

AMERICAN
ASSOCIATION FOR THE
ADVANCEMENT OF
SCIENCE

SCIENCE

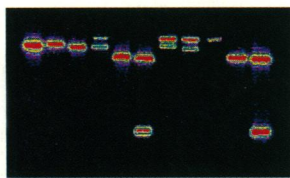
19 JULY 1991

\$6.00

VOL. 253 ■ PAGES 241-352



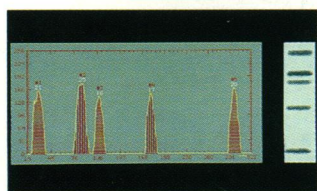
Digitize:



Rapidly scan autoradiographs, photographs, drawings, text, stained gels and more. Scan images at 300 dots per inch (85 μ spot size)

in 256 shades of gray. Edit scanned images using the powerful tools of the StrataScan's digital image processing and editing software.⁽¹⁾

Densitometry:

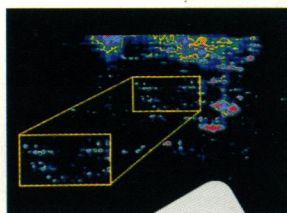
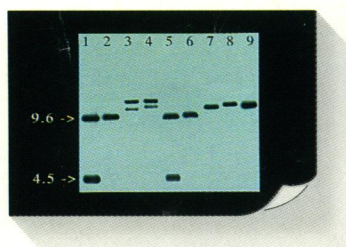


Quantitate individual or multiple lanes; spots or bands; and slot and dot blots.⁽²⁾ Adjust image

contrast, subtract background, enlarge or reduce, without altering the original data. Output your data in tabular form or export it to other programs for additional analysis or presentation.

Document:

Create Presentation quality composite images for handouts, overheads, slides and journals.



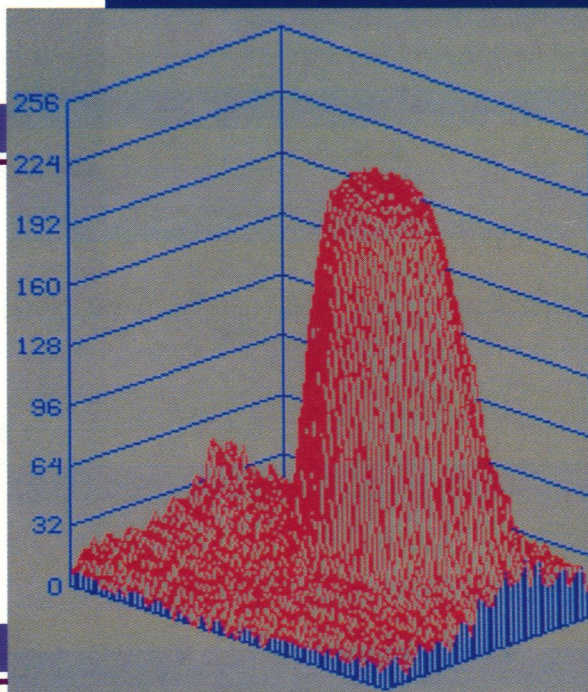
STRATAGENE

Corporate Headquarters:
11099 North Torrey Pines Rd.
La Jolla, CA 92037
Ordering and Tech. Service:
800-424-5444
Fax: 619-535-5430
Telex: 9103809841

Stratagene GmbH
Postfach 105466
D-6900
Heidelberg, Germany
Telephone: (06221) 40 06 34
Telefax: (06221) 40 06 39

Circle No. 110 on Readers' Service Card

Experience The Third Dimension



The **StrataScan™ 7000** Graphic Arts and Densitometry System combines state-of-the-art hardware innovations and well crafted software to bring sophisticated densitometry analysis and presentation quality documentation to your laboratory.

Stratagene's **StrataScan™ 7000** Graphic Arts and Densitometry System

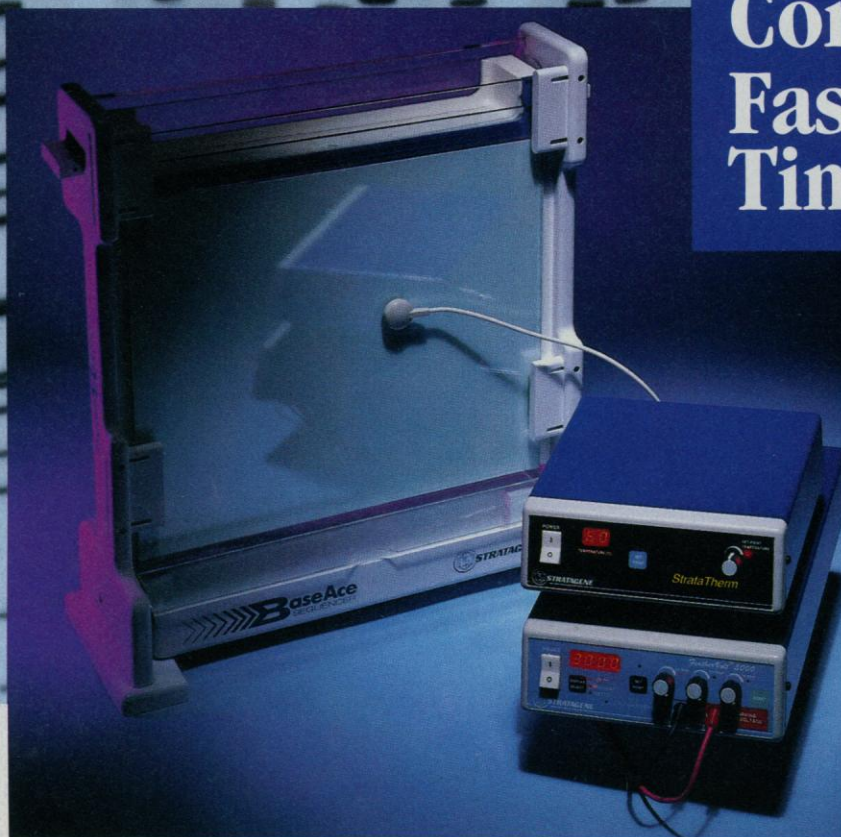


Stratagene Ltd.
Cambridge Innovation Centre
Cambridge Science Park
Milton Road
Cambridge CB4 4GF
Telephone: (0223) 420955
Telefax: (0223) 420234
Telex: 81417 INNEN G

Please contact Stratagene for a distributor near you.

References
1. Fox, J.S. (1989). *Strategies* 2: 53-55
2. Bauer, J.C., and Fox, J.S. (1991). *Strategies* 4: 6-7

Resolve Gel Compressions. Faster Run Times.



Introducing the StrataTherm™ Temperature Controller

Now you can obtain the benefits of temperature regulation for the same price as a conventional sequencing power supply.

Conventional sequencing gels are routinely electrophoresed at temperatures of 40°C to 50°C. Higher temperature electrophoresis is not generally recommended as temperature fluctuations result in plate cracking. With certain sequences, some secondary DNA structures do not fully denature at 50°C, despite the presence of formamide in the loading dye and urea in the gel matrix. Undenatured secondary structures result in compressed bands and loss of sequence information. The elimination of temperature fluctuation during high temperature gel electrophoresis allows resolution of compressed bands without plate cracking.

The StrataTherm™ temperature controller is designed to maintain a constant gel temperature between 30°C and 90°C automatically. The StrataTherm temperature controller permits electrophoresis at high temperatures by regulating voltage automatically to ensure a constant gel temperature. In addition, high temperature electrophoresis significantly reduces the combined pre-warm and run time. The StrataTherm temperature controller is specifically designed for use in conjunction with the FeatherVolt™ 3000 volt, 100mA power supply*. It can be used with most sequencing gel tanks that maintain even heat distribution.

The StrataTherm temperature controller is also useful for studies involving hairpin analysis of mutant PCR fragments.



Resolution of compressed DNA at higher temperatures using the StrataTherm temperature controller.

ssM13 DNA was sequenced with dGTP or 7-deaza dGTP and electrophoresed on a 33cm 6% acrylamide gel maintained at constant temperature. Panel A: 40°C; panel B: 55°C.

Temp	Run Time	Mean Voltage
40°C	90 min.	1700 volts
55°C	50 min.	1900 volts

Table #1. Reduction in gel prewarming time and gel run time using the StrataTherm temperature controller.

Gels were prewarmed at 150 watts (W), 2500 volts (V). After reaching the specified temperature, the voltage was regulated by the StrataTherm temperature controller. Electrophoresis times (bromophenol blue dye to the bottom of the gel) are shown.

StrataTherm™ temperature controller plus the FeatherVolt™ 3000 volt, 100mA power supply

Catalog#
400650

* Patents Pending



STRATAGENE®

Corporate Headquarters, USA
1-800-424-5444
Telefax: 619-535-5430

Germany, Stratagene GmbH
(06221) 40 06 34
Telefax: (06221) 40 06 39

United Kingdom, Stratagene Ltd.
(0223) 42 09 55
Telefax: (0223) 42 02 34

Circle No. 111 on Readers' Service Card

247 This Week in *Science*

Editorial

249 Heroines and Role Models: M. F. SINGER

Letters

250 Species Hybridization and Protection of Endangered Animals: G. D. AMATO; R. M. NOWAK; S. J. O'BRIEN AND E. MAYR; E. R. GLITZENSTEIN

ScienceScope

255 Money woes at Stanford University; fiscal relief at the genome data bank; etc.

News & Comment

256 Tilting at the Space Station ■ NASA Squeezed, NSF Expands—for Now
258 Greenhouse Role in Reef Stress Unproven
259 Geographic Fission on Fusion
260 Does War on Cancer Really Equal the War on Poverty
261 Tilting Toward Megaprojects
Communist Academics Refuse to Fade
262 Promising AIDS Drug Looking for a Sponsor ■ The Growing Anti-HIV Armamentarium
264 *Briefings*: Brain Food in Computer Games ■ UK OKs RU-486 ■ Who Are the Animal Rightsers? ■ SSC Fundraiser Resigns ■ Coming of Age for Mental Health ■ Skulduggery ■ Superchicken ■ Keeping Up?

Research News

266 Alzheimer's Research Moves to Mice
268 Radio Astronomy's Crumbling Showpiece
270 A Speedier Way to Decompose Polygons
271 Dancing With Death at Unzen Volcano
272 A Tentative Vote for Supersymmetry

Perspective

273 Oxygen Activation at the Diiron Center of Ribonucleotide Reductase: L. QUE, JR.

Articles

275 Fallout of Pyroclastic Debris from Submarine Volcanic Eruptions: K. V. CASHMAN AND R. S. FISKE
281 Nonlinear Optical Materials: D. F. EATON
287 Computations Underlying the Execution of Movement: A Biological Perspective: E. BIZZI, F. A. MUSSA-IVALDI, S. GISZTER

Research Article

292 Mechanism of Assembly of the Tyrosyl Radical-Dinuclear Iron Cluster Cofactor of Ribonucleotide Reductase: J. M. BOLLINGER, JR., D. E. EDMONDSON, B. H. HUYNH, J. FILLEY, J. R. NORTON, J. STUBBE

Reports

299 Expansion and Contraction of the Sahara Desert from 1980 to 1990: C. J. TUCKER, H. E. DREGNE, W. W. NEWCOMB

- **SCIENCE** (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC 20005. Second-class postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 1991 by the American Association for the Advancement of Science. The title **SCIENCE** is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): \$82 (\$47 allocated to subscription). Domestic institutional subscription (51 issues): \$150. Foreign postage extra: Mexico, Caribbean (surface mail) \$50; Other countries (air assist delivery) \$95. First class, airmail, student and emeritus rates on request. Canadian rates with GST available upon request, GST #1254 88122. **Change of address:** allow 6 weeks, giving old and new addresses and 11-digit account number. **Postmaster:** Send change of address to *Science*, P.O. Box 2033, Marion, OH 43305-2003. **Single copy sales:** \$6.00 per issue prepaid includes surface postage; Guide to Biotechnology Products and Instruments, \$20. Bulk rates on request. **Authorization to photocopy** material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$1 per copy plus \$0.10 per page is paid directly to CCC, 27 Congress Street, Salem, Massachusetts 01970. The identification code for *Science* is 0036-8075/83 \$1 + .10. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.
- The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objectives are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.



COVER Submarine fallout deposits in the Mio-Pliocene Shirahama Group, 500 meters west of the Senjojiki, near the southern tip of the Izu Peninsula, Japan. Pieces of pumice (light colored) are an average of six to seven times as large as codeposited rock fragments (dark colored); this ratio suggests that the deposits are formed by fallout of these particles from a submarine eruption column. Dark layers mark zones of reworking where ocean currents preferentially transported the lightweight pumice. See page 275. [Photograph by R. S. Fiske, Smithsonian Institution]

- 301 Organic Molecular Soft Ferromagnetism in a Fullerene C_{60} : P.-M. ALLEMAND, K. C. KHEMANI, A. KOCH, F. WUDL, K. HOLCZER, S. DONOVAN, G. GRÜNER, J. D. THOMPSON
- 303 Early Differentiation of the Earth and the Problem of Mantle Siderophile Elements: A New Approach: V. R. MURTHY
- 306 A Mechanical Trigger for the Trot-Gallop Transition in Horses: C. T. FARLEY AND C. R. TAYLOR
- 309 Hybridization Between European and Africanized Honey Bees in the Neotropical Yucatan Peninsula: T. E. RINDERER, J. A. STELZER, B. P. OLDROYD, S. M. BUCO, W. L. RUBINK
- 312 Transcription-Dependent and Transcription-Independent Nuclear Transport of hnRNP Proteins: S. PIÑOL-ROMA AND G. DREYFUSS
- 314 Kinetic Characterization of Ribonuclease-Resistant 2'-Modified Hammerhead Ribozymes: W. A. PIEKEN, D. B. OLSEN, F. BENSELER, H. AURUP, F. ECKSTEIN
- 317 Deleted HTLV-I Provirus in Blood and Cutaneous Lesions of Patients with Mycosis Fungoides: W. W. HALL, C. R. LIU, O. SCHNEEWIND, H. TAKAHASHI, M. H. KAPLAN, G. RÖUPE, A. VAHLNE
- 320 Inhibition of Entry of HIV-1 in Neural Cell Lines by Antibodies Against Galactosyl Ceramide: J. M. HAROUSE, S. BHAT, S. L. SPITALNIK, M. LAUGHLIN, K. STEFANO, D. H. SILBERBERG, F. GONZALEZ-SCARANO
- 323 Deposits of Amyloid β Protein in the Central Nervous System of Transgenic Mice: D. O. WIRAK, R. BAYNEY, T. V. RAMABHADRAN, R. P. FRACASSO, J. T. HART, P. E. HAUER, P. HSIAU, S. K. PEKAR, G. A. SCANGOS, B. D. TRAPP *et al.*
- 325 Evidence for the Effects of a Superantigen in Rheumatoid Arthritis: X. PALIARD, S. G. WEST, J. A. LAFFERTY, J. R. CLEMENTS, J. W. KAPPLER, P. MARRACK, B. L. KOTZIN
- 330 Buckminsterfullerene: The Inside Story: M. SAUNDERS

Technical Comment

- 332 Controls for Lesions of the Nigrostriatal Dopamine System: T. E. ROBINSON; C. R. GERFEN AND T. M. ENGBER

Book Reviews

- 334 The Man Who Knew Infinity, *reviewed by* J. M. BORWEIN AND P. B. BORWEIN ■ Jessie Bernard, M. MILLMAN ■ Some Other Books of Interest ■ Books Received

Products & Materials

- 338 SDS as Solution ■ Solar-Powered pH Meter ■ New Separation Medium ■ Monoclonal Antibodies ■ Programmable Temperature Controller ■ Protein Analysis Kit ■ Population Software ■ Literature

Board of Directors

Donald N. Langenberg
*Retiring President,
Chairman*

Leon M. Lederman
President

F. Sherwood Rowland
President-elect

Mary Ellen Avery
Francisco J. Ayala
Eugene H. Cota-Robles
Robert A. Frosch
Joseph G. Gavin, Jr.
Florence P. Haseltine
Jean'ne M. Shreeve
Warren M. Washington

William T. Golden
Treasurer

Richard S. Nicholson
Executive Officer

Editorial Board

Charles J. Arntzen
Elizabeth E. Bailey
David Baltimore
William F. Brinkman
E. Margaret Burbidge
Pierre-Gilles de Gennes
Joseph L. Goldstein
Mary L. Good
Harry B. Gray
John J. Hopfield
F. Clark Howell
Paul A. Marks
Yasutomi Nishizuka
Helen M. Ranney
Robert M. Solow
Edward C. Stone
James D. Watson

Board of Reviewing Editors

John Abelson
Frederick W. Alt
Don L. Anderson
Stephen J. Benkovic
Floyd E. Bloom
Henry R. Bourne
James J. Bull
Kathryn Calame
Charles R. Cantor
Ralph J. Cicerone
John M. Coffin
Robert Dorfman
Bruce F. Eldridge
Paul T. Englund
Fredric S. Fay

Douglas T. Fearon
Harry A. Fozzard
Theodore H. Geballe
Roger I. M. Glass
Stephen P. Goff
Corey S. Goodman
Stephen J. Gould
Eric F. Johnson
Stephen M. Kosslyn
Konrad B. Krauskopf
Charles S. Levings III
Richard Losick
Anthony R. Means
Mortimer Mishkin
Roger A. Nicoll
William H. Orme-Johnson III
Yeshayau Pocker

Dennis A. Powers
Erkki Ruoslahti
Thomas W. Schoener
Ronald H. Schwartz
Terrence J. Sejnowski
Thomas A. Steltz
Robert T. N. Tjian
Emil R. Unanue
Geerat J. Vermeij
Bert Vogelstein
Harold Weintraub
Zena Werb
George M. Whitesides
Owen N. Witte
William B. Wood
Keith Yamamoto



Eppendorf® spins out two new winners.

Two new Micro Centrifuges that make your work faster, easier, and safer.

One has refrigeration. The new Model 5402 Refrigerated Micro Centrifuge spins heat-sensitive samples at temperatures as low as -9°C ,* bringing the cold room to your benchtop.

Both control aerosols. The refrigerated model and the new Model 5415C Micro Centrifuge both use new, easily interchangeable rotors with lids for added quiet, convenience, and safety.

Call 800-645-3050; in New York, 516-334-7500, for more information. Or write Brinkmann Instruments, Inc., Cantiague Road, Westbury, NY 11590. (In Canada: 416-675-7911; 50 Galaxy Blvd., Rexdale, Ont. M9W 4Y5)

*At 12,500 rpm.

eppendorf

BRINKMANN Quality products for research and control.

For information circle reader service number 63
For a demonstration circle reader service number 64

This Week in SCIENCE

Shifting sands in the Sahara Desert

The Sahara is the world's largest desert; its size fluctuates between about 7 and 9 million square kilometers. Images of the desert that reveal vegetation patterns, which are a direct reflection of rainfall, have been made by polar-orbiting meteorological satellites for the past decade. Between 1980 and 1990 many northward and southward shifts in the southern Saharan-Sahelian boundary have occurred. The year-by-year changes are described by Tucker *et al.* (page 299) and provide a valuable framework against which future shifts between desertification and steppe formation (more arable land) can be assessed; it will take several decades worth of data to reveal major trends that are occurring in the world's deserts. The techniques that are described in this study are currently being applied to analyses of desertification elsewhere on the planet's surface.

Buckyball structure and function

The list of novel structural features and properties of buckyballs (C_{60} molecules) continues to grow. C_{60} molecules have been found to be conductors and superconductors. Allemande *et al.* found that a doped fullerene (C_{60} doped with the organic ion tetrakis(dimethylamino)ethylene) can act as a molecular ferromagnet (page 301). They describe the preparation of the molecular solid and its transition at 16 K to a "soft" ferromagnet, one for which there is no hysteresis loop during the magnetic transition. Saunders examines what would be the energetically preferred form of fully reduced C_{60} ($C_{60}H_{60}$) (page 330). $C_{60}H_{60}$, or buckminsterfullerane, has enormous strain energy, and a computer search indicates that, if ten of the hydrogen atoms are oriented toward the inside of the spheric molecule, strain on the rings would be relieved and the lowest steric energy level would be reached.

Early chemical differentiation of Earth

Modelers of the earth's formation and of the differentiation of mantle and core have had a problem: they have been unable to account simply for the high abundance in the mantle of siderophile elements—those elements like gold, iridium, and rhenium that fractionate into the iron core. A new calculation by Rama Murthy shows that if partitioning of siderophile elements between mantle and core occurred at temperatures high enough to liquidize much of the material of the earth and not just material at the surface or at shallow depths—temperatures between 3000 and 3500 K—equilibration of mantle silicates and core materials would lead to siderophile element abundances that are approximately like those that are currently observed (page 303). By this extrapolation of available laboratory data to high enough temperatures, the siderophile problem appears to have been solved.

Horsepower

What causes a horse to switch from a trot to a gallop? A study by Farley and Taylor shows that the gait transition takes place when forces on the horse's bones, muscles, and tendons reach a critical level (page 306). Galloping reduced the force on the musculoskeletal system and is therefore likely to significantly reduce the risk of injury to the skeleton and muscles. Dynamic features of the trot-to-gallop transition were analyzed with horses that were running with and without weights on a motorized treadmill. Whether or not they were wearing weights, the horses switched from trotting to galloping when the same peak force was reached; in horses running with weights this level of force was reached at lower speeds than for those running without weights. The gait transition speed proved to be one at which galloping is more energetically costly than trotting; thus safety rather than an energy advantage—which for many

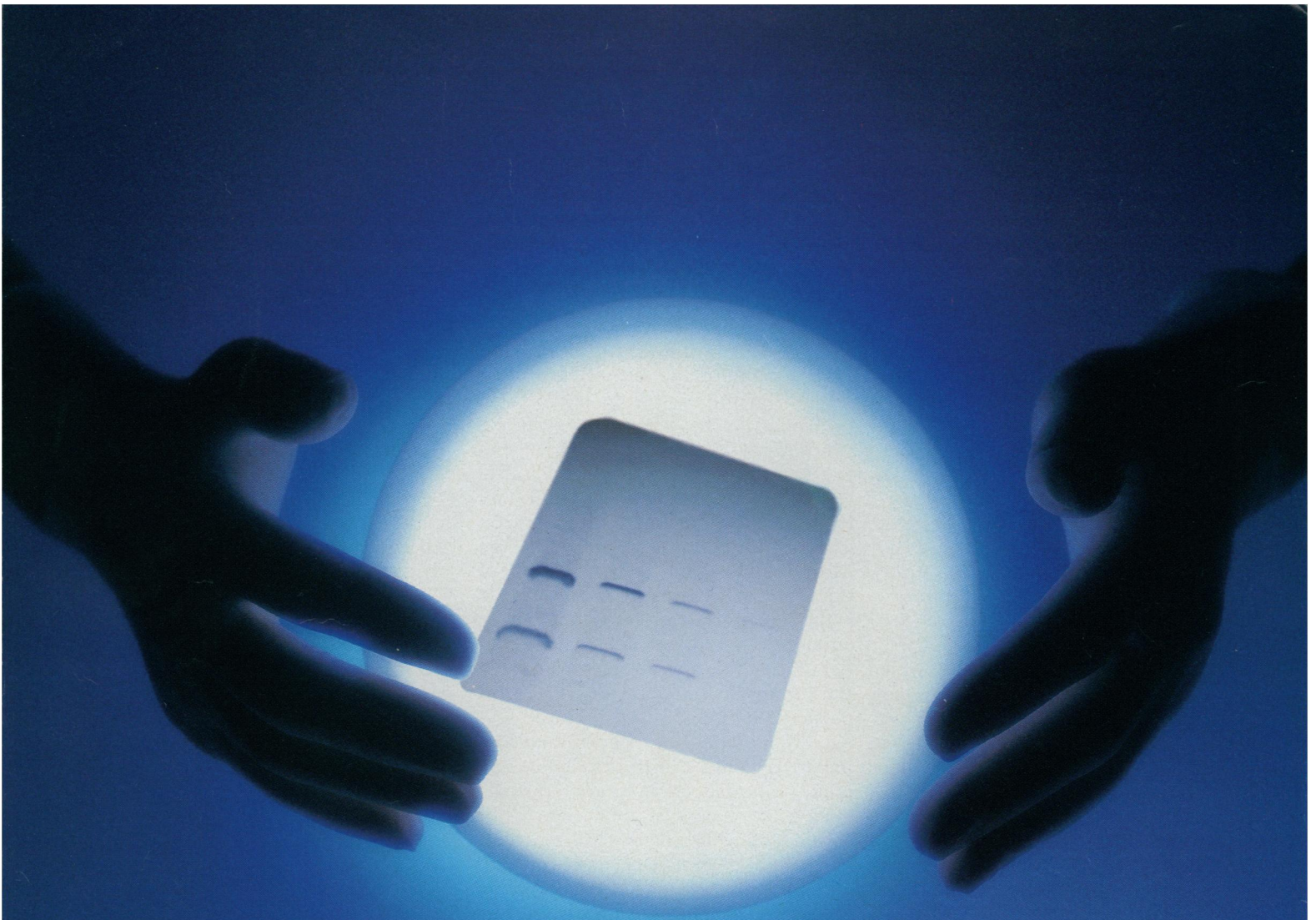
years was regarded as the trigger for the switch—appears to drive the gait transition.

HTLV-I in mycosis fungoides

Infection with HTLV-I, the human T cell leukemia/lymphoma virus type I, is associated with the development of certain aggressive adult T cell leukemias and lymphomas. Patients with a number of other rare cutaneous T cell lymphomas have no detectable antibodies to this virus. However, searches in the cells of such patients, specifically those with mycosis fungoides, indicated that portions of the genetic material from HTLV-I were present (page 317). Hall and colleagues report that, in patients with mycosis fungoides, cells from the skin lesions have incomplete HTLV-I provirus sequences. It appears that the initial infection in mycosis fungoides may involve an exogenous HTLV-I virus, and that at some point in infection certain viral sequences are deleted. This may explain the relatively indolent nature of the infection.

HIV-1 entry into cells

The human immunodeficiency virus HIV-1 typically enters cells by binding to a receptor called CD4; however, the virus has also been observed to enter and infect cells that lack CD4. Harouse *et al.* found that, in two cell lines derived from cells of the nervous system, a glycolipid that is typically found in association with myelin, called galactosyl ceramide (GalC), can serve as a receptor for HIV-1 (page 320). Antibodies to GalC blocked entry of HIV-1 into the cells and prevented development of HIV-1 infections. The gp120 protein of the virus is the viral component that interacts with GalC; gp120 is also the protein that binds to CD4 receptors. Neurologic symptoms in HIV-1 infections are common, and GalC may be one of the molecules involved in neuropathogenesis of HIV-1-infected individuals. ■ RUTH LEVY GUYER



It always comes out the same.
Superior.

Sure Blot® Blue. The True Blue.

It is easy to see why Sure Blot® Blue for non-isotopic DNA/RNA hybridization and detection consistently yields superior results.

We couple our positively charged nylon membrane, the industry standard, to our matched hybridization and non-isotopic detection reagents to create a single tailor-made product for Southern and Northern hybridization experiments.

The total system approach plus rigorous quality control testing of every lot makes all the following come true: same consistent level of reproducibility, extremely low background noise, and sensitivity down to at least 0.2 picograms of target nucleic acids...even 0.05 picograms is possible. Unmatched sensitivity and consistency, 5 years of experience, and Oncor® service and support make Sure Blot® Blue the True Blue.

Your future holds superior results.

Just call 1-800-77-ONCOR today and find out more about Sure Blot® Blue.

The Molecular Pathology Company

oncor

209 Perry Parkway Gaithersburg, MD 20877

©1991, Oncor, Inc. Oncor & Sure Blot are registered trademarks of Oncor, Inc.

Circle No. 12 on Readers' Service Card

Pure mRNA in Minutes...

...Directly from Small or Large Samples of Cells or Tissue.

FastTrack™ and MicroFastTrack™ set the industry standard in high quality mRNA isolation.

MicroFastTrack™*: 20 Reactions

- Ideal for PCR, Northern and cDNA synthesis
- Isolation from samples ranging in size from 10^3 - 10^6 cells or 10-250mg of tissue.
- Reproducible yields of high quality mRNA.

FastTrack™*: 6 Reactions

- mRNA isolation for Northern, cDNA, library construction, PCR, microinjection, RNA protection studies and *in vitro* translation.
- Isolation from samples ranging in size from 10^7 - 10^8 cells or 0.4-1.0 gram of tissue.
- Fast, efficient recovery of large amounts of polyA+ RNA from a variety of sources.

Both systems offer:

- High yields of intact mRNA with low ribosomal contamination.
- Eliminate the need for total RNA isolation or the use of toxic chemicals.
- The most cost effective means of generating high quality mRNA.
- Consistency, convenience and the fastest isolation time.

For the very best in direct mRNA isolation FastTrack™ and MicroFastTrack™ are the choice of thousands of research labs worldwide. When the quality of your mRNA is important, turn to the original source for purity, reliability and convenience; turn to Invitrogen.

Toll Free 1-800-955-6288

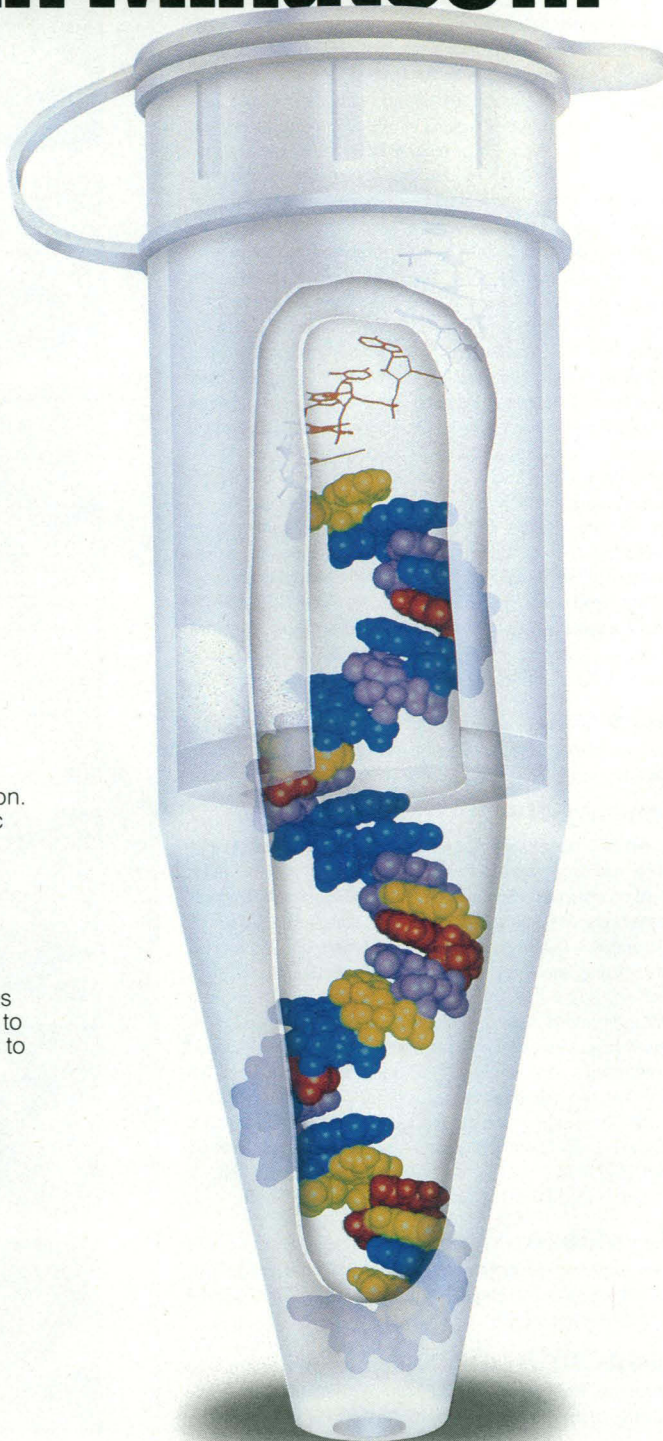


3985 • B Sorrento Valley Blvd. • San Diego, CA 92121
(619) 597-6200 Phone • (619) 597-6201 Fax

 BRITISH BIOTECHNOLOGY LTD, UK - TEL: 44-235529449 • AMS BIOTECHNOLOGY UK LTD, UK - TEL: 44-993822786 • BDH INC., CANADA - TEL: 800-268-0310 • BIO-TRADE, AUSTRIA - TEL: 43-2228284694 • CELBIO, ITALY - TEL: 39-24048646 • FUNAKOSHI PHARMACEUTICALS, JAPAN - TEL: 81-356841622 • ITC BIOTECHNOLOGY GMBH, GERMANY - TEL: 06221-303907 • KEBO LABS AB, SWEDEN - TEL: 46-86213400 • MEDOS COMPANY PTY LTD, AUSTRALIA - TEL: 61-38089077

*patent pending. mRNA model courtesy of BIOSYM

Circle No. 104 on Readers' Service Card



CSS:STATISTICA™

CSS/3™ Complete Statistical System with over 1,000 presentation-quality graphs fully integrated with all procedures and on-screen graph customization ■ The largest selection of statistics in a single system; in-depth, comprehensive implementations of: *Exploratory techniques; multi-way tables with banners; nonparametrics; distribution fitting; multiple regression; general nonlinear estimation; logit/probit analysis; general ANCOVA/MANCOVA; stepwise discriminant analysis; log-linear analysis; factor analysis; cluster analysis; multidimensional scaling; canonical correlation; item analysis/reliability; survival analysis; time series modeling; forecasting; lags analysis; quality control; process analysis; experimental design (with Taguchi);* and much more ■ Manuals with comprehensive introductions to each procedure and examples ■ Integrated Stats Advisor expert system ■ Extensive data management facilities (powerful spreadsheet with formulas; relational merge; data verification; flexible programming language) ■ Optimized (plain English menus/mouse) user interface: even complex analyses require just few self-explanatory selections (CSS can be run without manual; Quick Start booklet explains all basic conventions) ■ Macros, batch/commands also supported ■ All output displayed in Scrollsheets™ (dynamic tables with pop-up windows and instant graphs) ■ Extremely large analysis designs (e.g., correlation matrices up to 32,000x32,000) ■ Unlimited size of files; extended precision; unmatched speed (Assembler, C) ■ Exchanges data (and graphics) with many applications (incl. Excel®, Lotus 3®, dBASE IV®, SPSS®) ■ Highest resolution output on practically all printers (incl. HP, Postscript), plotters, recorders, typesetters ■ IBM compatibles, 640k or more ■ Price: **\$595.**

Quick CSS™ Subset of CSS/3: all basic statistical modules (incl. data management) and the full, presentation-quality graphics capabilities of CSS/3 ■ Price: **\$295.**

CSS:GRAPHICS™ A comprehensive graphics/charting system with data management ■ All graphics capabilities of CSS/3 and, in addition, extended on-screen drawing, 19 scalable fonts, special effects, icons, maps, multi-graphics management ■ Hundreds of types of graphs ■ Interactive rotation and interactive cross-sections of 3D graphs ■ Extensive selection of tools for graphical exploration of data; fitting; smoothing; spectral planes; overlaying; layered compressions; marked subsets ■ Unique multivariate (e.g., 4D) graphs ■ Facilities to custom-design new graphs and add them permanently to menu ■ Import/export of graphs and data, 15 formats ■ Optimized (menu/mouse) user interface; even complex graphs require few keystrokes: all graphs on this page can be produced from raw data in less than 20 minutes ■ Macros, batch/commands also supported ■ Unlimited size of files ■ Highest resolution output on all hardware (see CSS/3) ■ IBM compatibles, 640k or more ■ CSS:GRAPHICS is included in CSS:STATISTICA (available separately for **\$495**).

Megafile Manager™ Comprehensive analytic data base management system ■ Unlimited size of files (up to 32,000 fields or 8 MB per record) ■ Megafile Manager is included in CSS/3 and CSS:STATISTICA (separately: **\$295**).

CSS:STATISTICA™ A fully integrated system that combines all the capabilities of CSS/3 and CSS:GRAPHICS into a single extremely comprehensive data analysis system ■ Price: **\$795.**

Domestic sh/h \$7 per product; 14-day money back guarantee.

Circle No. 114 on Readers' Service Card



StatSoft™

2325 E. 13th St. • Tulsa, OK 74104 • (918) 583-4149
Fax: (918) 583-4376

Overseas Offices: StatSoft of Europe (Hamburg, FRG), ph: 040/4200347; fax: 040/4911310. StatSoft UK (London, UK) ph: 0462/482822; fax: 0462/482855. StatSoft Pacific (Melbourne, Australia), ph: 613-866-1766; fax: 613-866-3318. StatSoft Canada-CCO (Ontario), ph: 416-849-0737; fax: 416-849-0918. Available From: CORPORATE SOFTWARE and other Authorized Representatives Worldwide Holland: Lemax 020-659-6856; France Conceptel (1) 45669700; Sweden: AkademiData 018-240035; Spain: ADDLINK, SRL: ph: 34-3-459-0722

CSS, CSS/3, CSS:GRAPHICS, Megafile Manager, Quick CSS, STATISTICA, StatSoft, dBase IV, Excel, Lotus, MacDraw, Macintosh, Postscript are trademarks of their respective companies; SPSS is a registered trademark of SPSS, Inc.



STATISTICA/Mac™ A CSS-compatible, comprehensive data analysis and graphics system designed for the Macintosh ■ Large selection of statistical methods fully integrated with presentation-quality graphics (incl. EDA, multiplots, a wide selection of interactively rotatable 3D graphs; MacDraw-style tools) ■ Unlimited size of files ■ Exchanges data with Excel and other applications ■ Price: **\$495.**

Quick CSS/Mac™ A subset of STATISTICA/Mac: all basic statistical modules and the full, presentation-quality graphics capabilities of STATISTICA/Mac ■ Price: **\$295.**

Conformations and Forces in Protein Folding

Barry T. Nall and Ken A. Dill, editors

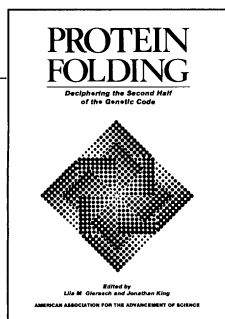
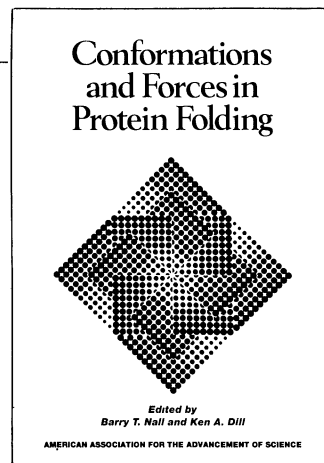
Protein folding, the self-directed transition from disorganized chains to highly ordered and functional biological structures, is of increasing practical concern for the biotechnology industry and for interpreting DNA sequences. In the biological sciences folding is of major importance in the "self-assembly" process that produces the protein catalysts that facilitate and regulate cellular chemistry. Folding plays a role in such diverse cellular processes as macromolecular transport and assembly, targeting of proteins to intra- or extracellular locations, and in vivo stability of proteins.

Several aspects of folding addressed include forces and interactions important to protein stability and function, methods for determining proteins, studies of alterations in structure in mutant proteins, mechanistic investigations of the folding process, and analyses of auxiliary factors that modify or catalyze protein folding.

1991; ca. 272 pp.; indexed and illustrated; #91-05S — softcover; \$34.95 (members \$27.95); ISBN 0-81768-394-6

CONTENTS

- Preface—G. Rose
- I.** Compact States, Electrostatics, and Folding — K. A. Dill
1. Calculation of the Total Electrostatic Energy of a Macromolecular System: Solvation Energies, Binding Energies, and Conformational Analysis — M. K. Gilson and B. Honig
 2. Electrostatic Effects and Allosteric Regulations in E. Coli Aspartate Transcarbamylase — M. P. Glackin, J. B. Matthew, N. M. Allewell
 3. Charge Effects on Folded and Unfolded Proteins — D. Stigter and K. A. Dill
 4. Compact Polymers — H. S. Chan and K. A. Dill
- II.** Relation of Amino Acid Sequence to Structure and Folding — L. M. Gierasch
5. Can Molecular Evolution Provide Clues to the Folding Code? — S. C. Hardies and L. D. Garvin
 6. Folding and Activity of Hybrid Sequence, Disulfide-Stabilized Peptides — J. H. B. Pease, R. W. Storrs, D. E. Wemmer
 7. ¹H NMR Assignments and Three-Dimensional Structure of Ala14/Ala38 Bovine Pancreatic Trypsin Inhibitor Based on Two-Dimensional NMR and Distance Geometry — H. M. Naderi, J. F. Thomason, B. A. Borgias, S. Anderson, T. L. James, I. D. Kuntz
 8. The Tryptophan Synthase $\alpha_2\beta_2$ Multienzyme Complex: Relationship of the Amino Acid Sequence and Folding Domains to the Three-Dimensional Structure — E. W. Miles
- 9.** Protein Structure Determination in Solution by Two-Dimensional and Three-Dimensional NMR — A. M. Gronenborn and G. M. Clore
- III.** Folding Mechanisms — C. N. Pace
10. The Mechanism of Protein Folding — O. B. Ptitsyn, G. V. Semisotnov
 11. Conformation States in Acid-Denatured Proteins — A. I. Fink, L. J. Calciano, Y. Gotto, D. Palleros
 12. Characterization of Unfolded and Partially Folded States of Proteins by NMR Spectroscopy — C. M. Dobson, C. Hanley, S. E. Radford, J. Baum, P. A. Evans
- IV.** Auxiliary Factors and Folding: Membranes and Catalysis — B. T. Nall
13. Teaching Proteins to Fold — P. M. Horowitz
 14. Alternate Folding Motifs for Gramicidin: Crystallographic and Spectroscopic Analyses of Polymorphism — B. A. Wallace
 15. Prolyl Isomerase: Role in Protein Folding and Speculation on Its Function in the Cell — F. X. Schmid, K. Lang, T. Kiefhaber, S. Mayer, E. R. Schonbrunner
 16. Protein-Disulfide Isomerase: An Enzyme That Catalyzes Protein Folding in the Test Tube and in the Cell — R. B. Freedman



Protein Folding: Deciphering the Second Half of the Genetic Code

Lila M. Gierasch and Jonathan King, editors

1990; 342 pp.; indexed and illustrated; color plates #89-18S — softcover; \$39.95 (members \$31.95); ISBN 0-81768-353-9

"Readers of the book will get a vivid impression of the diversity of systems under study and of the impressive variety of techniques employed in folding research."

—Trends in Biochemical Sciences

Order from: AAAS Books, Dept. A40, PO Box 753, Waldorf, MD 20604 (FAX: 301-843-0159). To order by phone (VISA/MasterCard only), call 301-645-5643 (9am-4pm ET) and ask for AAAS. Please specify item number. Individuals must prepay or use VISA/MC. Add \$4.00 postage/handling. For shipments to CA, add applicable sales tax.

American Association for the Advancement of Science