th>Cancer</th>
<th>Quantitative Structure Activity Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melvin Okamura</td>
<td>Georges Belfort</td>
<td>Terry Van Dyke</td>
<td>Herschel Weintraub</td>
</tr>
<tr>
<td>X-Ray Physics</td>
<td></td>
<td>Molecular Mechanisms of Microbial Adhesion</td>
<td></td>
</tr>
<tr>
<td>Massimo Allarelli</td>
<td></td>
<td>Sharon Long &amp; Staffan Normack</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dynamics at Surfaces</th>
<th>Human Molecular Genetics</th>
<th>Barrier Function of Mammalian Skin</th>
<th>Plant Cell Walls (NEW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charles Retner</td>
<td>Robert Nussbaum</td>
<td>Peter Elias</td>
<td>Andrew Staebelin</td>
</tr>
<tr>
<td></td>
<td>Supramolecules &amp; Assemblies, Chemistry of Larry Romsted</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Angiogenesis &amp; Microcirculation</th>
<th>Photosacoustic &amp; Photothermal Phenomena</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Harold Dvorak</td>
<td>Darryl Almond</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied &amp; Environmental Microbiology</td>
<td>Robert Imboden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parmely Pritchard</td>
<td>Queen's College, Oxford</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>August 24 - 29</th>
<th>August 31 - Sept. 5</th>
<th>September 7 - 12</th>
<th>September 14 - 19</th>
<th>September 21 - 26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illicit Substance Detection (New)</td>
<td>Molecular Electronic Spectroscopy</td>
<td>Calcium Signalling</td>
<td>Photacoustic &amp; Photothermal Phenomena</td>
<td>Solid State Chemistry</td>
</tr>
<tr>
<td>Steve Burrett</td>
<td>David Pratt</td>
<td>David Clapham &amp; David Lay</td>
<td>Darryl Almond &amp; Robert Imboden</td>
<td>Peter Battle</td>
</tr>
<tr>
<td>John Daly</td>
<td>Queen's College, Oxford</td>
<td>Queen's College, Oxford</td>
<td>Queen's College, Oxford</td>
<td>Jack Johnson</td>
</tr>
<tr>
<td>Queen's College, Oxford</td>
<td></td>
<td>Queen's College, Oxford</td>
<td></td>
<td>Queen's College, Oxford</td>
</tr>
</tbody>
</table>
Carcinoma Cell Enrichment

Enabling Detection and Analysis of Tumor Cells from Peripheral Blood

Miltenyi Biotec introduces the best way to enrich disseminated carcinoma cells from human peripheral blood or bone marrow. With the MACS magnetic enrichment system you can detect, quantify and analyze tumor cells 10-100 times more sensitive than with current methods.

Find 1 Cell in 10 Million with MACS Magnetic Technology

Using MACS colloidal MicroBeads, 10,000 fold enrichment of carcinoma cells can be achieved. Instead of screening dozens of slides, you analyze a few thousand cells from the magnetically enriched fraction.

Compatible with Immunocytochemistry, Flow Cytometry and PCR

The MACS process preserves the cell morphology, so tumor cells can easily be identified and enumerated by microscopy. MACS Antibody MicroBeads are so small that they don’t affect cell detection and analysis by flow cytometry, immunocytochemistry or PCR.

To enrich carcinoma cells for detection or analysis, call Miltenyi Biotec

Germany:
Phone 02204 - 8306-0
FAX 02204 - 8306-0
For local distributor call: +49 - 2204 - 8306-0

USA:
Phone (800) FOR MACS
FAX (916) 888 - 8925

For more information, call: (+49) 2204 - 8306-0

Miltenyi Biotec
Circle No. 47 on Readers’ Service Card

Discover New Effective Drugs For Human Cancer

META MOUSE™

- Evaluates all anti-tumor and anti-metastatic therapeutics
- Replicates human clinical responses including metastasis
- More clinically relevant than subcutaneous or transgenic models
- Same-organ tumor transplantation: fresh patient tumors or established lines
- All major cancer types available
- Contract research or models available for shipment

For more information call:
Tel-(800) 511-2555 • Tel-(619) 654-2555 • Fax-(619) 268-4175
7917 Ostrow Street • AntiCancer INcORPORATEd • San Diego, CA 92111, USA

EureKAlert!
The Web site for research news.

Check it out at http://www.eurekalert.org

For more information, call the AAAS News & Information Office at 202-326-6440. Or send a message to webmaster@eurekalert.org.
CALL FOR SUBMISSIONS

MOËT HENNESSY ◆ LOUIS VUITTON Science for Art Prize

science pour l'art

Since 1988, the LVMH MOËT HENNESSY ◆ LOUIS VUITTON group rewards scientists and artists for the indirect or direct impact of their works on artistic creation or aesthetic appreciation.

Two Prizes are being presented, a Science Prize and an Art Prize, each worth FF100,000 (about US$20,000).

The Science Prize is intended to reward candidates whose work opened up promising avenues in basic or applied research within the theme of the year. For 1997, the focus will be on:

GENESIS OF FORMS
Part 2: Mathematics, Physics and Earth Sciences

SOME PREVIOUS WINNERS


For further information on the Science Prize and for application forms, please contact:

LVMH Inc.
NEW YORK - USA
«science for art»
Fax: (212) 340 7620

MOËT HENNESSY ◆ LOUIS VUITTON
PARIS - FRANCE
«science pour l'art»
Fax: 01 44 13 22 23

LVMH JAPON K.K.
TOKYO - JAPON
«science for art»
Fax: (03) 3234 8561

La date limite de dépôt des dossiers est fixée au 31 Janvier 1997

Key words for the Science Prize:
topology, knots, braids, motifs, varieties, contours, differential geometry, membranes, minimal surfaces, dynamic systems, random motions, digital modeling, network simulations, image processing, hydrodynamic waves, crystallization, quasi-crystals, aggregates, nanostructures, dissipating structures, turbulences, coherences, new porous, amorphous or lamellar materials, climatology, terrestrial crust, convection, hot points, ocean trenches, eruptions, earthquakes, erosion, sedimentation, glaciology, seismology, geomagnetism, oceanography, planetology, shorelines.

The nomination for the Art Prize is made by experts and applications are not invited. The theme for 1997 is «Genesis of Forms» in Architecture and Earth Arts (ceramics, glass, metals,...).
Because You Want To Find It Now... SCIENCE Online

- Streamlined Research.
  Keyword searches make SCIENCE On-Line a no-hassles, time-saving research tool. Find what you want, when you want it.

- Instant Access.
  Full-text SCIENCE On-Line eliminates the wait. Read the latest issue on the day of publication. A rich offering of scientific news—available to you in real-time.

- Fruitful Interaction.
  Enjoy immediate colloquy with your colleagues. Make your voice heard by responding to SCIENCE authors and readers worldwide. Get answers to your queries and comments—online.

- Take a (FREE) look for yourself.
  Through December 31, 1996, you can access full-text SCIENCE On-Line for free. Sample its speed, power, and convenience. Then order SCIENCE On-Line for 1997 at a AAAS-members-only special introductory rate!

Go To http://www.sciencemag.org
ORDER NOW FOR THE SPECIAL INTRODUCTORY RATE!


☐ YES, I want instant access to SCIENCE. Please upgrade my membership to include full-text SCIENCE On-Line at the special introductory rate of only $12. (Offer good through 12/31/96.) Access to SCIENCE On-Line is for one year beginning January 1997.

☐ Please sign me up for AAAS membership and the special introductory rate for the full-text of SCIENCE On-Line. Membership includes 51 weekly issues of SCIENCE and one year access to SCIENCE On-Line (access begins January 1997.)

<table>
<thead>
<tr>
<th>Domestic</th>
<th>Europe, Asia, Pacific &amp; Other</th>
<th>Canada</th>
<th>Mexico/Caribbean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Member</td>
<td>$114</td>
<td>$204</td>
<td>$179.99</td>
</tr>
<tr>
<td>Postdoctoral/Resident</td>
<td>$89</td>
<td>$179</td>
<td>$153.24</td>
</tr>
<tr>
<td>Full-Time Student</td>
<td>$67</td>
<td>$157</td>
<td>$129.70</td>
</tr>
</tbody>
</table>

☐ Please sign me up for AAAS membership without SCIENCE On-Line: (includes 51 weekly issues of SCIENCE)

<table>
<thead>
<tr>
<th>Domestic</th>
<th>Europe, Asia, Pacific &amp; Other</th>
<th>Canada</th>
<th>Mexico/Caribbean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Member</td>
<td>$102</td>
<td>$192</td>
<td>$167.99</td>
</tr>
<tr>
<td>Postdoctoral/Resident</td>
<td>$77</td>
<td>$167</td>
<td>$141.24</td>
</tr>
<tr>
<td>Full-Time Student</td>
<td>$55</td>
<td>$145</td>
<td>$117.70</td>
</tr>
</tbody>
</table>

Rates are valid until 12/31/96. $55 allocated to the paper subscription of SCIENCE. Canadian rate includes GST #125488122. Please allow 6 weeks for receipt of first paper issue of SCIENCE.

☐ Check enclosed (payable to "AAAS") for: $

☐ Charge $__________________ to my: ☐ Visa ☐ MasterCard ☐ American Express

CARD # _______________ EXP. DATE __________

SIGNATURE ________________________________

NAME ________________________________

MEMBERSHIP ID # ________________________________

INSTITUTION ________________________________

STREET ADDRESS ________________________________

CITY __________________________ STATE ______ ZIP __________

MAIL TO: AAAS—Membership Services 1200 New York Avenue, NW Washington, DC 20005

OR FAX TO: (202) 842-1065

Circle No. 26 on Readers’ Service Card
The latest advance in DNA sequencing is now available.

The **SequiTherm EXCEL** Kit works this well on an “impossible” template.

Imagine what it does with an “easy” template!

Epicentre’s new SequiTherm EXCEL DNA Sequencing Kits incorporate unique innovations (U.S. & international patents pending) resulting in an ability to sequence even very difficult templates.

SequiTherm EXCEL Kits dramatically reduce stops, ambiguous base calls and nonspecific background. When other sequencing kits fail, SequiTherm EXCEL Kits can effectively sequence through problematic regions containing:

- Inverted or direct repeats
- Hairpin loops
- Interstrand reannealing
- High GC content
- Dinucleotide repeats
- Homopolymeric stretches

SequiTherm EXCEL Kits are available for manual sequencing using internal or end labeling with 32P, 33P, or 35S, and for automated sequencing on LI-COR® instruments.

**Limited Time Offer!**

Contact Epicentre today to receive your free copy of the new DNA Sequencing Methods and Protocols Guide.

Data at right: Results using the SequiTherm EXCEL Kit and a standard cycle sequencing kit on a template with strong secondary structure. Sequencing was performed on a pUC-based clone containing a 150 bp inverted repeat capable of forming a 75 bp hairpin/cruciform structure. Data were visualized on a LI-COR Model 4000 DNA Sequencer.

---

**SequiTherm EXCEL**

**EPICENTRE TECHNOLOGIES**

1202 Ann Street Madison, WI 53713

800-284-8474

...when you need to be sure of the quality

Circle No. 46 on Readers' Service Card

Outside of the U.S. contact the distributor in your country or call 608-258-3080 or fax 608-258-3088.

E-mail: techhelp@epicentre.com  World Wide Web: http://www.epicentre.com

Products & Materials

Filmless Autoradiography Storage
The Cyclone Storage Phosphor System is for filmless autoradiography of radiolabeled gels, blots, and tissue sections. The Cyclone features a novel confocal optical design that scans a variety of reusable, high-performance storage phosphor screens. It combines high sensitivity, high resolution, and affordability in one instrument, and has the versatility to image and quantify molecular biology applications from minigels to sequencing gels. Multipurpose screens are specially coated for moisture resistance and durability for typical gels and blots. Super Sensitive screens are thicker and formulated to be up to twice as sensitive as typical storage phosphor screens for low activity 32P and 125I applications. Super Resolution screens are formulated from the finest grain of phosphor crystals to provide the best resolving power for high resolution 35S, 33P, and 35Cl applications. Tritium Sensitive screens are like the Super Resolution screens, except they are uncoated in order to detect the low energy and high resolution of 3H in tissue sections. Packard. Circle 140.

Plasmid Purification Kit
PowerPrep is a kit for the isolation of plasmid DNA. It features a new proprietary DNA binding resin, pink RESIN, that resuspends with ease, thereby eliminating one of the main frustrations of using resins to isolate DNA. The kit makes use of rapid spin column protocols. Within 15 min, the plasmid can be isolated and tested for quality by running on the Uni-Lane gels supplied with each kit. PowerPrep routinely gives a yield of 2 to 10 μg of plasmid per 3 ml of bacterial culture. The quality is suitable for restriction enzyme digestion, sequencing, subcloning, and in vitro transcription. Geno Technology. Circle 141.

Image Analysis System
A new digital camera offers reduced cost per print when used as part of an image analysis system designed for recording and analyzing electrophoresis gels. At the core of the EDAS (Electrophoresis Documentation and Analysis System) is the Kodak Digital Science DC40, a lightweight, point-and-shoot digital camera. With its ethidium bromide filter, the DC40 can provide sensitivity comparable to instant film yet yield sharp and vibrant 24-bit color images for normal photographic applications. Once captured, an image can be printed, transmitted by e-mail, stored electronically, or incorporated directly into word-processed reports. In addition, any gel image can be analyzed using the one-dimensional software, a versatile program that can calculate mass and molecular weight data rapidly and accurately by referencing positions of known bands. Amersham International. Circle 142.

Electrophysiology and Patch Clamp Microscope
The upright BX50WI microscope with fixed-stage, focusable nosepiece and infinity-corrected water immersion optics provides a vibration-resistant platform for high image quality and high precision manipulation for electrophysiology, patch clamp applications, and intra-vital microscopy. The low-position fixed stage is securely fastened to the front and rear of the stable Y-shaped frame. This low position and the increased total focusing stroke allow the user to work with all different kinds of petri dishes or perfusion chambers. Micromanipulators can be mounted directly on the stage with adapter

Uniquely yours

Few things in life are yours and yours alone. Fortunately, Personal Alert from ISI® can be one of them. Personal Alert is the new, highly customized, profile-based alerting service developed just for you. It pinpoints the exact science, technology, and social sciences research information you need and delivers it via Internet e-mail. Direct to your desktop. Daily—or weekly if you choose. So you get only what you need, only when you need it. At one fixed—and very affordable—price.

Your reports are defined by terms YOU provide (including something only ISI offers, cited references). So they have everything you need for your research—complete bibliographic data, full author abstracts, author names and addresses, and more. All from the ISI database of over 16,000 journals (including electronic journals), books, and proceedings.

See for yourself. Subscribe or ask about a 30-day, no-obligation review period. The benefits will be all yours. Call today.

Phone: 1-800-336-4474, 215-386-0100, +44-1895-270016
Fax: 215-386-2911, +44-1895-256710
E-mail: sales@isinet.com, uksales@isinet.com
Web: http://www.isinet.com

The first thing that comes across is its value.®
Institute for Scientific Information®
Publisher of Current Contents® and the Science Citation Index®
Circle No. 54 on Readers' Service Card