GENEFILTERS®

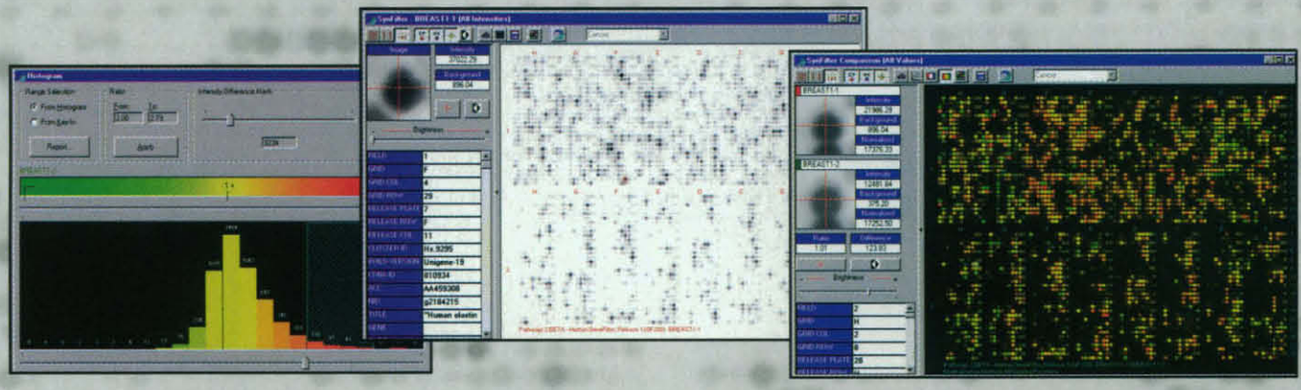
MICROARRAYS CONSISTING OF THE DNA INSERTS FROM TENS OF THOUSANDS OF SEQUENCE VALIDATED CLONES

GENEFILTERS microarrays contain DNA from over 5,000 different genes spotted onto nylon membranes. Over 25,000 genes are represented in our growing collection of sequence validated I.M.A.G.E./LLNL clones[1] chosen from the UniGene[2] set. In addition to five GENEFILTERS microarrays representing the entire human collection, individual GENEFILTERS are available which represent only named human genes or only genes that have been shown to be expressed in a particular human tissue. The first release of our rat GENEFILTERS microarrays is now available also. This collection of over 5,000 genes represents about 1,700 named rat genes[3] as well as many rat ESTs that are considered similar to named genes in other organisms.

GENEFILTERS microarrays are high density DNA arrays produced on 5cm x 7cm membranes. These tools offer the opportunity to carry out sophisticated, genome-wide gene expression experiments using simple autoradiography. GENEFILTERS can be probed up to six times. Standard hybridization methods with ^{33}P and a phosphor imaging system produce data which can be analyzed using Pathways™ analysis software. For a complete description of each of the GENEFILTERS microarrays, see our web site at http://www.resgen.com.

Ref 1. Lennon, G., Auffray, C., Polymeropoulos, M., Soares, M.B. (1996) *Genomics 33,* 151-152.
2. http://www.ncbi.nlm.nih.gov/UniGene/index.html
3. http://ratEST.uiowa.edu

Cat. No.	Description	Price	Cat. No.	Description	Price
GF200	Human GENEFILTERS Release I	$ 960.00	GF300	Rat GENEFILTERS Release I	$ 960.00
GF201	Human GENEFILTERS Release II	$ 960.00	GF221	Human Prostate GENEFILTERS	$1,440.00
GF202	Human GENEFILTERS Release III	$ 960.00	GF224	Human Ovary GENEFILTERS	$1,440.00
GF203	Human GENEFILTERS Release IV	$ 960.00	GF227	Human Colon GENEFILTERS	$1,440.00
GF204	Human GENEFILTERS Release V	$ 960.00	GF211	Human Named Genes GENEFILTERS	$1,440.00



Pathways™ software was designed specifically for use with GENEFILTERS microarrays. The software imports and stores .gel or .tif files from phosphor imaging systems, and locates, calculates, and stores the spot intensities from those files. The software is capable of analyzing images from single membranes or graphically comparing two different images, as well as "bookmarking" genes of interest for easy future reference. An intuitive histogram tool allows easy selection of genes with differential expression. The internal database provides instant, on-screen identification of each spot as it is selected. Additionally, Pathways™ will export the data to reports, text files, and/or spreadsheets complete with GenBank accession numbers.

Cat. No.	Description	Price
PW200	Pathways™ Software	$2,850.00

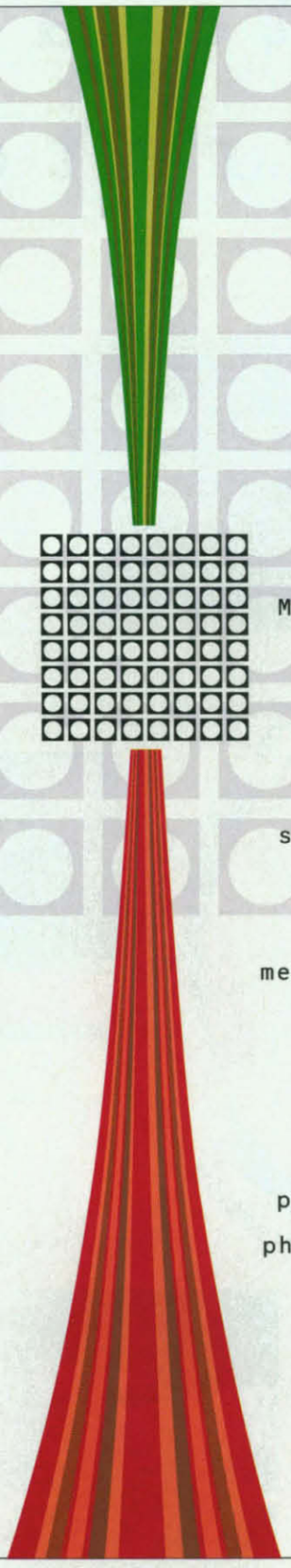
Research Genetics

Accelerating Discovery

2130 Memorial Pkwy, SW • Huntsville, AL • 35801
U.S. or Canada 800-533-4363 Worldwide 256-533-4363
U.K. 0-800-89-1393 FAX 256-536-9016
http://www.resgen.com

MICROARRAY ANALYSIS:

the next revolution in molecular biology



Microarrays that consist of ordered sets of DNA fixed to solid surfaces provide pharmaceutical firms with a means to identify drug targets. In the future, the emerging technology promises to help physicians decide the most effective drug treatments for individual patients.

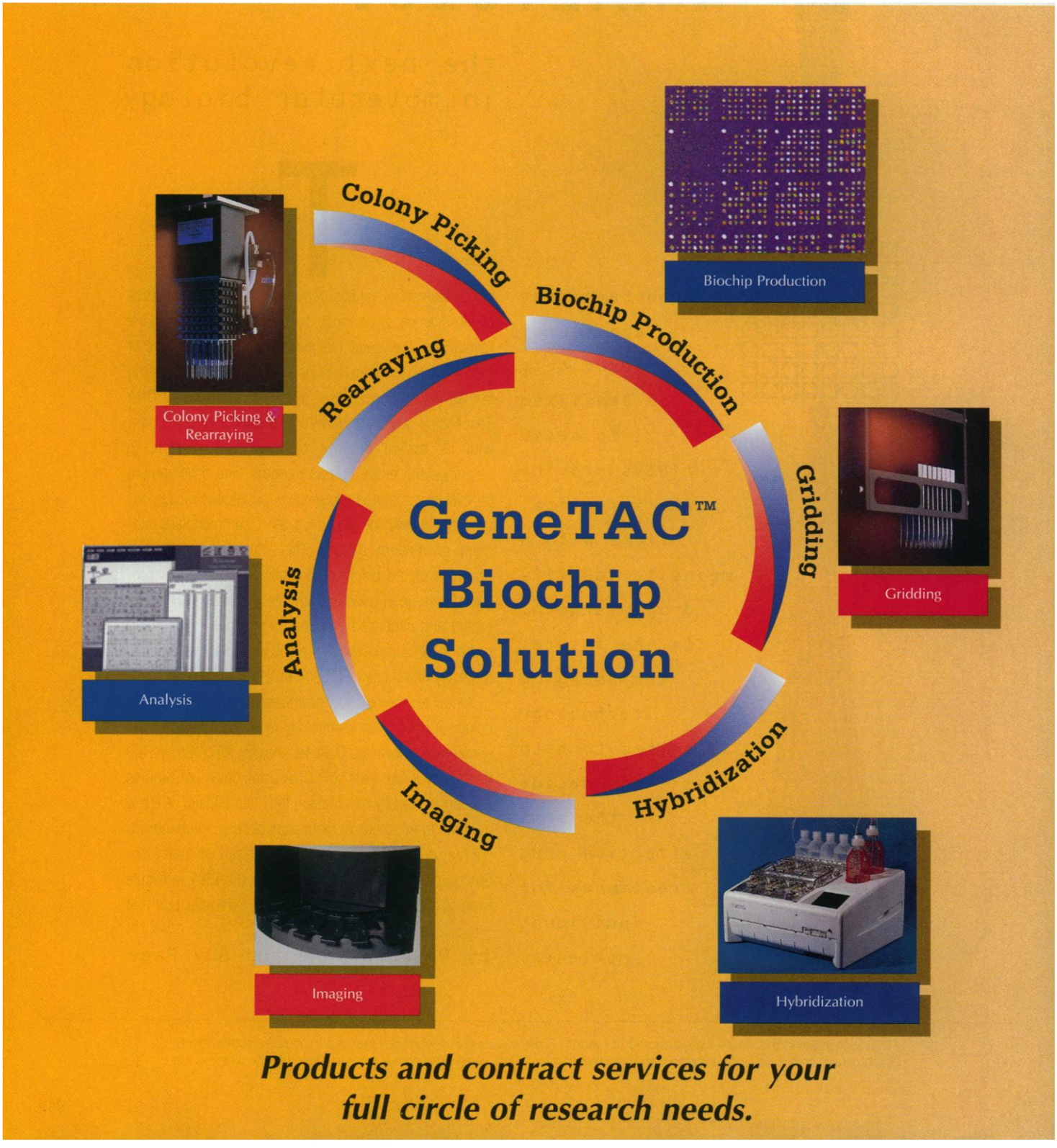
The remarkable speed with which biotechnology has become critical to the practice of life science owes much to a series of technological revolutions. Molecular biologists started the process in the mid-1970s, when they developed molecular cloning and DNA sequencing. Five years later, automated DNA sequencing took the world of biotechnology by storm, with its distant promise of making it possible to sequence the entire human genome. The development of reliable automated sequencing techniques made possible the growth of genomics as a commonplace element of modern biology. Then, ten years ago, the invention of the polymerase chain reaction (PCR) produced a surge in new experiments. Because PCR accelerated and simplified procedures previously performed much more laboriously by traditional molecular cloning, it quickly found use in experimental molecular biology.

A new technology now promises to advance biotechnology further. That technology is microarray analysis, sometimes known as DNA technology. Microarrays are simply ordered sets of DNA molecules of known sequence. Usually rectangular, they can consist of a few hundred to hundreds of thousands of sets. Each individual feature goes on the array at precisely defined location on the substrate. The identity of the DNA molecule fixed to each feature never changes. Scientists use that

by Peter Gwynne and Guy Page

The companies in this article were selected at random. Their inclusion in this article does not indicate endorsement by either AAAS or *Science*, nor is it meant to imply that their products or services are superior to those of other companies.

Printing to ana
your integrated



lyzing, we have biochip solution.

We've come full circle.

No matter what your research setting—pharmaceutical, biotechnology company, university or government-funded institution—we're your single source for products and services for gene expression analysis. Genomic Solutions is the first sole solutions provider in the business. Our family of GeneTAC™ Biochip products works together for precise, convenient, economical biochip printing and analysis. Our instrumentation and software provide the flexible, high-throughput help you need.

The GeneTAC Biochip Solution includes Flexys® Workstations for automated picking, gridding, replication and rearraying, GeneTAC Hybridization Stations, GeneTAC Biochip Imager/Analyzers, Array Analysis Products and Reagents.

Budget or organizational restrictions? No problem. We can fill in any part of your information stream with contract lab services from our in-house service laboratory. Biochip printing and analysis are now available to all levels of researchers. You control the experiments and data produced. We won't lay claim to your proprietary data.

Genomic Solutions. We have a full circle of research solutions to fit your exacting lab needs in gene expression analysis. Visit us at **www.genomicsolutions.com** or call us toll free at **1.877.GENOMIC**.

GENOMIC SOLUTIONS™

FUELING INNOVATION.
DRIVING DISCOVERY.™

Circle No. 65 on Readers' Service Card

Worldwide Corporate Headquarters: Genomic Solution 1355 Varsity Drive • Ann Arbor, MI 48108 • Phone: +1 734.975.4800 • Fax: +1 734.975.4808
Proteomics Division: 22 Alpha Road • Chelmsford, MA 01824 USA • Phone: +1 978.244.0033 • Fax: +1 978.244.0066
Genomic Solutions Ltd.: Unit 3, Forge Close, Little End Road • Eaton Socon, St. Neots • Cambridgeshire, PE 19 3TP UK • Phone: +44 (0) 1480 474 344 • Fax: +44 (0) 1480 471 660
Genomic Solutions KK: Gotanda Chuo Bldg. 2F • 3-5, Higashigotanda 2-chome • Shinagawa-ku • Tokyo 141-0022, Japan • Phone: +81.33.280.0990 • Fax: +81.33.280.0991

Worldwide distribution: see our website for a listing of all distributors

fact in calculating their experimental results.Microarray analysis permits scientists to detect thousands of genes in a small sample simultaneously and to analyze the expression of those genes. As a result, it promises to enable biotechnology and pharmaceutical companies to identify drug targets — the proteins with which drugs actually interact. Since it can also help identify individuals with similar biological patterns, microarray analysis can assist drug companies in choosing the most appropriate candidates for participating in clinical trials of new drugs. In the future, this emerging technology has the potential to help medical professionals select the most effective drugs, or those with the fewest side effects, for individual patients.

It's hardly surprising, then, that corporate and academic R&D laboratories are rushing to obtain the new technology. "The field is exploding," says Stephen Fodor, president and CEO of Santa Clara, California, company Affymetrix. "We're probably in 90 percent of the top pharmaceutical companies, and we're placing about two systems a week. I don't think people realize how pervasive this technology is."

The Potential of Microarray Analysis

The future contains even more promise. "Microarray technology will be as revolutionary to life science research as PCR technology, with an even bigger market potential," says Walter Tian, business development manager in charge of microarrays at Boston-based NEN Life Science Products. "Our own analysis and that of others suggest that this market can go over $1 billion in five years, including chips, other consumables, and instruments. We're talking about a brand new business here."

Indeed, the potential of microarrays seems almost limitless. "We'll obviously go to much higher densities and better designs," says Fodor. "The number of expression products, genotyping products, and disease management products will continue to increase." Dan Pinkel of the University of California-San Francisco (UCSF) agrees. "DNA chip technology is really diverse," he says. "It has an infinite number of variants and subtleties. It's just a wonderful hybridization environment that allows you to do what you want with very complex nucleic acids."

"DNA chip technology is really diverse. It has an infinite number of variants and subtleties. It's just a wonderful hybridization environment that allows you to do what you want with very complex nucleic acids."

New applications of microarray technology will blossom over time. In one notable example, researchers at the National Human Genome Research Institute (NHGRI) — a part of the National Institutes of Health in Bethesda, Maryland — are perfecting a new clinical application, based on 'tissue microarrays'. "In conventional arrays, you survey thousands of genes in one tissue at a time," explains Olli Kallioniemi, head of the tumor progression section at the institute's Cancer Genetic Branch. "In tissue microarrays, we survey one gene at a time, in thousands of tissue specimens." This technology permits researchers to study the relationship of individual genes to disease, and then to apply the knowledge they gain to the treatment of patients. "We are in very much in the first wave of tissue microarrays right now," says Kallioniemi. "It has been propagated mostly in the cancer community. But it has potential applications in several other fields, such as diseases other than cancer, normal tissues and cells during development, and studies of transgenic animals."

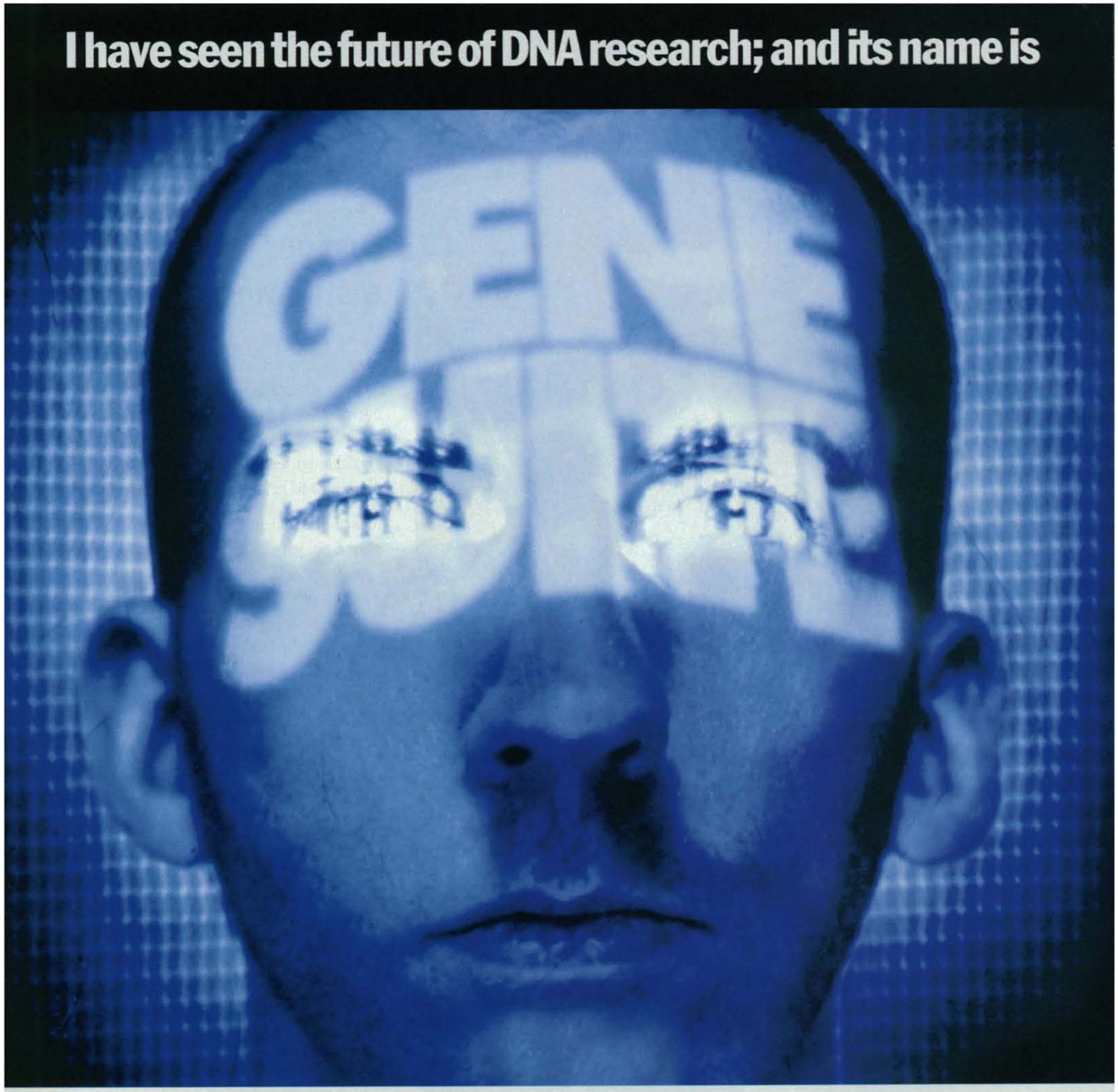
A new approach to the design of DNA chips promises broader application of the technology. Instead of looking at a very small part of the genome, explains Uwe Müller, director of advanced technology at Vysis in Downers Grove, Illinois, "we want to look at the whole genome in one assay. Our first chips look at 50 to 60 regions, but there is no limitation on the number. A chip could be designed to look at the entire genome with very high resolution." That type of advance should benefit fields as diverse as cancer genetics and prenatal genetics.

Microarray technology has the potential to be used to develop new drugs. "It's clearly been demonstrated that the technology can identify genes that have been upregulated or downregulated," says Jeffrey Williams, CEO of Genomic Solutions, based in Ann Arbor, Michigan. "We and others have identified some novel genes that seem to play a role in disease pathways. But so far no new drugs have been developed as a result of microarray technology. The field is too new yet." Most individuals in the field, however, believe that it's just a matter of time until this promising development becomes a reality.

The academic research community stands to benefit from microarray technology just as much as the pharmaceutical industry. The ability to use it in place of existing technology will allow researchers to perform experiments faster and more cheaply, and will enable them to concentrate on analyzing the results of microarray experiments rather than simply performing the experiments. This research could then lead to a better understanding of the disease process. That will require many different levels of research. While the field of expression has received most attention so far, looking at the gene copy level and protein level is just as important. Microarray technology has potential applications in each of these three levels.

continued ➢

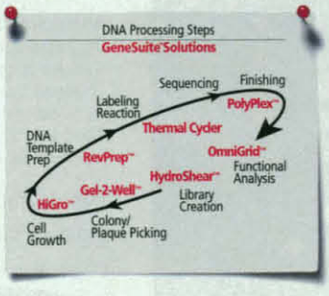
I have seen the future of DNA research; and its name is



Think about it, totally automated DNA procedures. Is it only a dream?

No, it's real. It's the GeneSuite™ – the complete line of automated DNA sample-handling tools from GeneMachines®.

The GeneSuite consists of fully automated solutions that eliminate tedious repetition. The result? Increased throughput, precision, repeatability and lower sample costs. So you can do more with less work.



Each part of the suite employs novel technology arising from our close collaboration with researchers at labs and universities around the world – many involved in The Human Genome Project. Time after time, we have been able to deliver innovative solutions that meet their special needs.

So to get past monotonous DNA handling problems, look to the future. The GeneSuite.

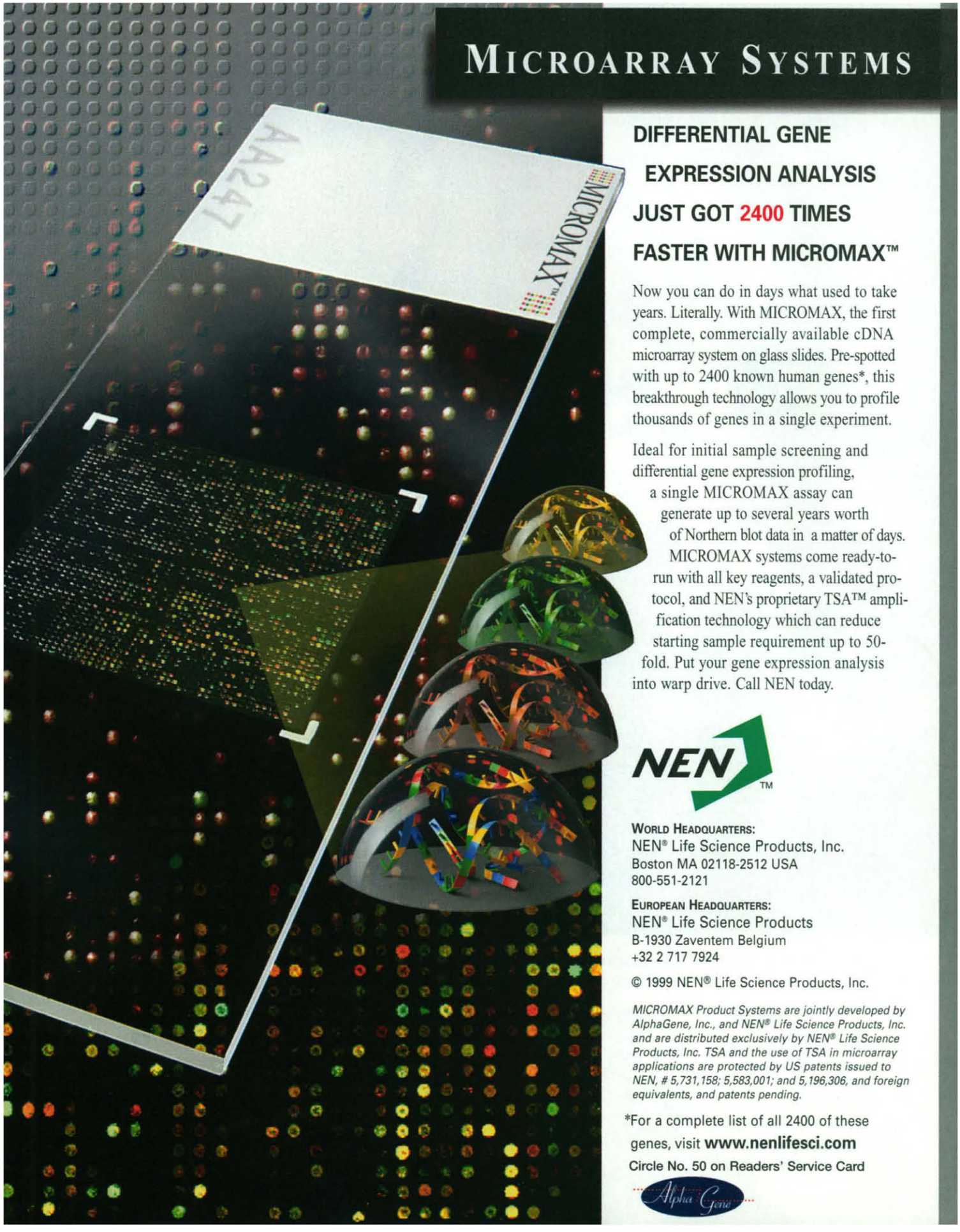
Call 650-508-1634 today. Or visit our web site at www.genemachines.com.

GENEMACHINES

WORK LESS. DO MORE.™

See Us at TIGR Booth 414-8

Circle No. 59 on Readers' Service Card



MICROARRAY SYSTEMS

DIFFERENTIAL GENE EXPRESSION ANALYSIS JUST GOT 2400 TIMES FASTER WITH MICROMAX™

Now you can do in days what used to take years. Literally. With MICROMAX, the first complete, commercially available cDNA microarray system on glass slides. Pre-spotted with up to 2400 known human genes*, this breakthrough technology allows you to profile thousands of genes in a single experiment.

Ideal for initial sample screening and differential gene expression profiling, a single MICROMAX assay can generate up to several years worth of Northern blot data in a matter of days. MICROMAX systems come ready-to-run with all key reagents, a validated protocol, and NEN's proprietary TSA™ amplification technology which can reduce starting sample requirement up to 50-fold. Put your gene expression analysis into warp drive. Call NEN today.

NEN™

WORLD HEADQUARTERS:
NEN® Life Science Products, Inc.
Boston MA 02118-2512 USA
800-551-2121

EUROPEAN HEADQUARTERS:
NEN® Life Science Products
B-1930 Zaventem Belgium
+32 2 717 7924

MICROMAX Product Systems are jointly developed by AlphaGene, Inc., and NEN® Life Science Products, Inc. and are distributed exclusively by NEN® Life Science Products, Inc. TSA and the use of TSA in microarray applications are protected by US patents issued to NEN, # 5,731,158; 5,583,001; and 5,196,306, and foreign equivalents, and patents pending.

*For a complete list of all 2400 of these genes, visit **www.nenlifesci.com**

Circle No. 50 on Readers' Service Card

AlphaGene

The Problem of Data Overload

Despite its breadth of potential applications, microarray technology has not yet reached the status of the Holy Grail of drug development. One major problem stems, ironically, from its remarkable productivity. Scientists can hardly cope with the huge volume of information produced by microarrays, an issue that has fundamental implications for the technology. To reduce the data down to manageable amounts, biostatisticians must make basic assumptions about the behavior of genes. Thus, dealing with microarray results is an interpretative art.

"But if your assumptions are incorrect," says Harry Burke, associate professor of medicine and oncology at New York Medical College in Valhalla, New York, "you will find spurious patterns. You could go on for years never knowing that you're going in the wrong direction."

This problem, continues Burke, "is of the traveling salesman variety. I don't think anybody knows how to get around it. But we are working on several different ways." Pat Brown, who works with distributed microarray technology at Stanford University, takes a more optimistic view. "We don't fully understand the rules," he says. "But they're not so completely mysterious that they're not apparent to us when we look at bodies of data."

No one wants bet against the ability of biotechnologists to solve the data problem. After all, they have achieved the seemingly impossible several times.

Silicon Surfaces

By the mid-1990s, the global biotechnology community knew that the Human Genome Project would successfully count and codify the entire number of human genes within a period of years. The process of measuring the activities of many hundreds or thousands of genes simultaneously in a single experiment became the basis for the new field of genomics. The remarkable success of this project also laid the foundation for the emerging technology of microarrays.

At some point, a number of scientists realized that they could adapt the techniques used in the Human Genome Project to other experiments. Simultaneously, the concepts developed in computer science and technology were infiltrating the field of biology. Computer scientists were committed to finding faster, smaller, and more accurate tools of measurement. Biological measurements, however, were typically bulky, slow, and imprecise. The transition to better measurement tools came initially in the form of the silicon wafer and the possibilities it offered for microscale analysis.

In its efforts to manufacture computer chips, the computer industry had developed highly precise, automated methods of handling silicon, a stable chemical that can react in several ways. The idea of adapting silicon or its oxide, silica, to life science soon followed. Affymax, a California firm, pioneered the application of techniques developed for the manufacture of computer chips to the life sciences. In a paper in Science in February, 1991, Stephen Fodor and his colleagues at the Affymax Research Institute, Duke University, and Stanford University reported on their development of "solid-

continued ➢

When it comes to high-throughput, there are custom oligos, and there are customized custom oligos.

Your lab is unique. Shouldn't your high-throughput service be?

We think so. That's why our competitive pricing and synthesis capacity allow you to order any number of custom oligos for your genome project. Choose from 96-well plates, 384-well plates, and cluster tubes customized to your specifications and delivered in 3-5 days.

What's more, no one's quality control surpasses ours. Every oligo is verified by PAGE analysis, and every batch is performance-tested by PCR and mass spec. You'll also enjoy our personal, friendly service and easy ordering. All at surprisingly affordable prices!

So call today for details on our revolutionary custom high-throughput oligo synthesis. You'll find that at Sigma-Genosys, we focus on you, so you can focus on your research.

SIGMA
GENOSYS

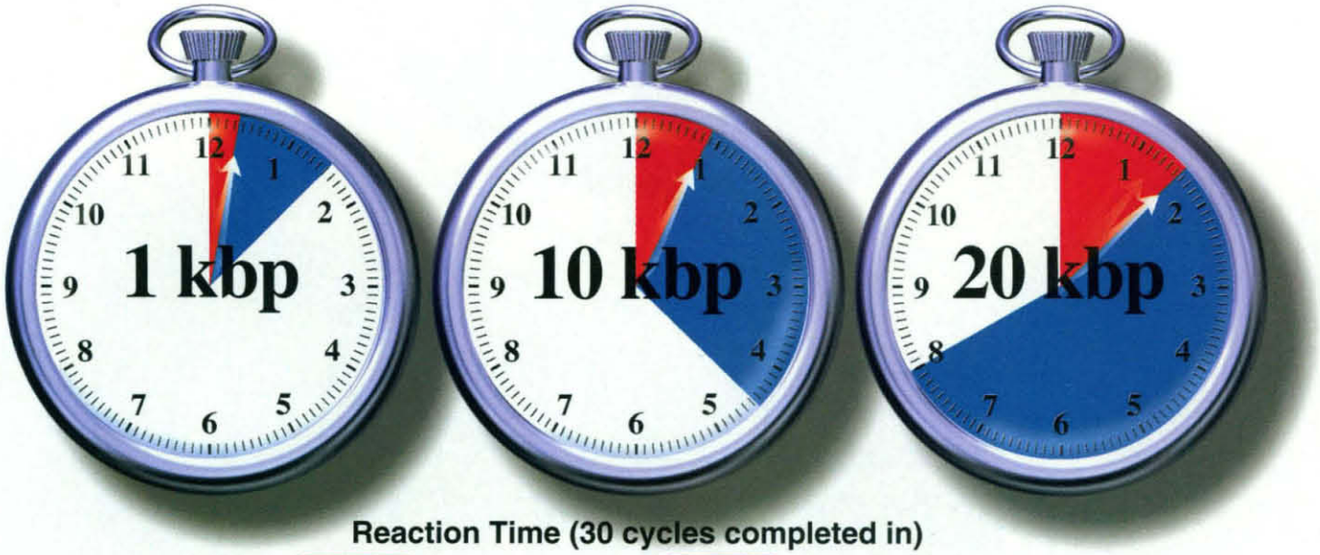
Toll Free: 877-260-0764 • www.genosys.com • Email: info@genosys.com

Circle No. 47 on Readers' Service Card

TaKaRa Z-Taq™

Today's Research for Tomorrow's Revolution

The Fastest DNA Polymerase Ever



Reaction Time (30 cycles completed in)

TaKaRa Z-Taq™ Conventional *Taq*

Speed Comparison in Amplifying *E. coli* Genomic DNA (100 ng/50 µl PCR)

TaKaRa Z-Taq™ (R006A: 200 U, R006B: 200 U x 4)

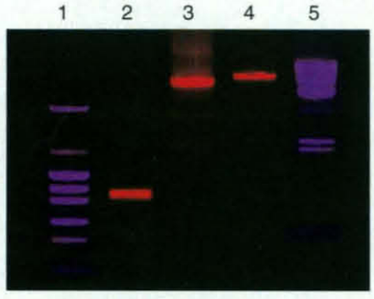
- Offers Unmatched PCR Productivity by any other enzyme at **Five times Faster Speed** with Excellent Processivity and Higher Sensitivity.

Amplification Length Achieved	
Human genomic DNA	17.5 kbp and longer
E. coli genomic DNA	20 kbp and longer
λ DNA	20 kbp and longer

- *TaKaRa Z-Taq*™ provides High-throughput to enable multiple runs of sample processing on a single cycler* each day. *Applicable to any thermal cycler currently in use
- Highly Efficient and Cost-effective PCR processes will accelerate genetics applications in every related field.

Amplification of *E. coli* Genomic DNA (100 ng/50 µl PCR) with *TaKaRa Z-Taq*™

on the TaKaRa PCR Thermal Cycler PERSONAL by performing 30 cycles: Using 5 sec-denaturation time at 98° C, extension times are 2 sec, 70 sec and 150 sec at 68° C, respectively for 1 kbp, 10 kbp and 20 kbp.



Lane (5 µl applied for the Electrophoresis)

1. pHY marker
2. 1 kbp
3. 10 kbp
4. 20 kbp
5. λ-*Hin*d III marker

Purchase of the *Takara Z-Taq* is accompanied by a limited license to use it in the Polymerase Chain Reaction (PCR) process for research in conjunction with a thermal cycler whose use in the automated performance of the PCR process is covered by the up-front license fee, either by payment to Perkin-Elmer or as purchase, i.e., an authorized thermal cycler.

TaKaRa
TAKARA SHUZO CO.,LTD.
BIOMEDICAL GROUP
Otsu, Shiga, Japan
Phone:+81 77-543-7247 Fax:+81 77-543-9254

Korea
BOHAN (TaKaRa-Korea) Biomedical Inc.
Phone: (02) 577-2002 Fax: (02) 577-3691
Europe
TaKaRa Biomedical Europe S.A.
Phone: +33 1 41 47 01 14 Fax: +33 1 47 92 18 80

DISTRIBUTORS

USA and the Americas
PanVera Corporation
Toll Free: 800-791-1400
Fax: 608-233-3007
E-mail : info@panvera.com

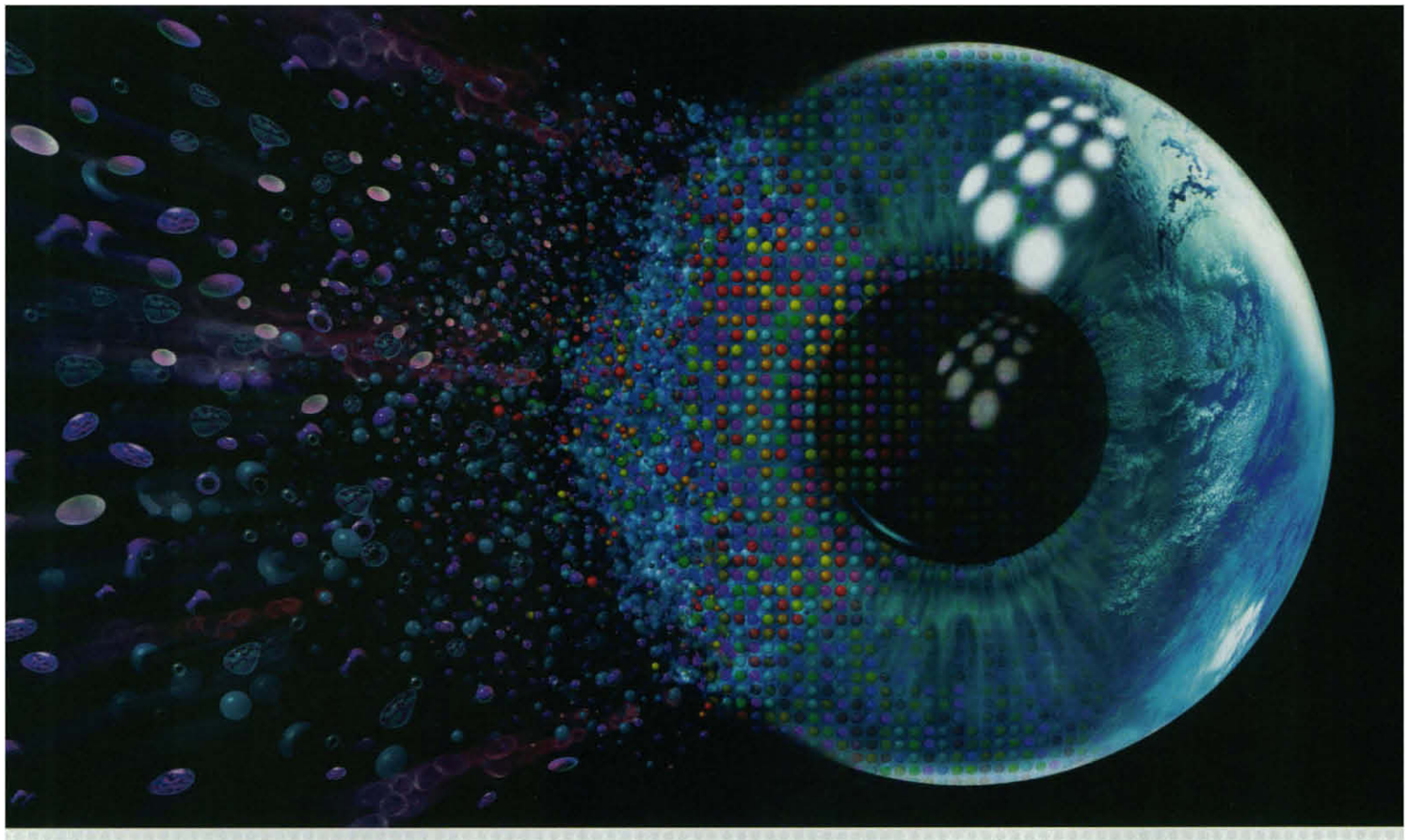
Europe
BioWhittaker Europe
Phone: +32(0)8732 1611
Fax: +32(0)8735 1967

Taiwan
Cold Spring Biotechnology Co.,Ltd.
Phone: +886 2-695-9990
Fax: +886 2-695-9963

Taiwan
Cheng Chin Trading Co.,Ltd.
Phone: +886 2-331-3111
Fax: +886 2-382-2197

Homepage: http://www.takara.co.jp/english/bio_e/ E-mail: bio-sm@takara.co.jp

Circle No. 14 on Readers' Service Card



DNA microarrays are revolutionizing genomic research and drug discovery. And Genetic MicroSystems is revolutionizing DNA microarrays. Using proprietary fluid transfer and digital laser imaging technology, we have developed a new generation of systems that enable you to create and utilize custom DNA microarrays for relatively low cost—in your laboratory and for your applications. Our systems are extremely flexible, with an open architecture that provides immediate access to this powerful research tool.

Changing the image of DNA microarrays

Imagine what you can do. For information, visit us on the Web at www.geneticmicro.com. To reserve your microarray system, call 781-932-9333. And open up an array of new possibilities.

Genetic MicroSystems™

Circle No. 34 on Readers' Service Card

GeneTAC™ Hybridization Station

Kinder, gentler microarray handling.

The GeneTAC Hybridization Station minimizes handling and potential human error by automating the entire hybridization process. It's a vast improvement over manual coverslip methods. In addition to enhanced reproducibility, the instrument has an agitation feature that results in better specificity, increased signal across the entire array, and more reliable data.

The GeneTAC Hybridization Station is part of GeneTAC Biochip Solution of products and services for biochip printing and analysis. We can also complement your information stream with contract lab services.

The GeneTAC Hybridization Station. A little gentleness can enhance your DNA signal. Visit us at **www.genomicsolutions.com** or call us toll free at **1.877.GENOMIC**.

GENOMIC SOLUTIONS™
FUELING INNOVATION. DRIVING DISCOVERY.™

Worldwide distribution: see our website for a listing of all distributors

Circle No. 67 on Readers' Service Card

> ...scientists can evaluate an entire set of genes at once, rather than looking at physiological changes one gene at a time.

phase chemistry, photolabile protecting groups, and photolithography ... to yield a highly diverse set of chemical products." Affymax later introduced the use of multiple small segments of protein on silica surfaces for drug screening.

Affymax then established Affymetrix as a subsidiary. The new company would pursue the commercial possibilities of performing DNA synthesis and analysis on arrays. This secondary course of action quickly became the more important. When data began to pour out of the Human Genome Project, and pharmaceutical companies became increasingly interested in the genes revealed by the thousands, the market for arrays containing short segments of DNA on their surfaces loomed large.

Using Microarrays

Identifying drug targets provided the initial market for the microarrays. A good drug target has extraordinary value for developing pharmaceuticals. By comparing the ways in which genes are expressed in a normal and diseased heart, for example, scientists might be able to identify the genes — and hence the associated proteins — that are part of the disease process. Researchers could then use that information to synthesize drugs that interact with these proteins, thus reducing the disease's effect on the body.

Gene sequences can be measured simultaneously and calculated instantly when an ordered set of DNA molecules of known sequence — a microarray — is used. Consequently, scientists can evaluate an entire set of genes at once, rather than looking at physiological changes one gene at a time. For example, Genetics Institute, a biotechnology company in Cambridge, Massachusetts, built an array consisting of genes for cytokines, which are proteins that affect cell physiology during the inflammatory response, among other effects. The full set of DNA molecules contained more than 250 genes. While that number was not large by current standards of microarrays, it vastly outnumbered the one or two genes examined in typical pre-microarray experiments. The Genetics Institute scientists used the array to study how changes experienced by cells in the immune system during the inflammatory response are reflected in the behavior of all 250 genes at the same time. This experiment established the potential for using the patterns of response to help locate points in the body at which drugs could prove most effective.

Microarray Products and Services

Within that basic technological foundation, microarray companies have created a variety of products and services. They range in price, and involve several different technical approaches. A kit containing a simple array with limited density can cost as little as $1,100, while a versatile system favored by R&D laboratories in pharmaceutical and biotechnology companies costs more than $200,000. The differences among products lies in the basic components and the precise nature of the DNA on the arrays.

Substrates, for example, don't have to be silicon or silica. Manufacturers also offer glass slides or nylon membranes. NEN Life Science Products,

continued ➢

Genomic Services

The optimized oligos
for DNA array and screening applications

Order in one batch

1,000 Oligos

0.45 $US/base

Your Partner in Genomic Science

1 OD PSF®-pure Oligo

5,000 Oligos

0.40 $US/base

Your Partner in Genomic Science

1 OD PSF®-pure Oligo

10,000 Oligos

0.37 $US/base

Your Partner in Genomic Science

1 OD PSF®-pure Oligo

High purified
by PSF®-technology

Salt free
by salt free purification environment

Metal ion free
by inert processing performance

Adjusted in concentration
in 96-well plates

Professionally documented
by MALDI-TOF MS

Mega scale
thanks to a capacity of >10,000 oligos/day

Fast delivery
thanks to automated production process

MALDI-TOF mass spectrum

5.00 $US/spectrum

Your Partner in Genomic Science

(max. length: 45-mer)

Concentration adjustment

25.00 $US/plate

Your Partner in Genomic Science

in 96-well plate format

Request for annual oligo-service agreements!

Oligonucleotides purified by **HPSF®** and **PSF®**-technology are approved and recommended by leading companies in DNA array technology and mass spectrometry.

European countries see prices on website. Prices given above are valid for oligos ordered in 0,01µmol synthesis scale (Length <30mer).
Average amount: >1 OD. No setup fee + tax + delivery.
Offer is valid from 15.07.99 to 30.09.99.

Circle No. 57 on Readers' Service Card

MWG AG BIOTECH

Visit our website:
www.mwg-biotech.com

Germany
Anzinger Str. 7
D-85560 Ebersberg
Tel.: +49(0)8092-82890
Fax: +49(0)8092-21084
E-mail: info@mwgdna.com

USA
4170 Mendenhall
Oaks Parkway, Suite 160
High Point, NC 27265
Tel.: +01 (336) 812 9995
Fax: +01 (336) 812 9983
E-mail: info@mwgbiotech.com

UK
Waterside House
Peartree Bridge
Milton Keynes, Mk6 3BY
Tel.: +44 (01908)247700
Fax: +44 (01908)247724
E-mail: info@mwg.co.uk

France
14; Avenue du Québec
SILIC 613
F-91045 Courtaboeuf Cedex
Tel.: +33 (1)69592050
Fax: +33 (1)69592055
E-mail: info@mwg-biotech.fr

Switzerland
Grabenackerstr-. 11
CH-4142 Münchenstein
Tel.: +41 (061) 4160616
Fax: +41 (061) 4160619
E-mail: mwgbiotech@magnet.ch

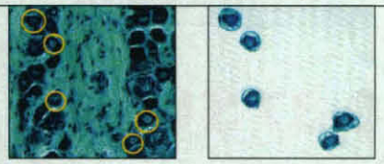
IN THE RACE FOR A CURE, FINISH FIRST WITH PIXCELL® II

Introducing a powerful new tool for high-throughput drug discovery

Laser Capture Microdissection (LCM) with the Arcturus PixCell II System now provides you with a powerful tool for high-throughput drug discovery. Using LCM technology developed in collaboration with the NIH, the PixCell II reliably delivers pure populations of selected cells from tissue samples, allowing precise measurement of drug effects at the molecular level.

cDNA Microarray

Be a part of the drug discovery revolution. Visit www.arctur.com and find out why more and more pharmaceutical and drug discovery professionals now rely on the PixCell II for specific cell sampling and biomolecule extraction. Accelerate your drug discovery with the PixCell II.



In minutes, locate a single cell or large groups of cells and, using a simple aim-and-shoot method, extract them for precise molecular analysis.

PixCell® II

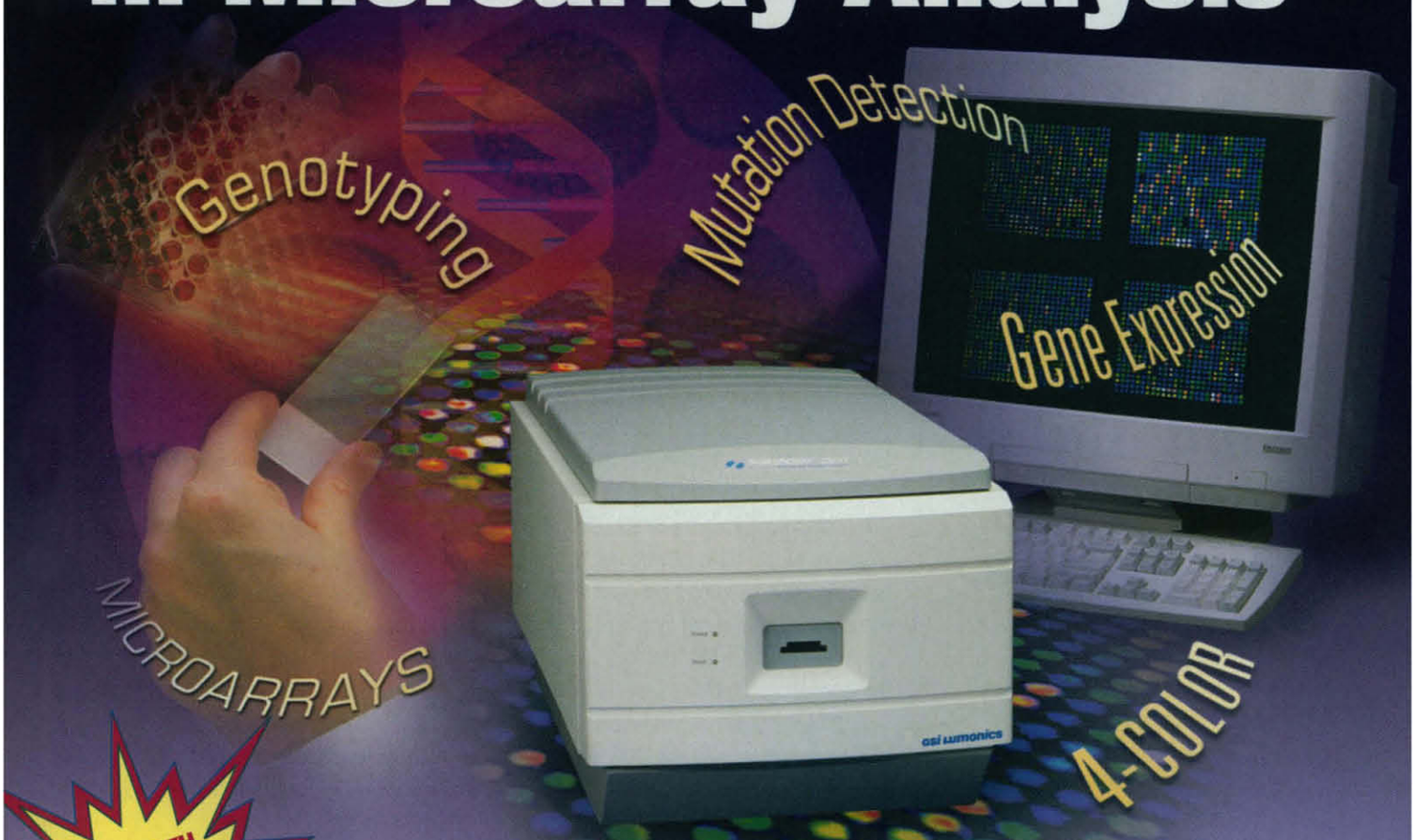
ARCTURUS

1.800.446.7911

www.arctur.com

Circle No. 75 on Readers' Service Card

Leading the Way in Microarray Analysis



NOW WITH NEW QUANTARRAY™ SOFTWARE

ScanArray®

GSI LUMONICS set the standard for microarray analysis using confocal laser scanning. The revolution continues with the new ScanArray® 4000 and 5000 systems, which offer four-color fluorescent imaging, higher sensitivity, resolution and throughput. Based on the experience of biochip pioneers and over 30 years of laser systems design, ScanArray systems now address a greater variety of microarray applications including gene expression, genotyping, mapping, high-throughput screening and drug discovery.

Now four-color fluorescent imaging is available with automated calibration, tracking and analysis of custom or commercially available microarrays. With numerous fluorescent dye options, ten emission wavelengths ranging from 488nm to 700nm, 5µm resolution and Windows® NT software, ScanArray systems continue to lead the way in microarray analysis.

Call us to configure a ScanArray system that meets your needs. A "build-to-order" process allows us to quickly customize and deliver your ScanArray system. For more information or an evaluation using your microarray samples, contact GSI Lumonics at **617-924-1010** or **www.gsilumonics.com/lifescience.htm.**

GSI Lumonics

500 Arsenal Street, Watertown, Massachusetts 02472

Tel: 617-924-1010 ♦ Fax: 617-926-4093

www.gsilumonics.com

Circle No. 4 on Readers' Service Card

for example, already markets a glass slide-based microarray system, called MICROMAX. Vysis will soon market microarray systems that contain DNA on glass covered with chromium. "The advantage is that you can attach DNA to it without having to modify the surface," says Müller.

The type of molecule placed on the array units also varies according to circumstances. The most commonly used molecule is cDNA, or complementary DNA, which is derived from messenger RNA and cloned. Since they are derived from a distinct messenger RNA, each feature represents an expressed gene.

A simple cDNA array experiment has five basic steps. First, the target cDNA is spotted or printed onto a substrate. Second, the sample RNA is isolated, a critical step in the experiment. "We're heavily targeting the preparation of the RNA," says Scott Hunicke-Smith, CEO of GeneMachines in San Carlos, California. "If you can't get clean RNA, you won't get good data." Third, the cDNA is synthesized, a procedure that also involves labeling it for later detection. Fourth, the labeled probe cDNA is hybridized to target the cDNA on the substrate. Finally the hybridization results are imaged and analyzed.

At a higher level of complexity, Affymetrix's GeneChip® microarrays contain oligonucleotides of defined sequences. The set of probes in an array is defined on the basis of its ability to hybridize to the target loci or genes of interest. These arrays, the most complex but most versatile of any currently available arrays, are manufactured by a proprietary process. This combines elements of solid-phase chemical synthesis with photolithographic fabrication methods that are used routinely by the semiconductor industry.

Identifying Interactions

To detect interactions at microarray features, scientists must label the test sample in such a way that an appropriate instrument can recognize it. Since the minute size of microarray features limits the amount of material that can be located at any feature, detection methods must be extremely sensitive.

Other than a few low-end systems that use radioactive or chemiluminescent tagging, most microarrays use fluorescent tags as their means of identification. These labels can be delivered to the DNA units in several different ways. One simple and flexible approach involves attaching a fluorophore such as fluorescein or Cy3 to the oligonucleotide layer. While relatively simple, this approach has low sensitivity because it delivers only one unit of label per interaction. Technologists can achieve more sensitivity by multiplexing the labeled entity — that is, delivering more than one unit of label per interaction.

Both Chiron and Genisphere, the latter a subsidiary of Datascope Corporation of New Jersey, have developed signal amplification systems. "Our technology is based on a carefully designed 36,000-base branched DNA molecule," explains Datascope's Ari Zak. "Every base is exactly what we want it to be. We can park hundreds of fluorescein or other labels on a single probe molecule, and still avoid the signal." The company is now testing its new technique. Zak expects to market the product by the end of October.

Techniques for detecting fluorescence have become almost routine. However, even that field remains open to innovation. Examples include the low-cost and high-throughput 2-, 3-, and 4-color laser scanning systems developed by GSI Lumonics, formerly known as General Scanning, of Watertown, Massachusetts. Introduced two years ago, at prices between $50,000 and $100,000, the ScanArray systems add confocal imaging capability to the basic detection modality. That permits the detector to focus on a spot defined in three dimensions rather than two, thereby reducing the background and improving the instrument's sensitivity and accuracy. "The ScanArray system was the first confocal microarray scanning system that was readily affordable and usable by both the academic and high-technology markets," recalls GSI Lumonics' Ken Smith.

continued ➢

Sequence Full Length cDNA Clones in 1 Reaction

Greater Than 2,000 bp per Reaction

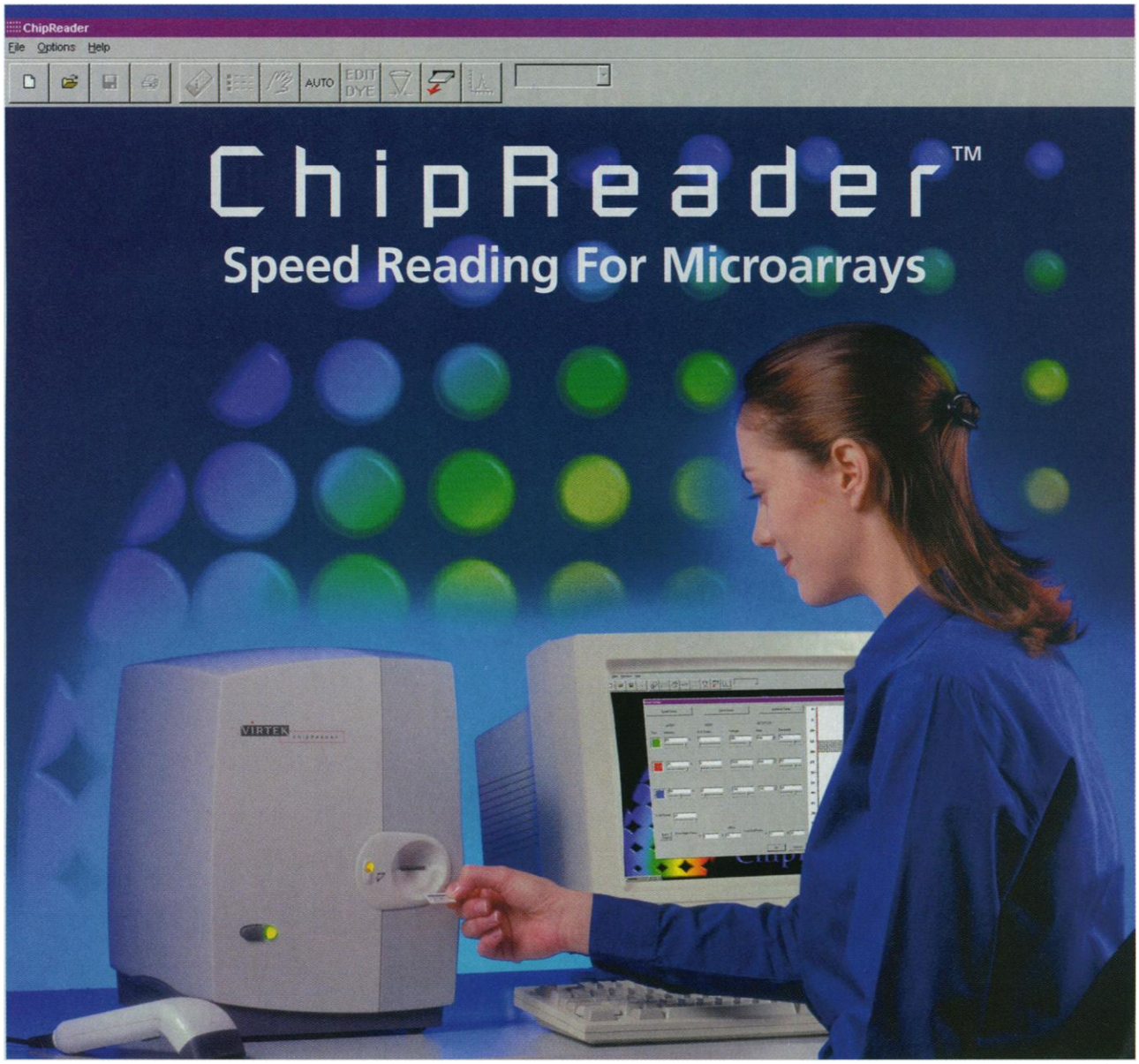
The LI-COR automated IR² System sequences both ends of cDNA clones simultaneously, with very accurate 1,000-1,400 bp read lengths from each end. The time and expense of custom primers are eliminated.

For more information on the best approach to cDNA clones, visit our website at http://bio.licor.com/cDNA.htm.

Your Options Keep Getting Better

LI-COR®
DNA Sequencing and
Genetic Analysis Systems
800•645•4267
www.licor.com

Circle No. 60 on Readers' Service Card



ChipReader™ is the first biochip imaging system to offer simultaneous reading of up to 5 different fluorescent dyes.

ChipReader is a high-sensitivity laser confocal system for imaging microarray biochips. It offers an array of speed and efficiency benefits.

Highest Sensitivity

Our a-chromatized objective lens provides the highest collection efficiency available.

Highest Throughput

ChipReader works up to 10 times faster than competitive products. The high-speed scanning mechanism reads up to 5 different dyes simultaneously, over a 20 x 20 mm area, in less than one minute.

Greatest Flexibility

ChipReader's modular design accommodates your changing needs. Use standard slides, stainless steel cartridges, or 3" x 4" (76 x 98 mm) glass plates. ChipReader can read glass substrates with the array printed on the top or bottom, wet or dry – with or without a cover glass! It can also read silicon, plastic and nylon substrates.

Smallest Footprint Available

Measuring just 11" in length, 9" in width, and 12" in height, there is no greater space-saving imaging option for your microarray biochips!

Easy To Run; User Friendly

To optimize experiment performance, parameters such as speed and number of scans can easily be set using ChipReader's icon driven Windows NT software. It can be integrated with your lab automation systems and is Y2K compliant.

Contact Beverly Giammara, 1-800-933-9011
Visit us at www.virtek.ca

VIRTEK

LEADING THE WORLD IN PRECISION LASER APPLICATIONS

Circle No. 73 on Readers' Service Card

When you need the ability to see more, you need the precision of Fujifilm Science Imaging Systems.

The LAS-1000plus is unsurpassed for resolving luminescent and fluorescent samples with high sensitivity.

The BAS-1800II and ArrayGauge software present a powerful yet versatile high-throughput screening tool.

No other fluorescent imaging system is as capable of capturing the variety of fluorescent dyes and radioisotopes as the FLA-3000G.

FUJIFILM

I&I – Imaging & Information

Science Imaging Systems

Japan Tel: +81-3-3406-2201 • Fax: +81-3-3406-2158 • Europe Tel: +49-211-5089-174 • Fax: +49-211-5089-139

U.S.A Tel: +1-203-353-0300 • Fax: +1-203-327-6485 (1-800-431-1850 ext. 3649 in the U.S.)

http://home.fujifilm.com/info/products/science/index.html • www.fujimed.com

TÜV PRODUCT SERVICE Quality system certified to ISO 9001

Circle No. 33 on Readers' Service Card

The Statistical Conundrum

Obtaining data from microarrays has become routine. Interpreting that data has emerged as a major difficulty. "An array is a technology that provides massively parallel molecular-genetic information, usually in a visual format," explains New York Medical College's Burke. "Massively parallel information is very difficult to deal with. In biostatistics, the usual paradigm is a few variable with many cases. What you've done in arrays is turn the thing topsy-turvy: You have many variables and few cases. The few cases make it even more of a problem."

Knowing which variables are significant becomes problematic. "Slimming down the data defeats the whole point of arrays," contends Burke, whose group at New York Medical College will soon publish a major paper on the issue. "All these genes detected by arrays could be important. So how can you, on arbitrary grounds, slim them down?"

"The whole problem is a very multidimensional one," says Stanford's Pat Brown. "In my laboratory, we use arrays to look at thousands of genes. We start out knowing virtually nothing about their function and expression. We have to build up an understanding of what the genes are doing and the logic in their expression program. We start from a knowledge base of virtually zero and rely on the data we collect."

Brown and his colleagues begin with "the logical link between the expression of a gene and its function," he explains. "That may sound trivial," he continues. "But it's one of the underlying structural features in systematic bodies of gene expression data that's extremely useful." As a corollary, Brown points out that genes that resemble each other in their expression are highly likely to participate in similar physiological programs in physical processes. "If the mode of expression is very similar to that of known genes," he adds, "then you can hypothesize with a reasonable degree of confidence that the unknown gene is involved in much the same process."

While difficult, the goal of understanding is not impossible. "We're trying to learn how the biology works through the data we're collecting," says Brown. "Part of that process involves thinking deeply about basic questions in biology and then adapting or developing *de novo* statistical tools that are appropriate for studying this kind of data. We're using a new window on biology. We are seeing a lot that we haven't seen before, and we're teaching ourselves how to understand it."

"We're using a new window on biology. We are seeing a lot that we haven't seen before, and we're teaching ourselves how to understand it."

"The statistical problem of going backwards from just thousands or tens of thousands of measurements to fundamental biological processes is not a soluble mathematical problem," adds UCSF's Pinkel. "Known interactions can be mapped onto the data that's being generated from these very large-scale experiments. We hope that there will be modules and segments of relationships that can be tied together." In other words, life scientists should be able to determine, eventually, what microarrays are telling them.

The Goal of Standardization

A group at the NHGRI, headed by imaging scientist Yidong Chen, is developing software that will help to interpret the huge trove of data that microarrays yield. "We're building a kind of fingerprint record against which to compare new array data," explains Chen. "We're at a very, very preliminary stage, seeing if we can derive anything from the 'fingerprints' of specific cancers. At the moment, we're concentrating on breast cancer, prostate cancer, and melanoma. We have to see that everything goes into the right database."

Along the corridor at NHGRI, Kallioniemi's team is developing automatic means of interpreting tissue microarrays. "The analysis is not as straightforward as with cDNA arrays," he explains. "You have to measure morphological information as well as intensity. So far, we have required human interpretation. We are working on automation, but it's more complicated that with cDNA." The group's work on tissue microarrays has a significant goal beyond interpreting data. "In the cancer research field, we are thinking of standardization, so that everyone works on the same tissue specimens, containing tumors, rather than their own particular set of cases," he says.

Standardization has emerged as a goal for manufacturers. "Some companies that produce scanning equipment are beginning to branch out into standardization," says Hunicke-Smith of GeneMachines. "It would be extremely useful for us. At present, everything we provide is relatively insensitive to standards." Affymetrix's Fodor adds: "Our approach will be to standardize. We will definitely take an open systems architecture approach. The last thing we want to do is contain the field." Müller of Vysis points to the similarity between the demands of today's microarray customers and software clients of a decade ago, who faced an equally wide range of proprietary systems. "Companies are very interested in finding a way to let customers merge their data," he says. "You want your customers to be able to make as much of their data as possible."

continued ➢

RULES OF THE GAME

Object: To sequence, size, and quantitate nucleic acids using any application you choose.

Requirements: Selected path must be affordable, convenient, easy to use, versatile, and quick.

How to play: Select a genetic analysis method. Analyze nucleic acids. Review results.

Winning: The player who most efficiently gathers results and publishes first wins the game.

The ABI PRISM® 310 Genetic Analyzer

Applied Biosystems

PE Biosystems
A PE Corporation Business

ISO 9000 CERTIFIED

For more information, visit www.pebiosystems.com/310.

PE Corporation, formerly The Perkin-Elmer Corporation, is committed to providing the world's leading technology and information to enable life scientists to uncover the logic of biology. PE Corporation consists of the PE Biosystems and Celera Genomics businesses. PE Biosystems comprises four divisions—Applied Biosystems, PerSeptive Biosystems, Tropix, and PE Informatics.

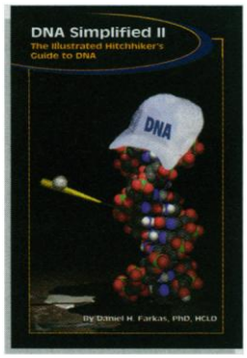
Circle No. 64 on Readers' Service Card

HOT OFF THE PRESS...BRAND NEW EDITION!

DNA Simplified II: The Illustrated Hitchhiker's Guide to DNA

Daniel H. Farkas

1999, Order # 202865,
ISBN 1-890883-13-1, $19
(AACC Members $15)



The new edition of AACC's most popular book! Now illustrated with multiple photographs and images, this classic, easy-to-read reference is better than ever. It provides an authoritative, factually correct, yet not overly serious look at DNA and the practice of clinical molecular pathology. For the growing number of people interested in DNA, this guide will serve as a foundation for further inquiry. The book is organized alphabetically, with listings for all of the common terms used in molecular pathology. It's not esoteric–it includes entries that have meaning to any scientist, physician or, really, any interested adult! Here's what reviewers said about the first edition:

"Farkas has compiled a dictionary of the essential ingredients for understanding molecular genetics and biology. But this is not another monotonous glossary of specialist lingo. The jargon of DNA technology has been translated into simple dialogue and familiar analogies, stripped down to the bare essentials. The book is an entertaining read, with the science taking on a personality of its own. Of particular appeal to biomedical scientists, the book paces through state-of-the-art DNA technology applied to clinical diagnostics. It provides an impressive account of recent innovations, as well as fresh adaptations of traditional methods. The book is relevant to anyone from the specialist to the uninitiated."

-from *Nature Medicine*, December 1997

"A Pulitzer Prize for *DNA Simplified*? Well, that may be an exaggeration, but I found this recent addition to the Hitchhiker's Guide series from AACC Press interesting, informative and enjoyable. Arranged in a glossary format, 'everything you always wanted to know about DNA' is presented in an informal writing style that does not detract from the reliability of the information presented–rather, it enhances it. The style of writing as well as the content has elicited requests from my dentist as well as my parish priest. All can benefit by being informed and entertained by this colorful paperback that fits in your lab coat or suit coat pocket!"

-from *Advance for Medical Laboratory Professionals*, February 2, 1998

4 WAYS TO ORDER!

MAIL: AACC Customer Service Department
2101 L Street, NW, Suite 202
Washington, DC 20037-1526

CALL: (800) 892-1400 or (202) 857-0717
FAX: (202) 887-5093
INTERNET: www.aacc.org

ORDER FORM

Product #	Title	Qty.	Unit Cost	Total
202865	DNA Simplified II: The Hitchhiker's...		$19/$15*	
			***$15 for AACC Members**	
			Additional Shipping and Handling Charge	
			Total Amount Enclosed/Bill to Charge Card	

Shipping Options
Domestic/U.S. Only Service Options

Standard	UPS Ground: 2-4 Weeks	$5.00 per item
Express	UPS Blue: 3 days	**By weight and zone
Rush	UPS Red: 2 days	**By weight and zone
FedEx		Provide your account number

Add an additional $10 for rush services

International/Outside U.S. Service Options

Standard: 4-6 weeks	$10.00 per item
Express: 7-10 days	$25.00 per item
FedEx	Provide your account number

***Call for charges* *For information about wire transfers, contact the AACC office.*

Prices subject to change without notice.

Enclosed is my check for $_____ payable to **AACC.**
Charge my: ❒ Visa ❒ MasterCard ❒ American Express
Card No.
___/___/___/___/___/___/___/___/___/___/___/___/___/___/___/___/
Card Expiration ___ ___ / ___ ___
Signature_____
FedEx Account #_____

AACC Member # *(Must include to receive member price)*_____
Name_____
Degree_____
Certification_____
Ship to Institution_____
_____
_____
Address *(Street address required for UPS delivery)*
_____
_____
_____
City_____
State/Province_____ Zip/Postal Code_____
Country_____
Telephone_____
Fax_____
E-mail_____

29MD2

❒ Please update my AACC address with the above information.

A New Business Trend

The need for products and services that are customer-friendly has sparked a new business trend in the industry. In addition to selling equipment, manufacturers are increasingly offering microarray services, such as scanning and data analysis for clients who lack laser scanners. Service contracts have particular appeal to university departments with limited funds. "There is a large number of academic laboratories not fully committed to a particular technology," says Tian of NEN Life Science Products. "They're very interested, but they don't want to spend too much on instrumentation now. That is why NEN offers a slide scanning service to its MICROMAX customers."

At the same time, several corporate users of microarrays have decided to invest in the equipment. "A lot of pharmaceutical companies that used service in the past have gone in-house," says Hunicke-Smith. "It's a very fluid market and a fluid technology."

That fluidity means a promising future for microarrays. "We're moving toward clinical products in the future," forecasts Jeff Bennett, product manager of Vysis. "We want the technology to lead to clinical microarrays. Eventually, we want to design disease-specific microarrays." Examining DNA, adds Pinkel, "we expect to be able to scan the genome at thousands of independent loci, with false positive and false negative error rates well below one-in-a- thousand in the next year or two."

Stephen Fodor, meanwhile, sees the Human Genome Project and microarray technology as pulling each other into a glittering future. "The Genome Project has evolved with the technology," he says. "Our focus is to put these genes on expression arrays in order to understand molecular circuitry and why genes are switched on and off. We also want to understand polymorphisms and their relation to expression and to disease. It's a massive opportunity. There will be an enormous amount of work after the Genome Project is completed asking what it all means."

Peter Gwynne is a freelance science writer based in Cape Cod, Massachusetts, USA. Guy Page is managing director of Ferguson Forth Page, a consulting firm in Madison, Wisconsin, USA.

Microarray Analysis LIST OF RESOURCES

Advertisers
American Association for Clinical Chemistry (AACC) . www.aacc.org
Arcturus. . . . . www.arctur.com
Bioinformational Technical Services, Inc. . . . . www.bioinfotech.com
Dynal . . . . . www.dynal.no
Fuji . . . . . www.fujimed.com
Gene Machines. . . . . www.genemachines.com
Genetic MicroSystems. . . . . www.geneticmicro.com
Genomic Solutions . . . . . www.genomicsolutions.com
Genpak. . . . . www.genpakdna.com
GSI Lumonics . . . . . www.gsilumonics.com
Incyte Pharmaceuticals, Inc. . . . . www.incyte.com/sequencing
Interactiva Biotechnologie . . . . . www.interactiva.de
Li-Cor . . . . . www.licor.com
Midland Certified Reagent Co. . . . . www.mcrc.com
MWG Biotech AG . . . . . www.mwg-biotech.com
NEN Life Science Products . . . . . www.nenlifesci.com
Operon . . . . . www.operon.com
PE Biosystems. . . . . www.pebiosystems.com
Research Genetics . . . . . www.resgen.com
Scanalytics . . . . . www.scanalytics.com
Sigma Genosys . . . . . www.genosys.com
Takara . . . . . www.takara.co.jp
Virtek . . . . . www.virtek.ca

Array Analysis
Imaging Research . . . . . www.imagingresearch.com

Array Scanner
GSI Lumonics . . . . . www.gsilumonics.com
Phoretix International . . . . . www.phoretix.com
Scanalytics . . . . . www.scanalytics.com
Virtek. . . . . www.virtek.com

Array Scanner/Image Analysis
Genometrix. . . . . www.genometrix.com
Molecular Dynamics . . . . . www.mdyn.com

Array Scanner/Software
Vysis . . . . . www.vysis.com

Complete Microarray Systems
Genomic Solutions . . . . . www.genomicsolutions.com
Incyte/Synteni . . . . . www.incyte.com

Data Analysis Software
BioDiscovery. . . . . www.biodiscovery.com
Silicon Genetics . . . . . www.sigenetics.com

Financial Overview
Hambrecht & Quist . . . . . www.hamquist.com

GeneChip Systems
Affymetrix . . . . . www.affymetrix.com

Labeling and Microarrays
New England Nuclear. . . . . www.nenlifesci.com

Labeling Technology
Genisphere. . . . . www.genisphere.com
Molecular Probes . . . . . www.probes.com

Macroarrays and Software
Clontech . . . . . www.clontech.com.
Research Genetics . . . . . www.resgen.com

Macro/Microarrays
Genosys. . . . . www.genosys.com
Interactiva . . . . . www.interactive.de
Stratagene . . . . . www.stratagene.com

Macro/Microarrays/Software
Genome Systems. . . . . www.genomesystems.com

Microarray Systems
Hyseq . . . . . www.hyseq.com

Multiple Instrument Platforms
GeneMachines. . . . . www.genemachines.com

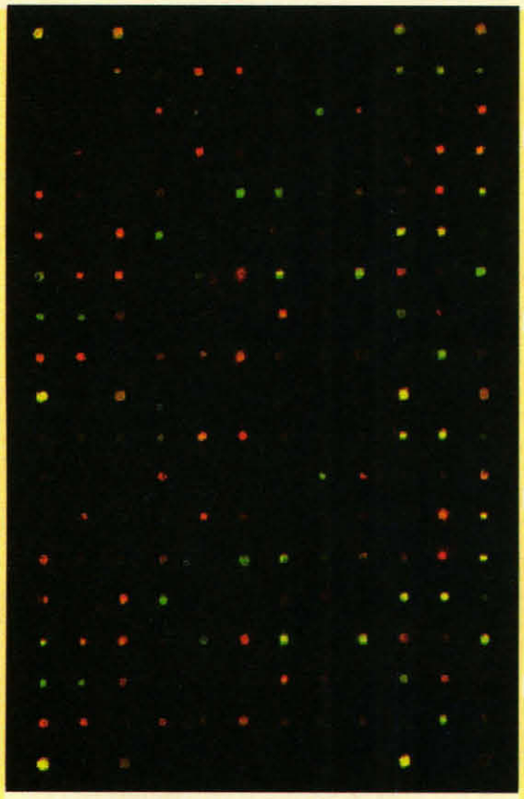
Robotic Arrayer
Biorobotics . . . . . www.biorobotics.com
Cartesian Technologies . . . . . www.cartesiantech.com
Packard Instruments . . . . . www.packardinst.com
Tecan US. . . . . www.tecan-us.com
Telechem International . . . . . http://arrayit.com

Note: Readers can find out more about the companies listed by accessing their sites on the World Wide Web (WWW). If the listed company does not have a site on the WWW, or if it is under construction, we have substituted that company's main phone number. Every effort has been made to ensure the accuracy of this information.

The companies in this article were selected at random. Their inclusion in this article does not indicate endorsement by either AAAS or *Science*, nor is it meant to imply that their products or services are superior to those of other companies.

Microarray Products

from Operon Technologies



Yeast expression data: the diauxic shift. An OpArray™ of 96 sequence-optimized, concentration-normalized PCR products (OPTs™) was printed in duplicate on glass slides and hybridized with a mixture of differentially labelled mRNA from *S. cerevisiae* harvested from early and late stages, respectively, of growth in culture. Red spots indicate transcriptional up-regulation at early stages of growth, and green spots signal transcriptional up-regulation at late stages.

Oligos

in any desired format for your arraying needs

Custom PCR† Service

high quality, high yield, large scale up available

OPTs™

sequence-optimized, concentration-normalized PCR products

OpArray™

medium density custom DNA arrays on glass slides

Contact Information

Phone: 800-688-2248

Fax: 510-865-5255

E-mail: oparray@operon.com

Web: http://www.operon.com

OPERON

OPERON TECHNOLOGIES, INC.

"The DNA Company"

1000 Atlantic Avenue, Suite 108 • Alameda, CA 94501

†These products are made using the Polymerase Chain Reaction ("PCR") Process which is covered by patents owned by Roche Molecular Systems, Inc. and F. Hoffmann-La Roche LTD. ("Roche"), under license from Roche. No license to use the PCR Process is conveyed expressly or by implication to the purchaser by purchase of these products.

Circle No. 72 on Readers' Service Card

NEW PRODUCTS

MASS SPECTROMETER WITH SIMULTANEOUS SCANNING

The TurboMass Mass Spectrometer can perform a selected ion monitoring scan while also acquiring data in the full scan mode. The combination of the two scanning modes provides all the benefits of both modes of operation in one run. Acquisition of library-searchable spectra ensures accurate identification while the selected ion signal provides enhanced quantifiable sensitivity. This scanning feature also helps to eliminate labor-intensive preconcentration and sample clean-up steps. Compounds difficult to determine at low levels, such as pentachlorophenol, can be detected and quantified with greater accuracy and greater sensitivity. This feature also reduces the number of analyses by combining a wider range of analyte responses in a chromatographic run. The selected ion monitoring mode increases sensitivity by selectively scanning for individual masses and can be activated on a compound-by-compound basis in one analysis. Full scan mode offers standard sensitivities with the ability to monitor a wide range of masses, thereby providing library-searchable spectra ensuring accurate identification.

Perkin-Elmer
For more information call 800-762-4000 or **circle 148** on the Reader Service Card

KITS FOR FAST CLONING AND SEQUENCING

New TOPO Cloning Kits for Sequencing allow 5-min ligation, yield >95% recombinants, and offer streamlined sequencing of polymerase chain reaction (PCR) products. The vectors in the kits include four sequencing primer sites, including T3 and T7 sites, which are only 33 base pairs from the PCR product insertion site. This minimizes the plasmid DNA sequence that needs to be read before reading the sequence of the user's clone. Kits are available for cloning *Taq*-amplified and blunt-end PCR products.

Invitrogen
For more information call 800-955-6288 or **circle 149** on the Reader Service Card

LITERATURE

PC Systems Handbook for Scientists and Engineers is a 188-page catalog that contains informative tutorials and detailed specifications on more than 3000 hard-to-find items, including a large selection of industrial computers, data acquisition and control devices, rack-mount personal computers and accessories, rugged portable computers, flat-panel displays, engineering software, serial communications, and motion control products.

Cyber-Research
For more information call 800-341-2525 or **circle 150** on the Reader Service Card

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS of any products or materials mentioned is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Reader Service Card and placing it in a mailbox. U.S. postage is free.

POSITIONS OPEN

TENURE-TRACK FACULTY POSITIONS NEUROBIOLOGY
University of Maryland School of Medicine

The Department of Anatomy and Neurobiology is recruiting new faculty in neurobiology. Appointments can be made at **ASSISTANT, ASSOCIATE,** or **FULL PROFESSOR** ranks.

Of particular interest are candidates using molecular approaches to understand development/plasticity or organization/function of mammalian central nervous system circuits. We are seeking candidates whose interests complement our strengths in developmental, cellular, and molecular neurobiology, and who can establish collaborative research programs.

Our facilities include state-of-the-art core laboratories in molecular neurobiology, imaging, neurophysiology, and neuroanatomy. We offer a collaborative environment with competitive salary and start-up packages. The department has NIH Program Project and Training Grants. Departmental faculty are members of the new interdisciplinary Program in Neuroscience (**website: http://neuroscience.umaryland.edu**). Faculty participate for three to five weeks in a team-taught medical school course.

Successful candidates must have a Ph.D. or equivalent, evidence of productivity, and the potential to establish an independent research program capable of attracting extramural funding. For best consideration, applications should be received before October 1, 1999. Candidates should submit a detailed curriculum vitae, a statement of research interests and goals, and the names and addresses of three to five references to:

Dr. Matthew Ennis and Dr. Frank Margolis
Faculty Search Committee
Department of Anatomy and Neurobiology
University of Maryland School of Medicine
685 West Baltimore Street
Baltimore, MD 21201
Website: http://neurobiology.umaryland.edu

We are eager to diversify our faculty. Women and minorities are encouraged to apply. The University of Maryland is an Affirmative Action/Equal Opportunity Employer/ADA Employer.

FACULTY POSITION IN CHEMICAL BIOLOGY/BIOORGANIC CHEMISTRY

The Department of Pharmacology and Molecular Sciences at the Johns Hopkins University School of Medicine is initiating a search for tenure-track faculty with research programs at the chemistry-biology interface. Examples of targeted research areas include the synthesis and/or use of small molecules as probes for problems of interest in biology, pharmacology, and medicine; mechanistic approaches to enzymes, receptors, and macromolecular machines; and combinatorial approaches to ligand discovery. We are primarily interested in **ASSISTANT PROFESSOR**–level candidates, but particularly qualified **ASSOCIATE** or **FULL PROFESSOR** candidates will also be considered. We seek individuals with a record of significant accomplishment in research and high potential for creative scholarship. An interest in graduate and medical student teaching is also important. The Johns Hopkins University School of Medicine provides a stimulating and supportive environment for research. Strong research programs in chemical biology, virology, oncology, neuroscience, and immunology exist within the Department of Pharmacology and Molecular Sciences as well as in the University as a whole. A letter of inquiry, curriculum vitae, summaries (one to three pages) of up to two research proposals, and two reprints should be sent by interested applicants to: **Dr. Philip A. Cole, Chair, Faculty Search Committee, Department of Pharmacology and Molecular Sciences, Johns Hopkins University School of Medicine, 725 North Wolfe Street, Baltimore, MD 21205. FAX: 410-955-3023.** Applicants should arrange to have three reference letters sent to this address. Review of applications will begin on October 1, 1999. *Women and minorities are strongly encouraged to apply. The Johns Hopkins University is an Equal Opportunity/Affirmative Action Employer.*

POSITIONS OPEN

FACULTY POSITIONS IN ATMOSPHERE, OCEAN, CLIMATE DYNAMICS AT YALE UNIVERSITY

The Department of Geology and Geophysics at Yale University announces a search for several ladder faculty positions in the general area of atmosphere, ocean, and climate dynamics. We seek both **JUNIOR** and **SENIOR** applicants with records of creative research in subject areas that improve understanding of modern atmospheric and oceanic processes and/or the evolution of the earth's climate on geologic time scales. Areas of special interest include atmosphere/ocean modeling; climate-system modeling; coupled air-sea interaction; dynamical meteorology and oceanography; glaciology; hydrology; remote sensing; and the physics, dynamics, and chemistry of clouds. New appointments at Yale in these areas will contribute to a broad emphasis in the Department on paleoclimatology, paleo-environments, and global change. Additional appointments in the Department will be made in areas of active tectonics and geomorphology, geochemistry, paleontology, and solid-earth geophysics. Closing date for applications is September 30, 1999.

Applicants should send a curriculum vitae, a statement of professional goals, and the names and addresses of three or more referees to:

Atmosphere, Ocean, Climate Dynamics
Search Committee
c/o Professor Danny Rye, Chair
Department of Geology and Geophysics
Yale University
P.O. Box 208109
New Haven, CT 06520-8109

We encourage applicants from historically disadvantaged ethnic, racial, and gender categories. Yale University is an Equal Opportunity Employer.

TENURE-TRACK OR TENURED FACULTY POSITION

The Department of Pharmacology, University of Illinois, College of Medicine, Chicago invites applications for a tenure-track or tenured faculty position at the **ASSISTANT, ASSOCIATE,** or **FULL PROFESSOR** level. Applicants should have a Ph.D., M.D., or both degrees, and an independent and NIH-funded research program. The department wishes to add to its strengths in vascular biology, signaling, receptor function, and biology of inflammation. Expertise in transgenic/knockout technology as an integral component of the research program is desirable. The position comes with an extensive and highly competitive start-up package, as well as renovated space. Please send a complete curriculum vitae, a brief statement of research interest, and names of three references to: **Search Committee (AP001), Department of Pharmacology (M/C 868), University of Illinois at Chicago, 835 South Wolcott Avenue, Chicago, IL 60612.** For fullest consideration, please submit applications by November 15, 1999. *UIC is an Affirmative Action/Equal Opportunity Employer.*

Lymphoma immunobiology **FACULTY POSITION**. The Department of Internal Medicine at the University of Nebraska Medical Center (UNMC) is seeking Ph.D., M.D., or M.D.-Ph.D. applicants for a **TENURE-TRACK** position in the area of lymphoma immunology and vaccine laboratory research. Academic rank and salary will depend upon qualifications. Successful applicants will be able to interact closely with clinical and translational researchers that are internationally recognized for lymphoma research. Opportunities for collaborations with other researchers at UNMC in immunobiology, molecular biology, and transplantation also exist. Applicants should send their curriculum vitae, names of three references, and a letter detailing their research goals to: **Julie M. Vose, M.D., Professor and Vice Chair, University of Nebraska Medical Center, Department of Internal Medicine, 983332 Nebraska Medical Center, Omaha, NE 68198-3332.** *UNMC is an Affirmative Action/Equal Opportunity Employer. Women and minorities are encouraged to apply.*

NRL • Naval Research Laboratory
Oceanographic Science and Technology

ACCEPT THE CHALLENGE

When it comes to understanding and applying knowledge of the maritime environment, the U.S. Navy must remain at the forefront. The Naval Research Laboratory is the Navy's corporate laboratory performing basic research and applied development to meet Navy, Department of Defense and national needs in oceanography. We are seeking a dynamic scientific leader.

A SENIOR EXECUTIVE SERVICE POSITION
OCEANOGRAPHY DIVISION DIRECTOR
Naval Research Laboratory
Stennis Space Center, Mississippi
$108,305 to $125,350 per annum

- Provides technical leadership to more than 65 scientists researching a broad spectrum of oceanographic science and technology areas
- Acts as spokesperson and principal consultant to the Navy, other agencies and nations on NRL oceanographic R&D programs under his/her cognizance
- Provides executive direction for all affairs of the Division including personnel, programs, equipment, facilities, administration, etc.
- Applicants should have national/international recognition
- Applicants must have planned and executed difficult programs of national significance, and/or specified programs that show outstanding attainments in their field of research.

Please call 202-767-3030 to request a copy of the vacancy announcement and the Senior Executive Service Qualifications pamphlet to assist you in addressing the executive core qualifications. If you require further assistance, please call Mrs. Beverly Scott on (202) 767-3789. Refer to Announcement Number 98-01A when calling. For consideration, applications ***must be postmarked*** by 20 September 1999.

The Naval Research Laboratory is an Equal Opportunity Employer

www.nrl.navy.mil • 4555 Overlook Ave SW, Washington DC 20375

mayo

MAYO CLINIC
POSTDOCTORAL RESEARCH FELLOW

A gene therapy laboratory in the Molecular Medicine Program is seeking a highly motivated individual. The overall goal of the program is to develop novel therapeutic genes and gene transfer strategies for eventual application in the clinic. The aim of the specific research project is to develop a targeted therapeutic fusogenic membrane glycoprotein based on the Gibbon Ape Leukemia virus envelope protein for eventual application in the treatment of B cell malignancies. The project will involve the use of retrovital display technology and various vital vector systems in vitro and in vivo. Applicants must have a recent Ph.D. degree and be competent in molecular biology and tissue culture techniques. Research experience in gene therapy and/or virology is highly desirable. Competitive salary and benefits are available for the successful candidate. Please send a letter of application, curriculum vitae, names and contact details of three references to:

Adele Fielding, MD
Molecular Medicine Program, Guggenheim 18
Mayo Clinic
200 First St., SW
Rochester, MN 55905
Telephone: 507-266-0969

Mayo Clinic is an affirmative action and equal opportunity employer and educator.

Faculty Position in Structural Biology

Washington
WASHINGTON·UNIVERSITY·IN·ST·LOUIS

Department of Pathology

Washington University School of Medicine is seeking to fill an assistant or associate professor position in structural biology. The primary appointment will be in the Department of Pathology with a secondary appointment available in the Department of Biochemistry and Molecular Biophysics. The successful candidate will be expected to develop their own independent research program utilizing structural approaches to address issues relevant to any of a number of areas including but not limited to signal transduction, eukaryotic gene regulation, cell biology, or molecular pathogenesis of disease. Candidates should be interested in, and be capable of bringing a structural perspective to, the broad range of areas represented within the Pathology Department, the Center for Immunology, and the Washington University Medical School community. The position is best suited for a protein crystallographer, although individuals using other biophysical methods for studying macromolecular interactions will be considered. A generous start-up package is available. Applicants should submit curriculum vitae, selected reprints, a short research summary, and three letters of recommendation to:

Herbert W. Virgin IV, M.D., Ph.D.
Chair, Structural Biology Search Committee
Associate Professor of Pathology
Washington University School of Medicine
Box 8118, 660 South Euclid Ave.
St. Louis, MO 63110

The University of Michigan

Ann Arbor
Director
Reproductive Sciences Program

The University of Michigan invites applications for the Director of the Reproductive Sciences Program (RSP), which is a free-standing, multidisciplinary research unit reporting to the Vice President for Research and closely affliated with the Medical School, School of Public Health, and the College of Literature, Science and Arts. Established in 1968, the RSP has earned an international reputation for excellence in research and training with consistent funding by programmatic, training, and individual research grants. The 31 RSP faculty (who hold joint appointments in multiple departments in four schools) pursue research interests that include: gonadal regulatory mechanisms, brain control of the reproductive system, reproductive development and aging, biological rhythms and seasonality, infertility, behavior, reproductive toxicology, and the effects of stress in reproduction. The scope of RSP research extends from the molecular level to whole organisms; fundamental to clinical research.

Candidates willhold the M.D. and/or Ph.D. degree(s) with a proven record of scientific accomplishment relevant to the reproductive sciences marked by an active, independent, internationally-recognized research program, a strong record of extramural support, and the respect of peers. Candidates with prior adminstrative experience and a documented commitment to effective leadership are strongly encouraged to apply.

It is anticipated that the new Director will hold a tenured appointment as the S. Jan Berhman Professor in Reproductive Medicine within the Department of Obstetrics and Gynecology, Medical School. The Director may also hold a joint appointment in another department if appropriate, based on his/her academic and professsional discipline. To apply, please send CV, statement of research interests, and the names of three references by September 30, 1999 to: **Mr. John D. Lindner, RSP Search Committee, Office of the Vice President for Research, The University of Michigan, 4080 Fleming Administration Building, 503 Thompson Street, Ann Arbor, MI 48109-1340.** (Individuals who wish to keep their candidacy confidential should indicate so in their cover letter.)

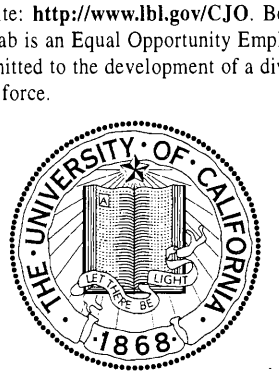
A Non-Discriminatory, Affirmative Action Employer

Genomics, Bioinformatics and/or Computational Biology Scientist

One-year Term Appointments with possible renewal. $3,300 - $6,600/Mo.

The **Lawrence Berkeley National Laboratory (LBNL)** and the University of California, Berkeley (UCB) are seeking to jointly recruit up to five scientists over a two-year period in the broad areas of genome-wide biology, bioinformatics and computational biology. LBNL and UCB have a long and distinguished legacy of successful collaboration in interdisciplinary science, including such related areas as biological imaging and structural biology. LBNL and UCB seek to build on our existing expertise in the biological, physical and engineering sciences by developing a highly interdisciplinary program to address biological problems that require acquisition and analysis of large-data sets. This program is being developed in conjunction with the Health Sciences Initiative currently taking shape at UCB. Candidates will be considered from across all levels of post-doctoral experience. These individuals will hold scientist positions at LBNL and adjunct faculty appointments in an appropriate department on the UCB campus. The recruits and their programs will reside in the new Genome Science Laboratory at LBNL, situated on a hilltop immediately adjacent to UCB.

Please send, by November 30, 1999, CV, cover letter, names, addresses and telephone numbers of three references and a description of past research and plans for future research to: **Dr. Edward Rubin, M.D., Ph.D., Search Committee Chair (reference Job #LS010906/JSCI), One Cyclotron Road, MS84-171, Berkeley, CA 94720. E-mail EMRubin@lbl.gov. FAX: 510-486-4229.** You may see the full position description and qualification requirements on our LBNL website: **http://www.lbl.gov/CJO**. Berkeley Lab is an Equal Opportunity Employer committed to the development of a diverse work force.



THE R. W. JOHNSON PHARMACEUTICAL RESEARCH INSTITUTE

Utilize the most advanced techniques in cellular and molecular biology, discover novel approaches to unmet medical conditions, and help us make the difference that will be measured in the quality of life. We're The R.W. Johnson Pharmaceutical Research Institute, a dynamically expanding organization that conducts research and development in a variety of therapeutic areas for the Johnson & Johnson family of companies.

To continue to meet the demands of our success, we have outstanding opportunities in the following areas:

MICROBIOLOGY OPPORTUNITIES

Scientist/Senior Scientist

In addition to a Ph.D. degree, successful candidates will have 2 to 8 years of experience in bacterial physiology and genetics, preferably working with gram-positive bacteria such as S. aureus or S. pneumoniae. A strong background in biochemistry and high through-put screening is a plus. **Ref. #8157**

Scientist/Senior Scientist

We are seeking a highly motivated, innovative professional with a Ph.D. plus 2 to 8 years experience. The successful candidate will be an individual with a strong background in bacterial genetics and physiology/molecular biology, and have extensive experience working with gram-negative bacteria, such as E. Coli and Pseudomonas. Experience in the use of microarray technology is also desirable. **Ref. #8158**

Scientist/Senior Scientist

A Ph.D. or D.V.M. with experience in infectious disease animal models and a background in micro biology/immunology/pathogenesis or a related field is required. Previous experience studying the roles of specific genes in the virulence of gram-negative or gram-positive bacteria is also desirable. **Ref. #8159**

Associate Scientist

Requirements include a Bachelor's degree or a Master's degree and 0-5 years of related experience. A strong background in molecular microbiology or experience as a medical technologist is required for one position. Experience in biochemistry, microbial genetics, molecular biology, and in vivo animal models are required for additional positions. Experience in assay development and high through-put screening is a plus. **Ref. #8160**

BIOINFORMATICS OPPORTUNITIES

Scientist/Senior Scientist

We require a Ph.D. in immunology, microbiology, virology or neurobiology with 2-3 years of postdoctoral experience (preferably 2-3 years of industry experience in drug discovery). Responsibilities include collaborating with therapeutic teams to mine DNA/protein sequences in public and proprietary databases and analyze microarray gene expression data to elucidate gene function and identify potential targets. Involvement in the design and construction of Bioinformatics database and software is expected. Proficiency in programming C++, Java, Perl, HTML and SQL in UNIX and Windows NT environments is a must. If you are a flexible, multi-tasked, customer service oriented individual who seeks interaction with several scientific disciplines, then this is the position for you! **Ref. #7530**

Postdoctoral Fellow

Requires Ph.D. in immunology, microbiology, virology or neurobiology. Programming experience in C++, Java, Perl, HTML and SQL in UNIX and Windows NT environments is preferred. Please include two letters of recommendation with your CV. **Ref. #11839**

Please send your resume **(MUST include Ref. #) to:**

Human Resources, RWJPRI
3210 Merryfield Row
San Diego, CA 92121
E-mail: priljhr@prius.jnj.com

Johnson & Johnson

RWJPRI is proud is to be an EOE

FACULTY POSITIONS

Assistant and Associate Professor
Center for Cell & Molecular Biology
Albany Medical College

The Center for Cell & Molecular Biology at the Albany Medical College announces the availability of one tenure-track (Assistant Professor) and one tenured (Associate Professor) faculty position. The successful candidate's research will interface with scientific programs within the Center focusing on basic mechanisms of tissue remodeling. Faculty interests include molecular mechanisms that regulate cell adhesion and motility, cell proliferation, angiogenesis, growth factor and matrix dependent signal transduction, and gene therapy of cancer. It is expected that new faculty will participate in the graduate program in Cell & Molecular Biology and in the Postdoctoral Training Program in "Tissue Remodeling and Cancer." The Center for Cell & Molecular Biology is aligned with the Cancer Center at the Albany Medical Center and opportunities exist to develop collaborations with clinical faculty in the Cancer Center as well as in the Centers for Vascular Biology, Neuroscience, and Immunology and Microbial Disease.

The level of appointment will reflect the experience of the candidate selected. Qualifications include a Ph.D. degree and a demonstrated track record of excellence in research. The applicant will be expected to maintain an independent, externally funded research program that emphasizes molecular genetic approaches to problems related to Cancer Biology. The applicants will be expected to participate in the teaching missions of both the Graduate and Medical School.

Full consideration will be given to those applications received by October 1, 1999. A curriculum vitae, description of research interests, and at least three letters of reference are required; providing copies of published papers is strongly encouraged. Application materials should be submitted to:

Paul J. Higgins, Ph.D.
Cell & Molecular Biology (165)
Albany Medical College
47 New Scotland Avenue
Albany, NY 12208

The Albany Medical College is an Equal Opportunity, Affirmative Action Employer

---

IDEXX

IDEXX Laboratories, Inc. is a worldwide leader in developing advanced diagnostic and therapeutic products and services for applications in animal health, food and water quality. Our product line includes sophisticated semi- and fully automated analytical instruments that work in concert with state-of-the-art immunological and biological technologies to meet the unique needs of our customers. The Company sells over 400 products to customers in more than 70 countries. IDEXX is headquartered just outside of Portland, Maine. The following positions are available in our corporate research & development group:

Senior Scientist - Molecular Immunologist

Experienced molecular biologist or, preferably, molecular immunologist with a Ph.D. and least 5 years' hands on experience in molecular biological research in an industrial environment. Required skills should include an ability to design and implement strategies for the isolation of novel genes. First hand experience with bacculovirus and mammalian cell protein expression systems and knowledge of antibody structure and solid experience in antibody engineering are required. The position involves project leadership skills and supervisory responsibilities. The successful candidate will coordinate efforts in both diagnostic and therapeutic reagent development for the veterinary market.

Research Scientist - Molecular Biologist

A Ph.D. level molecular biologist with at least 2 years' post-doctoral experience in molecular biological research. The position requires skills in the isolation of novel genes and expertise in state-of-the art techniques in molecular biology, protein expression and combinatorial libraries.

Research Scientist - Biochemist

Ph.D. level biochemist with at least 2 years' post-doctoral experience in protein chemistry, ligand interactions and molecular immunology techniques.

Ability to work in a team environment with shared responsibilities toward a common goal will be the key to success in these positions.

Please send resume and cover letter to: **Human Resources Department, IDEXX Laboratories Inc., One IDEXX Drive, Westbrook, ME 04092 or fax it to (207) 856-0571.** An Equal Opportunity Employer M/F/D/V. No phone calls please. **For more information about IDEXX, please visit our Web Site at www.idexx.com.**

DANA-FARBER CANCER INSTITUTE

Post-Doctoral Opportunities in Signaling/Cancer Research

Dana-Farber Cancer Institute at Harvard Medical School

Two funded Post-Doctoral positions are available to study intracellular signaling and its role in cancer. Projects include determining the molecular mechanisms of newly cloned signaling proteins and studying the roles of signaling molecules in zebrafish development. Experience in the techniques of molecular biology, tissue culture, western blotting, and/or developmental biology is desirable. Preference will be given to candidates just finishing their doctoral work. Applicants should send a cover letter detailing research experience and career goals plus a CV to:

Thomas M. Roberts, Ph.D.
Chair, Dept. of Cancer Biology
Dana-Farber Cancer Institute
44 Binney Street
Boston, MA 02115
E-mail:
thomas_roberts@dfci.harvard.edu

We are an Equal Opportunity Employer

Associate Laboratory Director Basic Energy Sciences

Brookhaven National Laboratory (BNL) is seeking candidates for the Associate Laboratory Director (ALD) for Basic Energy Sciences (BES). This Directorate contains several major research and facility sectors; Chemical Sciences, Material Sciences, The National Synchrotron Light Source (NSLS), and the High-Flux Beam Reactor (HFBR). The annual budget of the Division is about $78 Million with a staff of 350. The position reports to the Laboratory Director.

The ALD for BES provides overall scientific and managerial leadership for the science programs and the facilities in the Directorate. The successful candidate should have a Ph.D. degree and a distinguished research career in the chemical and/or material sciences accompanied by proven experience in the management of a mid-size research effort. He/she will develop internationally recognized programs that are aligned with the mission of the U.S. Department of Energy and participate at the Director's level in the Laboratory-wide planning for new programs and user facilities. He/she has line responsibility for the safe and environmentally sound operation of the science programs and the facilities.

Recent areas of scientific focus are complex materials and chemical catalysis. In the facilities sector the focus will be on maintaining and expanding the capabilities of the NSLS with expanding applications to biological sciences, and on developing the technology for an X-ray free electron laser. We also seek to enhance the program in neutron scattering at Brookhaven both at the HFBR and at the emerging spallation neutron sources.

BNL is managed by Brookhaven Science Associates under contract with the U.S. Department of Energy. We will begin screening applications September 1, 1999, and plan to fill the position by January 1, 2000. Applications should be sent to R. D'Angio, Human Resources Division, Brookhaven National Laboratory, Bldg. 185, P.O. Box 5000, Upton, L.I., NY 11973-5000. BNL welcomes diversity and encourages applications from all qualified individuals.

BROOKHAVEN
NATIONAL LABORATORY

www.bnl.gov

GODDARD SPACE FLIGHT CENTER

CHIEF, LABORATORY FOR HIGH ENERGY ASTROPHYSICS

The NASA/Goddard Space Flight Center invites applications for this Senior Executive Service position, located in Greenbelt, Maryland.

The Chief of the Laboratory for High Energy Astrophysics is responsible for supervising, developing, directing, and conducting a broad program of experimental and theoretical astrophysics and space physics research. This research includes state-of-the-art studies of the properties of astrophysical systems, with emphasis on the structure and evolution of the universe. The work of the Laboratory involves the development of space astronomy instruments as well as laboratory and theoretical investigations in support of astrophysical studies of stars, pulsars, stellar clusters, black holes, galaxies, galaxy clusters, gamma-ray bursts, energetic particles, and the early universe.

The incumbent reports to the Director of Space Sciences, and participates in the development and implementation of the space science mission of the Goddard Space Flight Center, as well as in NASA agency-wide panels and committees. In addition to being the supervisor for personnel within the Laboratory for High Energy Astrophysics, the Chief performs individual research and may act as a principal investigator, a co-investigator, and/or a project scientist on NASA missions.

This search is targeted primarily to those with an advanced degree and extensive post-graduate experience in both scientific research and scientific management. Additionally, the candidate should be recognized as an authority in x-ray astronomy, gamma-ray astrophysics or cosmic ray studies. The candidate should also possess demonstrated executive management abilities commensurate with the management responsibilities of this position. Compensation for this position ranges from $110,351 to $125,900 per annum, including locality pay. Salary will be commensurate with the candidate's experience.

Applicants must submit either an "Optional Application for Federal Employment" (OF 612), or SF-171, "Application for Federal Employment," or a resume. In addition, applicants should submit a professional vita (containing a list of refereed publications), and a cogent (approximately 1000 words) statement of career interests. The OF-612 and SF-171 can be accessed using the following URL: http://ohr.gsfc.nasa.gov/forms/formdesc.html

Applications should be forwarded to:
NASA/Goddard Space Flight Center
Human Resources Operations Office, Code 113
ATTN: Ms. Dorenda Small
Greenbelt, MD 20771.

For more information about position requirements and application procedures, please call Ms. Small at (301) 286-6958 or (301) 286-7918 (TDD); and for technical questions, please call Dr. Steve Holt at (301) 286-6066. Applications must be submitted by September 30, 1999.

Equal Opportunity Employer. U.S. Citizenship Required.

A healthy vision.

A world class leader in Research and Development, SmithKline Beecham continues to pioneer innovative pharmaceutical and healthcare products and services. We have the following opportunity available at our state-of-the-art suburban Philadelphia facility.

Scientist/Senior Scientist

Working in our DMPK department you will contribute to all portions of *in vivo* ADME studies, quantitatively analyzing drugs and metabolites in biological media using HPLC and associated detection techniques. Will also develop and implement *in vivo* and *in vitro* test systems studies resulting in the structural identification of metabolites, utilizing both on-line and off-line approaches and be responsible for all phases of studies to be conducted under GLP.

We require a sound theoretical and practical scientific knowledge in Chemistry or a related biological science equivalent to a BS/MS degree with demonstrated years of appropriate research experience. The understanding of the techniques used for *in vivo* and *in vitro* drug metabolism studies; excretion, quantitative metabolite profiling and identification of drugs and metabolites in biological media is also required. Previous experience with the use of radiochemicals and handling of common laboratory animals, and an interest in pharmacokinetics/drug metabolism/ biotransformation/molecular biology is necessary.

SmithKline Beecham is dedicated to an innovative workplace and supports you with career long opportunities and learning. We offer a competitive benefits and compensation package. To be considered for this suburban Philadelphia opportunity, please forward your scannable resume to: SmithKline Beecham, c/o National Resume Processing, Ad Code: 991282A, P.O. Box 1070, Burlington, MA 01803. Indicating Ad Code is essential. For a full listing of current opportunities, or to submit a resume online, visit our website at www.sb.com/careers

Realize your potential

Developing talent through equality of opportunity, M/F/D/V.

SB
SmithKline Beecham
Pharmaceuticals

Purdue University Department of Foods and Nutrition

Purdue University invites applications for positions in the areas of nutrition and cancer, gene-nutrient interactions and nutrition, fitness and health. Ten-month, tenure-track research and teaching appointments may be at the assistant/ associate or professor level.

The Purdue, West Lafayette campus houses an NIH-funded Cancer Center that supports basic laboratory research. Newly built laboratories for human performance, sensory, and fitness and nutrition research support human studies. The Department shares support of two transgenic animal and cell culture facitlities.

Successful candidates are expected to hold a PhD, DVM or MD degree with evidence of strong scholarly activity as measured by extramural research funding, peer-reviewed publications and collaborative research. Teaching effectiveness should also be documented. Postdoctoral experience preferable.

Applications should include current and planned research and scholarly activities, three representative preprints/reprints, curriculum vitae and names, addresses and phone numbers of three references. Applications will be reviewed until the position(s) are filled. Send materials to:

Search Committee, Purdue University
Department of Foods and Nutrition
Stone Hall, Room 212
West Lafayette, IN 47907-1264

More information is available at **www.purdue.edu**.

Purdue is an Equal Opportunity, Affirmative Action Employer.

MICHIGAN STATE UNIVERSITY
John A. Hannah Professorship in Plant Genomics

Michigan State University, as a premier land grant institution, has a long-standing tradition of excellence in all phases of plant science. In order to enhance and expand on these traditions, the leadership at Michigan State University has recently committed to adding six new faculty positions in plant science. One of these positions is an endowed chair in the area of plant genomics. The departmental home for this position is open and will be finalized based on the interests and expertise of the successful candidate; possibilities include the Departments of Biochemistry, Botany and Plant Pathology, Crop and Soil Sciences, Forestry, and Horticulture.

We are seeking candidates with a proven record of research excellence in their area of expertise and an interest in cooperating with colleagues in many areas of the plant sciences, including participation in multidisciplinary research teams created to solve important agricultural problems. The research topic is open and includes any area of plant science where a genomics or proteomics approach is being employed. Both established and mid-career candidates are encouraged to apply, including those who have recently moved into plant biology from other disciplines, but all candidates must have a record of accomplishment that warrants appointment at the level of Professor. The successful candidate will have access to outstanding research facilities and ongoing research support from the endowment. Applications, consisting of a current CV, a description of research interests and activities plus the names and addresses of three references should be sent to: Hannah Chair Search Committee, Room 106 Plant Biology Building, Michigan State University, East Lansing, MI 48824. Nominations are welcome and should be sent to the same address. Review of applications will begin on September 30 and will continue until a suitable candidate is identified.

MSU is an Affirmative Action/Equal Opportunity Institution. People with disabilities have the right to request and receive reasonable accommodations.

Discovery

Leading-edge resources & a passion for discovery. You'll find them at Roche.

Hoffmann-La Roche is a leading research-intensive pharmaceutical company that discovers, develops, manufactures and markets prescription drugs that improve, prolong and save lives. Right now, we are in the midst of one of the most exciting periods in our 100+ year history. Join our **Nutley, NJ** team as we lead the industry into the 21st century.

Principal Scientist - Bioinformatics - Data Miner

As a member of our Bioinformatics group, you will use innovative approaches for genome-scale data analysis. With access to proprietary databases and powerful analytical tools, this position offers a unique opportunity to synergize with the global Roche scientific community, applying statistical and data mining methods to the analysis of complex data sets. Qualifications include a Ph.D. in a biological discipline and significant knowledge of statistics and a combination of genetics, molecular biology, and/or biochemistry. A strong background in mathematics, experience in database mining, and scripting language skills are desirable.

As one of *NJ Monthly's* "Best Companies to Work for in New Jersey," we offer our employees competitive salaries and a comprehensive benefits package. For consideration, forward your resume, indicating Job Code: 99-0001301 and salary requirements, to: **Hoffmann-La Roche, R&D Human Resources, 340 Kingsland Street, Building 76/5th Floor, Nutley, NJ 07110; FAX: 973-235-2767.** We appreciate your interest in Hoffmann-La Roche, but can only respond to qualified candidates. Hoffmann-La Roche is an equal opportunity employer fully committed to diversity in the workplace.

For more information on this and other career opportunities, visit our Web site at http://www.rocheusa.com

Roche

Merck Research Laboratories, a leader in pharmaceutical research, has an immediate opening in our Bioprocess & Bioanalytical Research Department located in **West Point, PA (only 25 miles NW of Philadelphia).**

BIOANALYTICAL CHEMIST

We are seeking a scientist to aid in the development and validation of methods for product characterization and release testing of multi-component vaccine formations. To qualify, you must have a BS/MS or the equivalent in Biochemistry (or a related field) and strong experimental, communication and documentation skills. Relevant laboratory experience in performing HPLC and immunochemical methods is desirable, as well as an interest in laboratory automation.

An excellent salary and a comprehensive benefits program accompany this position in our modern research facilities. Please send your curriculum vitae, with a cover letter and the names of 3 references, to: **Merck Research Laboratories, Ad# RM: A-193, WP 27T-4, P.O. Box 4, West Point, PA 19486.** Only candidates considered for interviews will receive responses. We are an Equal Opportunity Employer, M/F/D/V.

1999 FORTUNE America's Most Admired Companies

www.merck.com MERCK

Science

SENIOR EDITOR

Science is seeking an experienced biological editor to join the editorial team in our Washington office. This Senior Supervisory Editor will oversee the letters department at *Science*, be responsible for coordinating editorials, and handle the peer review process for manuscripts in one area of biology. Preferred areas of expertise include molecular and cell biology, developmental biology, and genetics. This individual will also travel to scientific meetings to represent *Science*, commission Reviews and Perspectives, and otherwise contribute to the editorial efforts of *Science*. A Ph.D. and research experience plus at least 3 years of experience as a scientifiic editor is required; management experience is preferred.

For all positions, please submit a cover letter describing qualifications and salary requirements, resumé, and contact information for three or more references to:

Mr. Gregory Stokes
American Association for the Advancement of Science
Human Resources Department, Suite #100
1200 New York Avenue
Washington, DC 20005

EOE/Nonsmoking work environment

---

mayo

MAYO CLINIC POSTDOCTORAL POSITION

A position is available for a postdoctoral fellow with an interest in the molecular mechanisms of cancer development in the Department of Pathology. Major emphasis will be on cell-cycle proteins and regulation of gene expression. Individuals with a strong background in biochemistry or molecular biology, with experience or interest in endocrine tumors are encouraged to apply. Salary will be determined by the successful candidate's experience. There is also an attractive benefit package. Mayo Foundation is a nonprofit physician led clinical practice integrated with education and research in a unified multi-campus system.

Applications including a curriculum vitae, summary of past accomplishments and the names of three references should be sent to:

Ricardo V. Lloyd, M.D., Ph.D.
Mayo Clinic
Laboratory Medicine and Pathology
200 First Street SW
Rochester, MN 55905
e-mail: lloyd.ricardo@mayo.edu

Mayo Foundation is an affirmative action and equal opportunity employer and educator.

BBI Biotech Research Laboratories, Inc.

BBI Biotech, the research and development division and a wholly owned subsidiary of Boston Biomedica, Inc., is a growing biotechnology company located in Gaithersburg, MD. BBI Biotech, in addition to its R&D efforts in support of the quality control products produced by its parent, is a leading supplier of contract and service support for government and private industry. With a long and reputable history in infectious disease research, BBI Biotech is on the cutting edge of Cellular and Molecular Biology. Our major focus is the development of innovative diagnostic tests and reagents for infectious disease.

Join BBI, and Grow with the Best

We offer excellent compensation, benefits and working environment. Interested candidates should send a cover letter or letter of interest with their complete CV indicating job code to:

BBI Biotech Research Laboratories, Inc.
217 Perry Parkway
Gaithersburg, MD 20877
Fax - (301) 208-8829
email - tadams@bbii.com

PROJECT DIRECTOR, PRESSURE CYCLE TECHNOLOGY

Ph.D. in Molecular Biology or related field with at least 6 years experience in a biotechnology company required. The successful candidate will be responsible for directing the development of new innovative technology using pressure cycling to effectively control molecular activity resulting in the potential inactivation of infectious organisms, extraction of nucleic acids for clinical specimens, antigen-antibody dissociation and other applications. Extensive knowledge of the blood products industry, diagnostics market, and instrumentation design are required. Individual must be highly motivated, ambitious, and have excellent communication (written and oral) and team building skills. **Job Code: PCT**

PROJECT SCIENTIST, CELL BIOLOGY

Ph.D. in HIV-related Virology or HIV-related Cell Biology with at least 4 years post doctoral experience, preferably in a managerial role. The successful candidate will be responsible for coordinating research and service activities under Good Manufacturing Practices (GMP) including isolation, expansion and Tissue Culture Infectious Dose 50% (TCID50) determination of fresh and laboratory adapted isolates of HIV. Additional assays may include: HIV neutralization assays, HIV quantitative infectivity assays, HIV cytolytic T cell assays, EBV-transformation, apoptosis evaluation (cellular or molecular) and experience with other viruses. Excellent written and verbal communication skills for contract and grant applications and ability to build a solid team required. **Job Code: CB1**

LABORATORY MANAGER, CELL BIOLOGY

M.S. in HIV-related Virology or HIV-related Cell Biology with 5 years experience concurrently managing multiple laboratory projects and one to two technicians. The successful candidate will manage the daily performance of HIV neutralization assays, HIV quantitative infectivity assays, growing fresh and laboratory adapted isolates of HIV under Good Manufacturing Practices (GMP), including isolation, expansion and Tissue Culture Infectious Dose 50% (TCID50) determinations. Excellent sterile technique, organizational and record-keeping skills, familiarity with data-base management and design, and being detail-oriented. **Job Code: CB2**

EMPLOYMENT OPPORTUNITY

Company overview
Caprion Pharmaceuticals Inc. is a privately-held biopharmaceutical company in Montreal, Canada founded to develop novel diagnostics and therapeutic compounds in the prion diseases, or Transmissible Spongiform Encephalopathies (TSEs). An entrepreneurial company, where team members guide core technology development in pursuing new opportunities, we offer an excellent learning environment, financial incentives and opportunities for leadership.

Position available:

Structural Biologist:

Responsibilities: Develop methods of identifying novel therapeutic compounds in diseases where abnormal protein conformation is implicated; investigate pathologic mechanisms of abnormal protein conformation. This includes working with the Molecular and Cell Biology, and High-Throughput Screening Groups, planning and executing experiments, evaluating results, recommending new strategies, and participating in new project development.

Qualifications: A Ph.D. in Chemistry or Biochemistry, Post-Doctoral experience, and at least 2 years of industry experience are necessary. Knowledge of a variety of structural techniques including circular dichroism, infrared spectroscopy, and computational approaches to structural analysis is required. The ability to work both independently and as part of a team, as well as excellent communications skills, and knowledge of GLP are necessary.

Contact info:
Andréa Mueller
R&D Associate
5375 Paré St., Suite 201
Montreal, Quebec
H4P 1P7
Fax: 514-874-9077
AMueller@caprion.com

C A P R I O N

Read All About It

www.scienceonline.org
Click on "*Science* Careers."

EurekAlert!
Now available for the first time on *Science* Professional Network, EurekAlert!, a comprehensive website about the latest research advances in science, medicine, health, and technology. An average of 20 research news releases are posted each day on EurekAlert!

Science
Real jobs. Right now.

Director: Naval Fleet/Force Technology Innovation Program Office

The Office of Naval Research (ONR) is seeking an outstanding individual to serve in the Senior Executive Service (SES). Salary range is $102,300-$118,000 **(plus locality pay)**, depending on qualifications. Career SES appointees are also eligible to compete for performance awards and bonuses.

The Director, Naval Fleet/Force Technology Innovation Program Office (NFFTIPO) is responsible for ensuring a strong link between the Department of Navy S&T program and Joint, Navy, and Marine Corps Commands worldwide. A primary function of the position will be to establish objectives, policies, and priorities pertinent to the NFFTIPO and to manage daily operations via engineering and support staff at headquarters and in the field. The office will provide immediate, on-the-spot assistance to operational commands and to develop opportunities for collaboration between operational, concept development, and technical commands in managing rapid technology transitions and developing long-term investment strategies. The incumbent provides recommendations to the Chief of Naval Research, Executive Director/ Technical Director, and Vice Chief of Naval Research on the operational focus of the S&T investment strategy and serves as a DoN senior advisor on all aspects of near-term S&T requirements of naval forces.

Candidates must have progressive, responsible, and substantial experience (preferably a doctorate degree) in the performance and management of technical programs that crosscut multiple scientific and technical disciplines as evidenced by experience in systems integration and analysis, and introduction of new systems of relevance to the Fleet/Force. Candidates must also possess knowledge and experience in technology policy development, planning, and management, including insights into national, DoD, and DoN programs, and specifically, detailed knowledge and understanding of Fleet/Force needs and the ability to translate those into S&T goals. An understanding of operational plans and theater strategies of warfighting Commanders-in-Chief, as well as Navy and Marine Corps component commands to trans-late required military capabilities into specific technical program support is required.

To request a copy of the vacancy announcement, call 703-696-0972 or our TDD number, 703-696-6357. Applicants may download a copy of the vacancy announcement from ONR's web site (http://www.onr.navy.mil/hr/). For additional information on applying for the position, please contact Ms. Susan Darner at 703-696-4625. For technical information concerning this position, applicants may call the Assistant Chief of Naval Research at 703-696-4261. Applications will be accepted through **9/30/99** and must be received by that date. Interested persons should submit their application to Office of Naval Research, Human Resources Office, Attn: Announcement #99-25 (S), 800 North Quincy Street, Arlington, Virginia 22217-5660.

ONR is an equal employment opportunity employer and promotes diversity in the workplace. Women and minorities are encouraged to apply.

Purdue Biopharma L.P.

Purdue Biopharma, L.P., is a new R&D facility located in **Princeton, New Jersey.** To continue our staffing efforts, we are seeking highly motivated professionals to support the growing R&D and manufacturing community.

MOLECULAR IMMUNOLOGIST

Successful candidate will help interface with our Immunology group. Requires a Ph.D. in Molecular Biology or related field, 5 years' pharmaceutical experience following completion of postdoctoral training and a strong molecular biology/immunology background. Must have a proven track record cloning and manipulating DNA fragments encoding antibodies, as well as supervising Ph.D./non-Ph.D. level scientists. Knowledge of antibody structure and functional importance of different domains/sequences is essential, along with strong MB skills, including DNA cloning, site-directed mutagenesis, PCR, cell culture and expression of recombinant proteins in mammalian cells. An understanding of oncology and/or infectious diseases a plus.

RESEARCH SCIENTIST-IMMUNOLOGY

Antibody & Vaccine Research

We're looking for a hands-on individual to provide characterization and functional evaluation of target drugs and vaccines. You will conduct research through various sources and contribute critical data analysis. Ph.D. in immunology or related discipline with 3-6 years' post-doctoral training in the field of cellular immunology is required. Specific experience in the following areas are necessary: functional assessment of immune responses (lymphocyte activation/proliferation, CTL, ADCC, adhesion, etc.); immunological/biochemical assay development, receptor-ligand binding, SCID-Hu reconstruction, tumor immunology and idiotypic networks. Candidate should be proficient in using computer software and Internet to conduct research and data analysis. Industrial experience is highly desirable; supervisory skills are preferred.

RESEARCH ASSOCIATES

Antibody & Vaccine Discovery Research

These positions require a BS degree in Microbiology, Biochemistry or related discipline and 3+ years' research laboratory experience, or an MS degree with 1+ years' experience. Must have a solid background working with ELISA/RIA, cell receptor-ligand binding techniques, cell proliferation/cytotoxicity assays; as well as evaluating immune response and antibody specificity/affinity. Familiarity with protein purification techniques and characterization methods is essential. PC skills for data management and analysis necessary.

SENIOR QA MANAGER

In this key role, you will supervise QA staff and operations for our biotechnology manufacturing and sterile filing unit, covering both approved products and clinical materials. You'll plan internal/external audits; review/approve audit documentation; oversee GMP related issues; prepare for regulatory inspections; and devise improved systems. BS/MS degree required, preferably in a technical field, Biology or Chemistry, along with 10+ years' pharmaceutical experience, with 5+ years in a QA role. Must have a management background in the QA field and a solid history of success in biotechnology or sterile manufacturing. Good written/verbal communication and interpersonal skills are necessary, in addition to knowledge of cGMP and regulatory requirements for biotechnology products and the ability to work under minimal supervision.

SENIOR QA AUDITOR

We need a detail-oriented professional to plan and conduct internal/external audits including manufacturing areas, testing laboratories, various procedures/systems, outside suppliers and contractors. You will also prepare audit documentation, track activities, interface with audited functions to facilitate corrective actions, and provide input to QA systems development. BS/MS degree required, preferably in a technical field, Biology or Chemistry, along with 7+ years' pharmaceutical experience, with 3+ years in a QA role. Strong written/verbal communication and interpersonal skills are essential, as well as knowledge in the application of cGMP requirements and the ability to work under minimal supervision. Biotechnology or sterile manufacturing background desirable.

We offer competitive compensation, an attractive benefits package and opportunities for personal advancement and professional growth. For immediate consideration, qualified applicants should mail or fax resumes, indicating position of interest and salary requirements, to: **Associate Director, Human Resources Services, Dept-SM, Purdue, 100 Connecticut Avenue, Norwalk, CT 06850; FAX: (203) 851-5300.** Corporate standards require drug testing and background investigation. We are an equal opportunity employer committed to a diverse workplace.

PURDUE™ *Science into Practice*

Impact the World Around You!

At PE Corporation we're making some of the biggest breakthroughs in science possible by creating products and instruments that change the way researchers identify and analyze the building blocks of life. To support this effort, we have recently created Celera Genomics with the goal of sequencing the complete human genome within the next 3 years. Currently, we're seeking top-notch scientific professionals to join our facilities in Foster City.

Scientist II/III

Managing a high throughput DNA sequencing team, your duties will include coordinating raw data production process, assuring sequencing data quality, and complying with the delivery schedule. To qualify, you'll need the knowledge and skills normally acquired through the successful completion of an MS/PhD in Biochemistry, Molecular Biology or related life science, 2+ years high throughput sequencing lab experience, and a background in project management and team leadership. Automated DNA sequencing and troubleshooting skills are critical, and familiarity with standard operating procedures (SOPs) and robotic operation is preferred. Req. #XHX7563

Associate Scientist

Utilizing your PCR and DNA sequencing knowledge, you will carry out various sequencing projects. This will entail operating robotic workstations, colony PCR, plasmid preparation, gel electrophoresis, and cycle sequencing reactions. You must possess the knowledge and skills normally acquired through the completion of a BS in Molecular Biology, Biochemistry or related field, basic computer skills, and excellent teamwork abilities. Req. #XHX09643

In exchange for your talents, we offer a competitive salary and benefits package with advancement potential for your career. For consideration, please submit your resume, indicating appropriate Req.#, to: Celera Genomics, Human Resources Department, 850 Lincoln Centre Drive, Foster City, CA 94404. You may also fax to 650/638-6168, or email us at cketchum@fc.celera.com. PE Corporation is an equal opportunity employer.

Celera Genomics
A division of
PE CORPORATION

ANNOUNCEMENTS

DOES THIS SOUND LIKE YOU OR SOMEONE YOU KNOW?

"I have long been interested in science, and in helping people. During my training, I had a number of clinical experiences which convinced me that I wanted to specialize in immunology at the bench, but still have patient contact."

"I was always tinkering with my toys, taking them apart, trying to fit the square peg in the round hole. NIH is the only place to be for cutting-edge training, creativity, and pure excitement."

Has your interest always been to pursue medical research? Do the realities of staggering educational debt appear to prevent you from realizing your dreams? NIH offers a variety of clinical and basic science postdoctoral training fellowships that can be combined with educational loan repayment incentives. You owe it to yourself to know about these programs (or share the information with someone in need!) as you make your career decisions. You owe it to yourself to learn more about what NIH can do for you.

NIH Loan Repayment Benefits of $35,000 per Year

NIH, the world's leading biomedical research facility, has trained thousands of qualified students in neuroscience, pathology, immunology, molecular genetics, developmental biology, cell biology, molecular biology, virology, and structural biology, to name only a few areas in our intramural research program.

For more information on the Loan Repayment Program and postdoctoral training, visit our websites at:

http://www.training.nih.gov and
http://lrp.info.nih.gov

Toll Free: 1-800-528-7689 • TTY: 1-888-352-3001

NIH is dedicated to building a diverse community in its training and employment programs.

Dow AgroSciences (formerly Mycogen Corporation) is taking the lead in shaping the future of global agriculture through products and services that help to increase the production of food and fiber products around the world. We have an immediate opening for the following to support the Biotechnology Group in San Diego:

ENTOMOLOGIST

Ph.D.-level entomologist needed to apply a broad set of knowledge and skills in invertebrate pest biology, physiology and biochemistry to discover novel means of insect control. Together with members of other functional groups, the successful candidate will oversee and implement discovery strategies for selecting novel, commercially relevant insect and nematode control genes. The ideal candidate will provide technical leadership in one or more areas of pest control biology, possess excellent communication skills, and relish working in a goal-oriented, team environment.

NEMATOLOGIST

B.S./M.S.-level nematologist or entomologist needed to contribute to the discovery of novel, commercially relevant insect and nematode control genes. Thorough understandings of pest biology as well as a working knowledge in one or more areas of biochemistry, molecular biology or microbiology are desirable attributes. The ideal candidate will provide technical leadership in one or more areas of pest control biology, possess excellent communication skills, and relish working in a goal-oriented, team environment.

Dow AgroSciences offers a competitive compensation and benefits package and challenging opportunities within a creative and stimulating work environment. Interested candidates should send a letter of interest, salary history, resume, transcripts and references, to: **Dow AgroSciences, HR/Science, 5501 Oberlin Drive, San Diego, CA 92121; Fax: 858/453-0142.** EOE

Dow AgroSciences™

FACULTY POSITION IN ACTIVE TECTONICS AND GEOMORPHOLOGY AT YALE UNIVERSITY

The Department of Geology and Geophysics at Yale University announces a ladder faculty position, at either the junior or senior level, in the general area of active tectonics and geomorphology, starting as early as January 2000. This position is part of a broad multidisciplinary hiring initiative in earth sciences at Yale, including the areas of the dynamics of the oceans, atmospheres, and climate; geochemistry; solid-earth geophysics; and paleontology. For the active tectonics and geomorphology search, we are particularly interested in finding candidates who relate the evolution of landforms to the forcing caused by tectonic and climate processes. We also welcome applications from related fields, including, but not limited to, geodynamics of landscape evolution, paleoseismology, structural geology, and tectonics. The successful candidate is expected to develop an internationally visible research program, and to teach at both the graduate and undergraduate levels.

The closing date is September 30, 1999. Applicants should send a curriculum vitae, a statement of professional goals, and the names and addresses of three or more referees to:

Geomorphology Search Committee
c/o Professor Danny Rye, Chair
Department of Geology and Geophysics
Yale University
P.O. Box 208109
New Haven, CT 06520-8109

We encourage applicants from historically disadvantaged ethnic, racial, and gender categories. Yale University is an Equal Opportunity Employer.

MIT PLANETARY SCIENCE FACULTY

The Department of Earth, Atmospheric, and Planetary Sciences at MIT invites applications for a **FACULTY POSITION** in the area of planetary science. Rank and salary are open, but we particularly encourage potential junior faculty to apply. We seek creative applicants with broad research interests who have a strong understanding of fundamental physical processes. The position is open to outstanding candidates in all areas of planetary science; the areas of solar system formation and planetary evolution are of particular interest. The applicant may have any focus: theoretical, experimental, or observational; applicants capable of initiating and/or taking full advantage of future spacecraft opportunities are encouraged to apply. MIT facilities include the Center for Space Research and a share of the two 6.5-meter telescopes of the Magellan Consortium. Interest in teaching at the graduate and undergraduate level is essential at MIT.

Interested individuals should send curriculum vitae and names of three references to: **Ron Prinn, Department Head, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139-4307.** *MIT is an Equal Opportunity/Affirmative Action Employer. MIT is a nonsmoking environment.*

FACULTY POSITION BIOPHYSICS UNIVERSITY OF MICHIGAN

The Department of Physics and the Biophysics Research Division expect to fill two tenure-track positions in the area of experimental or theoretical biophysics to begin September 2000. We are looking for outstanding Junior Physicists who would strengthen our existing biophysics efforts and who would facilitate a strong interaction with a highly interdisciplinary program expected to evolve under the new Life Sciences Initiative. Applicants should send a curriculum vitae, a brief research statement, and the names of at least three referees to: **Ctirad Uher, Chair, Department of Physics, Randall Laboratory of Physics, University of Michigan, Ann Arbor, MI 48109-1120.** *The University of Michigan is an Affirmative Action/Equal Opportunity Employer.*

FACULTY POSITIONS IN GEOCHEMISTRY AT YALE UNIVERSITY

The Department of Geology and Geophysics at Yale University is starting a new multidisciplinary hiring initiative in earth science, which will include several ladder faculty appointments in the general area of geochemistry, starting as early as January 2000. We invite applications from both **JUNIOR**- and **SENIOR**-level candidates who will develop internationally recognized research programs in collaboration with present and future Yale Geoscientists. The positions will include teaching at both undergraduate and graduate levels. All subfields will be considered, including, but not limited to, biogeochemistry, earth surface chemical processes, experimental geochemistry, mantle geochemistry, organic geochemistry, radiogenic and stable isotopes, and theoretical geochemistry. Closing date for applications is September 30, 1999.

Applicants should send a curriculum vitae, a statement of professional goals, and the names and addresses of three or more referees to:

Geochemistry Search Committee
c/o Professor Danny Rye, Chair
Department of Geology and Geophysics
Yale University
P.O. Box 208109
New Haven, CT 06520-8109

We encourage applicants from historically disadvantaged ethnic, racial, and gender categories. Yale University is an Equal Opportunity Employer.

FACULTY POSITIONS IN SOLID-EARTH GEOPHYSICS AT YALE UNIVERSITY

The Department of Geology and Geophysics at Yale University is starting a new multidisciplinary hiring initiative in earth science, which includes a major expansion in solid-earth geophysics. To this end, we intend to fill several ladder faculty positions in solid-earth geophysics, either at the **JUNIOR** or **SENIOR** level, starting as early as January 2000. We invite applicants who will develop internationally recognized research programs in collaboration with present and future Yale Geoscientists. The positions will include teaching at both undergraduate and graduate levels. All subfields of solid-earth geophysics will be considered, including, but not limited to, geodesy, geodynamics, geomagnetism, mineral physics, rock and earthquake mechanics, and seismology. Closing date of applications is September 30, 1999.

Applicants should send a curriculum vitae, a statement of professional goals, and the names and addresses of three or more referees to:

Solid-Earth Geophysics Search Committee
c/o Professor Danny Rye, Chair
Department of Geology and Geophysics
Yale University
P.O. Box 208109
New Haven, CT 06520-8109

We encourage applicants from historically disadvantaged ethnic, racial, and gender categories. Yale University is an Equal Opportunity Employer.

Chemistry Department, Penn State, University Park, Pennsylvania. Several **TENURE-TRACK FACULTY POSITIONS** are available for fall 2000. Appointees are expected to establish an exceptionally strong and highly visible research program that incorporates excellence in undergraduate and graduate education. Rank is open; however, senior appointments should have a previous record of national and international distinction. We encourage applications from candidates in all areas of chemistry, including those that interface with other disciplines such as environmental sciences, materials sciences, biological sciences, and bioinformatics. Applicants should submit a curriculum vitae, a list of publications, research plans, and arrange to have three letters of recommendation sent to: **Chair of the Search Committee, Box S, Department of Chemistry, 152 Davey Laboratory, Penn State University, University Park, PA 16802.** Review of applications will begin on October 1, 1999, and continue until the positions are filled. *Affirmative Action/Equal Opportunity Employer.*

FACULTY POSITION IN PALEONTOLOGY AT YALE UNIVERSITY

The Department of Geology and Geophysics at Yale University is starting a new multidisciplinary hiring initiative in earth science, which includes the strengthening of its program in paleontology. To this end, we intend to fill a ladder faculty position in paleontology, at either the **JUNIOR** or the **SENIOR** level, starting September 2000. We invite applicants who will develop an internationally recognized research program in collaboration with present and future Yale Geoscientists and Bioscientists. The position will include teaching at both the graduate and undergraduate levels. All subfields of paleontology will be considered, including, but not limited to, biogeochemistry, biostratigraphy, event stratigraphy, evolutionary processes, functional morphology, macroevolution, origin of major groups/body plans, marine paleoecology, mass extinctions, paleobiogeography, paleoenvironmental analysis, systematics, or taphonomy. Closing date for applications is January 15, 2000.

Applicants should send a curriculum vitae, a statement of professional goals, and the names and addresses of three or more referees to:

Paleontology Search Committee
c/o Professor Danny Rye, Chair
Department of Geology and Geophysics
Yale University
P.O. Box 208109
New Haven, CT 06520-8109

We encourage applicants from historically disadvantaged ethnic, racial, and gender categories. Yale University is an Equal Opportunity Employer.

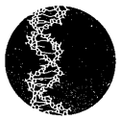
SYSTEMS NEUROSCIENTIST THE UNIVERSITY OF TEXAS AT DALLAS

The Cognition and Neuroscience Program of the School of Human Development at The University of Texas at Dallas seeks a Systems Neuroscientist whose research interests address behavioral, cognitive, perceptual, neuropsychological, and/or plasticity issues. This individual will add to our multidisciplinary strengths in systems and in cellular neuroscience, neurophysiology, computational and neural modeling, cognitive aging, memory, language, and perception. Appointment is tenure-track at the **ASSISTANT** or **ASSOCIATE PROFESSOR** level, beginning in the 2000–2001 academic year. For information, contact: **Dr. L. T. Thompson, Neuroscience Search Chair, e-mail: tres@utdallas.edu**. Cognition and Neuroscience at UT Dallas (see **website: www.utdallas.edu/dept/hd**) is a strong and growing graduate (Ph.D.) program, with top academic ratings and excellent research facilities; we also offer a B.S. in neuroscience.

Send a curriculum vitae and four letters of reference to: **Academic Search #564, The University of Texas at Dallas, P.O. Box 830688-M/S AD 23, Richardson, TX 75083-0688.** Indication of sex and ethnicity for Affirmative Action statistical purposes is requested but not required. Review of applicants begins October 15, 1999, and continues until the position is filled. *The University of Texas at Dallas is an Equal Opportunity/Affirmative Action Employer and strongly encourages applications from candidates who would enhance the diversity of the University's faculty and administration.*

UNIVERSITY OF FLORIDA

Seeks a **RESEARCH ASSISTANT PROFESSOR** in the Department of Medicine, Division of Rheumatology. M.D. degree, Board-certified/Board-eligible in rheumatology. This is a non–tenure-track position. Responsibilities of seeing patients in the outpatient clinic setting. Attend on the rheumatology and internal medicine consults services. Salary and benefits commensurate with experience. Recruiting deadline August 26, 1999. Anticipated starting date October 1, 1999. Please reply with curriculum vitae and a cover letter to: **Eric Sobel, M.D., Department of Medicine, Box 100221, JHMHC, Gainesville, FL 32610.** *Affirmative Action/Equal Opportunity Employer*



The Institute of Human Virology (IHV), University of Maryland Biotechnology Institute (UMBI), is seeking a Cellular or Molecular Immunologist to join a highly collaborative research group focused on chronic viral infections. The successful candidate will focus on questions that are best answered using human or primate models. This position is at the Associate Professor-Professor level for a tenure-track/tenured position.

Requirements: Ph.D., M.D. or equivalent, demonstrated expertise in academic or industrial setting and ability to establish a competitive extramural funded research program as demonstrated by success in obtaining extramural funding.

Please send curriculum vitae, research interest statement and names of three references to:

Search Committee, F3-0089
Institute of Human Virology
University of Maryland
Biotechnology Institute
725 W. Lombard Street
Baltimore, MD 21201

The University of Maryland is an Equal Opportunity/Affirmative Action Employer.

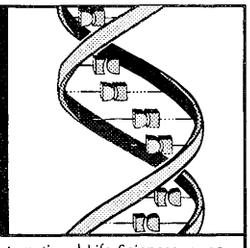
GRANTS

The **Ara Parseghian Medical Research Foundation** announces an unrestricted request of applications (RFA) directed toward understanding the cause and/or developing a treatment for Niemann Pick Type C (NPC) disease. The Foundation will fund meritorious research proposals for up to a two year period (renewable thereafter), at a maximum of $125,000/year, excluding salary support for the P.I. Investigators new to this field are encouraged to apply for funding. Targeted areas of emphasis include:

1. Cell Biology of the NPC1 gene product. Particular emphasis on examining: i) the function of the NPC1 protein in regulating intracellular trafficking, ii) NPC-1 regulated metabolic and signaling pathways, and iii) offending metabolites in the CNS.
2. Neurobiology of NPC Disease. Investigators are encouraged to use transgenic and gene transfer technologies to determine the molecular pathogenesis of NPC disease in the CNS.
3. The function of NPC1 in lower organisms and invertebrate species.
4. Design of a bio-assay suitable for large scale biopharmaceutical industry screening of drugs and bio-active compounds that may be used to treat NPC disease.
5. Identification of surrogate endpoints in NPC patients that correlate with progression/regression of NPC disease with particular emphasis on screening serum, CFS and non-invasive clinical indices including MRI and other CNS imaging modalities.

The application deadline is October 1, 1999 with funding to begin January 1, 2000. For information and application forms, please contact: **Grants Administrator, The Ara Parseghian Medical Research Foundation, 1760 E. River Rd., Suite 115, Tucson, AZ 85718. Telephone 520-577-5106: FAX 520-577-5212,** or visit our website at www.parseghian.org (the site contains the application, instructions and information).

DNX Transgenic Sciences



DNX Transgenic Sciences, a division of Phoenix International Life Sciences, a recognized leader in global drug development, currently has several opportunities in their newly expanded research facility in Cranbury, NJ.

PRINCIPAL SCIENTIST To manage molecular biology, transgenic and gene targeting research projects. Qualified candidates should have a Ph.D. in molecular biology or related field plus 2-5 years post-doctoral experience developing transgenic and gene targeted animal models. The position requires strong leadership and communications skills in a team environment. Industry experienced preferred.

RESEARCH ASSOCIATE/MICROINJECTIONIST Qualified candidates should have BS in Biology or related scientific discipline with 3-5 years experience in a core transgenic facility. Extensive experience and proficiency needed in pronuclear microinjection and blastocyst injection for the generation of transgenic and gene targeted animals. Excellent computer and communication skills are required.

RESEARCH ASSOCIATE/MOLECULAR BIOLOGY Qualified candidates should have a BS and/or MS in Biology with 3+ years of molecular biology experience. We seek persons with experience manipulating large genomic clones (BAC libraries) and constructing gene targeting vectors. Skills required include Southern blots, PCR, and gene cloning. Hands on experience culturing embryonic stem cells would be a strong plus. Ability to work independently in a group environment essential.

ASSOCIATE DIRECTOR, OPERATIONS Qualified candidates should have a PhD in molecular biology, animal science or a related discipline. Responsibilities include managing core transgenic animal operations including animal husbandry, gene transfer and genotyping activities. This position requires strong supervisory and management skills in an industrial setting.

DNX Transgenic Sciences emphasizes an atmosphere of collaboration, intellectual honesty and scientific integrity. We offer an excellent work environment with a competitive and compensation package. Please send resume to:

Human Resources Department
DNX Transgenic Sciences
301B College Road East, Princeton, NJ 08540
FAX: (609) 520-9864

At Pfizer, you'll have all the resources you need to bring new and dynamic ideas to fruition. As a company committed to innovation, we share your goal of making this world a healthier place and value the creative drive and professional expertise it takes to get there. Working together, we will continue to develop and launch the products that make such a difference in the lives of so many. At Pfizer, the power to create a better world is as immediate as it is real—and it belongs to you. The following position is based in our Groton, CT facility.

Ph.D. RESEARCH SCIENTIST – PROTEIN EXPRESSION

We are seeking a scientist with significant experience in prokaryotic/eukaryotic expression systems and their optimization for the production of proteins for x-ray crystallographic and NMR structural studies. The successful candidate will work in a multidisciplinary team and will also be responsible for the evaluation and integration of new expression technologies. Ph.D. in Molecular biology or related field required. Experience in protein characterization and structure determination is desirable. The applicant must have a demonstrated record of independent and creative research in these fields in an academic or industrial environment.

Pfizer offers exceptional salaries and benefits, as well as tremendous growth potential. Please send your resume in confidence to: Pfizer Inc, Job Code: 9926520SCI, Central Research, c/o Aon Consulting, P.O. Box 25, Findlay, OH 45839, or e-mail to: Pfizer@aon-hros.com. As an Equal Opportunity Employer, Pfizer is focused on building a diverse workforce.

Pfizer

LIFE IS OUR LIFE'S WORK.

VISITING FACULTY POSITIONS IN EARTH SCIENCES AT YALE UNIVERSITY

The Department of Geology and Geophysics at Yale University announces the opening of several visiting faculty positions, starting as early as September 1, 1999. Applicants from all areas of earth science and all career levels are welcome to apply. The visiting positions are part of a major hiring initiative in earth sciences at Yale focused on rebuilding the size and strength of the department. We are looking for individuals who would enjoy contributing and interacting in a broad multidisciplinary department that includes active programs in atmospheres, oceans, and climate; geochemistry; petrology; solid-earth geophysics; paleontology and evolutionary theory; and tectonics. The successful applicant would be expected to conduct an active research program, to interact with students and faculty, and to teach one course or seminar per semester with the topic to be negotiated. The duration and scope of the visit are negotiable as well. Applications will be considered as they arrive.

Applicants should send a curriculum vitae, a statement of objectives for the visit, and the names and addresses of three referees to:

Visiting Faculty Search Committee
c/o Professor Danny Rye, Chair
Department of Geology and Geophysics
Yale University
P.O. Box 208109
New Haven, CT 06520-8109

We encourage those from historically disadvantaged ethnic, racial, and gender categories. Yale University is an Equal Opportunity Employer.

SENIOR OPENING IN MARINE/AQUATIC BIOLOGY AT FLORIDA ATLANTIC UNIVERSITY

ASSOCIATE or **FULL PROFESSOR** position in marine/aquatic biology is available in the Division of Science at Florida Atlantic University's Davie Campus. We seek an individual deeply committed to both research and teaching whose particular area of expertise includes freshwater, marine, or estuarine systems. The successful candidate will be expected to contribute to upper-level undergraduate and graduate biology programs allied to the area of specialization, to actively participate in and enhance collaborative projects at the local, state, and federal levels, and to continue to maintain a dynamic extramurally supported research program. The ideal individual will have an exemplary publication record, evidence of sustained funding, and a strong commitment to undergraduate research and education. Preference will be given to individuals whose research provides an ecosystem perspective. The position starts spring semester 2000. Interested scientists should submit a letter of application, curriculum vitae, three (3) letters of recommendation, and five (5) representative publications to: **Dr. John C. Volin, Search Committee Chair, Division of Science, Florida Atlantic University, 2912 College Avenue, Davie, FL 33314** by August 12, 1999.

Florida Atlantic University is an Equal Opportunity/Access/Affirmative Action Institution.

ASSISTANT PROFESSOR of medicine, University of Wisconsin, Section of Hematology/HSCT. M.D. or M.D.-Ph.D. with Board-eligibility in hematology. Clinical responsibilities and research program focused on hematopoietic stem cell transplantation (HSCT) and/or lymphoma, leukemia, and other hematological malignancies. We are seeking someone who will interact productively with other clinical and basic scientists in studies related to hematologic oncology and hematology. Reply with statement of clinical, academic, and research interests and names of three references to: **Deane F. Mosher, M.D., Section of Hematology, H4/534, 600 Highland Avenue, Madison, WI 53792-5156. Telephone: 608-263-1836; e-mail: hemesec@medicine.wisc.edu.**

Unless confidentiality is requested in writing, information regarding applicants and nominees must be released upon request. Finalists cannot be guaranteed confidentiality. *The UW-Madison is an Equal Opportunity Employer/Affirmative Action Employer.*

POSITIONS OPEN

TENURE-TRACK PHYSIOLOGY AND PHARMACOLOGY POSITIONS DEPARTMENT OF PHYSIOLOGY

The Department of Physiology of the Northeastern Ohio Universities College of Medicine (NEOUCOM) is seeking applicants to fill three tenure-track (**ASSISTANT/ASSOCIATE PROFESSOR**–level) positions in cardiopulmonary physiology (two openings) and cardiovascular pharmacology (one opening). The Department has a cardiopulmonary research focus and invites applicants who are using modern cellular and/or molecular biology techniques to address integrative physiological problems that complement ongoing research programs. Candidates must have a Ph.D. and/or M.D. with appropriate Postdoctoral Fellowship training, a strong record of research accomplishment, and the ability to establish an independent externally funded program. Excellent opportunities exist within the Department and Institution for collaboration. Major medical student teaching responsibilities will be to participate in teaching either the medical physiology or medical pharmacology course. Department faculty are members of the graduate faculty in programs leading to the Ph.D. through the School of Biomedical Sciences at Kent State University. The successful candidate will have the opportunity to develop graduate courses that relate to his/her specialty. Further information about the Department and Institution can be obtained from the NEOUCOM **website: http://www.neoucom.edu**. Candidates should send a letter of application describing research experience and goals, accompanied by a curriculum vitae, and the names and addresses of three references, by September 15, 1999, to Human Resources:

c/o Michael B. Maron, Ph.D.
Professor and Chairperson
Department of Physiology
Northeastern Ohio Universities
College of Medicine
P.O. Box 95
Rootstown, OH 44272-0095

NEOUCOM is an Affirmative Action/Equal Opportunity Employer.

ASSISTANT PROFESSOR. Dynamic Biology Department has tenure-track position at the Assistant Professor level to begin August 14, 2000. Qualifications include a Ph.D., one year of postdoctoral experience, and a demonstrated commitment to undergraduate teaching and research. Preference will be given to applicants with teaching and research interests in developmental biology, cell biology, microbiology, or ecology, and whose research interests complement those of current faculty. More information is available at website: **http://www.bradley.edu/personnel/**. For full consideration, send letter of interest, curriculum vitae, transcripts, statements of teaching and research interests, and have three letters of reference sent by October 15, 1999, to: **Dr. Kelly McConnaughay, Department of Biology, Bradley University, Peoria, IL 61625**. Applicant screening will begin October 15, 1999, and will continue until the position is filled. *Bradley University is an Equal Employment Opportunity/Affirmative Action Employer, and encourages applications from underrepresented groups.*

ASSOCIATE PROFESSOR OR PROFESSOR LIFE SCIENCE EDUCATION

The Biology Department at Colorado State University invites applications from Biologists with expertise in education research. A Doctorate in a life science is required. The successful candidate is expected to develop an externally funded research program in science pedagogy, to participate in undergraduate and graduate eduation, and participate in K–12 outreach.

To apply, send a letter stating teaching and research interests, a curriculum vitae, letters from at least three references (sent separately), and up to three publications to: **Education Search Committee, Department of Biology, Colorado State University, Fort Collins, CO 80523** by 15 October 1999.

CSU is an Affirmative Action/Equal Opportunity Employer. Office of Equal Opportunity, 101 Student Services.

POSITIONS OPEN

EXPERIMENTAL POPULATION GENETICIST. University of California, Davis. The Division of Biological Sciences, University of California, Davis invites applications and nominations for a position in the Section of Evolution and Ecology at the tenure-track **ASSISTANT PROFESSOR** level. The position could include an appointment in the Agricultural Experiment Station. Candidates must have a Ph.D. (or equivalent) in the biological sciences or related fields. Candidates are expected to have a strong record of empirical research aimed toward understanding the population genetic mechanisms underlying evolution. Research topics of specific interest include (1) forces shaping genetic variation within populations, (2) the genetics of speciation, (3) phylogeographic analysis, and (4) population genetics of breeding systems. Teaching responsibilities may include an undergraduate course in evolution, part of a graduate course in population biology, and specialized courses in population genetics. Applicants should send (1) a curriculum vitae, (2) copies of no more than five published and in-press papers, (3) a description of current and projected research, and (4) a summary of teaching interests and experience, and have three letters of recommendation sent to: **Charles H. Langley, Chair, Population Geneticist Search Committee, Section of Evolution and Ecology, University of California, One Shields Avenue, Davis, CA 95616-8755**. Closing date: Open until filled, but all application materials, including letters of recommendation, must be received before October 1, 1999, to assure full consideration. *The University of California is an Equal Opportunity/Affirmative Action Employer with a strong institutional commitment to the development of a climate that supports equality of opportunity and respect for differences.*

FACULTY POSITION IN CHEMISTRY UNIVERSITY OF CALIFORNIA AT BERKELEY
Department of Chemistry

The Chemistry Department at the University of California at Berkeley, solicits applications for a faculty position as **ASSISTANT PROFESSOR** of chemistry or **PROFESSOR** of chemistry, beginning in the fall of 2000. Creative and energetic candidates who show exceptional promise or accomplishment in research and teaching are specifically sought in the fields of synthetic/organic or biophysical/bioanalytical chemistry, although truly outstanding candidates in any area of chemistry will be considered. Appointment may be at the junior or senior level, according to the qualifications of the candidate. Applicants should send a curriculum vitae and a proposed research program, and arrange to have three letters of recommendation sent to: **Chair, Faculty Recruiting Committee (#404), Department of Chemistry, University of California, Berkeley, CA 94720-1460**. The deadline for receipt of applications is October 18, 1999; applications will be reviewed beginning September 1, 1999. *The University of California is an Equal Opportunity/Affirmative Action Employer.*

An **ASSOCIATE SPECIALIST** position is available in the Division of Immunology, Department of Molecular and Cell Biology, at University of California Berkeley, to study antigen processing mechanisms and T cell antigen recognition. Duties include generation of T cell hybrids, preparation of cDNA libraries, expression cloning of T cell stimulating antigens, biochemical analysis of naturally processed peptides. Qualifications: Ph.D. in immunology and a track record in recombinant DNA methods, generation of T cell lines, and screening cDNA libraries by functional T cell assays. Experience in biochemical and HPLC peptide analysis. Minimum salary $42,660 commensurate with experience. Employment dates 1 September 1999 through 31 August 2000. Deadline: 30 days after publication of this advertisement. Interested candidates should send complete curriculum vitae, research qualifications, and arrange for three letters of reference to be sent to: **Professor Nilabh Shastri, 421 LSA, Molecular and Cell Biology, University of California, Berkeley, CA 94720-3200.**

The University of California is an Equal Opportunity Affirmative Action Employer.

Two Tenure-Track Faculty Positions in Immunology

The interdisciplinary Immunology and Microbial Disease Program at the Albany Medical College invites applications for two tenure-track faculty positions at the **Assistant Professor** level from individuals who have a doctoral degree, postdoctoral experience, and demonstrated research productivity. We are particularly interested in applicants with expertise in immunology as related to protection from microbial disease. The successful candidates will be expected to establish independent, extramurally-funded research programs and participate in the teaching of medical and graduate students. The Institution's new Strategic Research Plan approved by the Board of Directors is designed to promote and expand biomedical research at Albany Medical College by recruiting new faculty who will receive competitive salaries, attractive start-up packages, newly-renovated research laboratories, and access to outstanding core facilities. In addition, the College has established close relationships with the New York State Wadsworth Laboratories and the Trudeau Institute, providing a diverse environment that is rich in immunology and infectious disease expertise. Albany Medical College is located in a mid-sized city within the New York Capital Region, and has easy access to Boston, New York, and the Adirondack Mountains.

Applicants should send by September 30, 1999, their curriculum vitae, a statement of research plans, and three letters of reference to:

Dennis W. Metzger, Ph.D.
Professor and Program Director
Immunology and Microbial Disease Program, MC-151
Albany Medical College
47 New Scotland Avenue
Albany, NY 12208

For further information about the program, visit
www.amc.edu/Academic/Research/imd.htm

An Equal Opportunity/Affirmative Action Employer. Women and minorities are encouraged to apply.

RAPID ACCESS TO PREVENTIVE INTERVENTION DEVELOPMENT - "RAPID"

National Cancer Institute

The National Cancer Institute announces a new initiative: Rapid Access to Preventive Intervention Development (RAPID). RAPID will make available to academic investigators the preclinical and early clinical drug development contract resources of NCI's Division of Cancer Prevention. The goal of RAPID is the rapid movement of novel molecules and concepts from the laboratory to the clinic for clinical trials of efficacy. RAPID will assist investigators who submit successful requests by providing any (or all) of the preclinical and phase 1 clinical developmental requirements for phase 2 clinical efficacy trials. These include, for example, preclinical pharmacology, toxicology, and efficacy studies; bulk supply, GM manufacturing, and formulation; and regulatory and IND support and phase 1 clinical studies. Suitable types of agents for RAPID may range from single chemical or biological entities to defined complex mixtures with the potential to prevent, reverse, or delay carcinogenesis. For more detailed information, visit the web site, http://dcp.nci.nih.gov/CB/

Requests for RAPID resources are to be submitted as described in the web site. Written requests will be evaluated by a specially constituted RAPID panel, consisting of selected NCI staff and outside experts from academia and industry. Requests must be received on or before November 1, 1999. Applications should be submitted directly to the office listed below. Inquiries are encouraged, and the opportunity to clarify issues or questions is welcome. See also NIH Guide, release date April 29, 1999. Please contact:

RAPID
James A. Crowell, Ph.D.
Division of Cancer Prevention, NCI
Executive Plaza North, Suite 201
6130 Executive Blvd.
Bethesda, MD 20892
Rockville, MD 20852 (for express/courier service)
telephone (301) 594-0459
fax (301) 402-0553, (301) 594-2943
email: jc94h@nih.gov

ENDOWED PROFESSORSHIP IN COMPARATIVE ONCOLOGY UNIVERSITY OF MISSOURI-COLUMBIA

The University of Missouri seeks applications for the Tom and Betty Scott Professorship in Comparative Oncology. This professorship offers a unique opportunity for a highly motivated academician to contribute to a campus-wide, interdisciplinary oncology program involving faculty from the School of Medicine, College of Veterinary Medicine, University of Missouri Research Reactor, and several other divisions. The Scott Professor will facilitate this effort by contributing to translational research benefiting both domestic animals and humans with cancer. Collaborative opportunities and resources necessary to develop an outstanding program will exist.

Additional faculty positions will be added to the University's oncology program over the next three years through a legislative initiative termed mission enhancement. A key goal is to achieve NCI-Comprehensive Cancer Center status for the University's Ellis Fischel Cancer Center. Substantial discretionary funds also will be provided yearly through the Scott endowment.

Candidates should have an earned doctorate (DVM, MD, PhD, etc), qualify at the academic rank of Professor, and be committed to interdisciplinary research. Applicants should send a letter of intent, curriculum vitae, and the names of three references to Dr. Edward A. Deutsch, Director, University of Missouri Research Reactor and Chair of the Search Committee, c/o Ms. Christine Errante, Research Park, University of Missouri, Columbia, MO, 65211-3400, 573/882-4211. Review of applications will begin September 1, 1999 and continue until the position is filled.

The University of Missouri is an equal opportunity institution and complies with the guidelines of the Americans with Disabilities Act of 1990. If you have special needs as addressed by the ADA and need assistance with this or any portion of the application process, notify us at the above address or telephone number as soon as possible. Reasonable efforts will be made to accommodate your special needs.

POSTDOCTORAL FELLOWSHIP IN CYTOKINE mRNA REGULATION

Laboratory of Immunology, NEI, NIH

An **Intramural Research Training Award** to study post-transcriptional regulation of cytokine mRNAs during T cell activation is available in the Clinical and Molecular Immunology Section. The lab is engaged in basic research and clinical trials related to autoimmune diseases. The aim of the current project is to develop novel immunotherapies based on CD28 mediated signal transduction. Applicants will be highly self-motivated individuals with an extensive working knowledge of current techniques in molecular biology. Prior experience in the isolation and characterization of RNA binding proteins is desirable. A background in immunology/ ophthalmology is not required. The position is available beginning Fall 1999 for 2 or more years. Candidates must have a doctoral degree or equivalent training and less than 5 years of postdoctoral experience. Salary is based on the NIH pay scale and benefits are included. Applicants should send a brief cover letter describing their research interests and experiences, curriculum vitae with bibliography, and three letters of recommendation to:

Jack A. Ragheb, M.D., Ph.D.
Laboratory of Immunology/NEI/NIH
Bldg.10, Rm.10N112A
10 Center Dr. MSC-1857
Bethesda, Maryland 20892-1857

Deadline for receipt of applications is September 30, 1999.

NIH IS AN EQUAL OPPORTUNITY EMPLOYER

POSITIONS OPEN

RESEARCH PLANT PATHOLOGIST

The USDA, Agricultural Research Service Root Disease and Biological Control Research Unit, Pullman, Washington is seeking a Research Plant Pathologist, GS-11/12/13. Salary range is $39,960 to $74,035, and is commensurate with experience. *Candidates must be U.S. citizens.* The incumbent conducts basic and applied research of fungal plant pathogens that cause root and crown rot diseases of wheat and barley. In addition to the basic educational requirements, applicants must demonstrate (1) knowledge of the ecology, physiology, and genetics of fungal root pathogens, (2) knowledge of classical and molecular plant pathology, (3) skills in recombinant DNA techniques, and (4) skills in experimental design and computer analysis of data. For information about the research program, contact: **Dr. David M. Weller, Telephone: 509-335-6210; e-mail: wellerd@mail.wsu.edu.** This position has specific education and experience requirements, and factors that must be addressed. In order to ensure submission of a complete application, applicants must request a copy of the vacancy announcement by calling **Pam Dean, Telephone: 509-335-8663** or by printing it from the Internet at **website: http://www.ars.usda.gov**. Applications must be postmarked by September 7, 1999. *USDA/ARS is an Equal Opportunity Employer and Provider.*

PHARMACOKINETICS

The Department of Basic Pharmaceutical Sciences, in the College of Pharmacy at the University of South Carolina, invites applications for a tenure-track position at the level of **ASSISTANT PROFESSOR** to start on or before February 1, 2000. Applicants must possess excellent communicative and interpersonal skills and be willing to collaborate with other faculty in multidisciplinary research projects in the areas of medicinal chemistry, pharmacology, and pharmaceutics. A Ph.D. degree in a relevant area and a minimum of two years of postdoctoral experience in pharmacology, biochemistry, molecular biology, or gene therapy, etc. is required. The applicant will be expected to develop an independently funded research program and to participate in the teaching of pharmacokinetics to professional and graduate pharmacy students. Candidates should send a curriculum vitae, a statement of research objectives, and the names and addresses of three references by September 15, 1999, to: **Dr. Joseph W. Kosh, Chair, Department of Basic Pharmaceutical Sciences, University of South Carolina, College of Pharmacy, Columbia, SC 29208.** Additional information regarding the Department and the College is available at **website: http://www.pharm.sc.edu**. *The University of South Carolina is an Equal Opportunity/Affirmative Action Employer. Women and minorities are encouraged to apply.*

The University of Florida Shands Cancer Center invites applications for several tenure and non–tenure-track faculty positions at the **ASSISTANT** to **FULL PROFESSOR** level. Research interests of the Center include stem cell biology/gene therapy, signal transduction, cancer biology/gene regulation, and molecular virology and immunology. In addition, applicants dealing with research in the areas of breast, lung, and colon cancer are being recruited. Applicants will be expected to develop or have previously established a funded research program. The successful candidate will have a M.D. and/or Ph.D. degree, demonstrated organizational skills, and a strong record of personal research accomplishments supported by publications in leading peer-reviewed journals. Application deadline will be September 1, 1999, with an anticipated starting date as early as October 1, 1999. Salary and rank will be commensurate with experience. Interested applicants should submit a curriculum vitae, a brief description of proposed research, and three letters of recommendation to: **James B. Flanegan, Ph.D., Search Committee Chair, Shands Cancer Center, University of Florida, Health Science Center, P.O. Box 100232, Gainesville, FL 32610-0232.**

The University of Florida is an Equal Employment Opportunity/Affirmative Action Employer.

POSITIONS OPEN

USDA Agricultural Research Service

USDA, Agricultural Research Service (ARS), Plant Sciences Institute, Insect Chemical Ecology Laboratory in Beltsville, Maryland is seeking a **SUPERVISORY RESEARCH CHEMIST/RESEARCH ENTOMOLOGIST**, GS-1320/414-14/15. Salary is commensurate with experience (GS-14: $68,570 to $89,142; GS-15: $80,658 to $104,851 per annum). *Candidates must be U.S. citizens.* The position serves as the Research Leader of the Laboratory whose mission is to discover and develop attractants, repellents, and other semiochemicals for use in insect pest management programs. The incumbent coordinates the research programs of the Laboratory and provides for the integration and sharing of scientific expertise. Candidates must request a copy of the vacancy announcement (ARS-X9E-9376) by either **Telephone: 301-504-1484** or by copying the full text announcement from the ARS Homepage at **website: www.ars.usda.gov**. Candidates must submit specific information as outlined in the vacancy announcement. As stated in the vacancy announcement, applications must be postmarked by the closing date of August 23, 1999. *USDA/ARS is an Equal Opportunity Provider and Employer.*

The Department of Physiology, Faculty of Medicine, Univerity of Manitoba, invites applications for two full-time contingent faculty positions at the level of **ASSISTANT PROFESSOR** in the Institute of Cardiovascular Sciences. Applicants should have a M.D. or Ph.D. degree in any of the medical sciences with two to three years of postdoctoral experience in molecular biology, gene expression, biochemistry, physiology, or pharmacology. The candidates are expected to establish independent research programs in the areas of heart failure and/or ischemic heart disease, collaborate with other members of the Institute, and teach both undergraduate and graduate students. Salary will be commensurate with experience and qualifications.

Priority consideration will be given to Canadian citizens and permanent residents. Please send your résumé and statement of research goals and arrange for three letters of reference by September 30, 1999, to: **Dr. N. S. Dhalla, Institute of Cardiovascular Sciences, St. Boniface General Hospital Research Centre, 351 Tache Avenue, Winnipeg, Manitoba R2H 2A6 Canada.** *The University of Manitoba encourages applications from qualified women and men, including members of visible minorities, Aboriginal peoples, and persons with disability.*

Receptor Biology Inc., a young dynamic firm that develops and sells targets for high-throughput screening, seeks a highly qualified individual with proven abilities to clone, express, and assay both existing and novel GPCRs. To be successful, you must have experience with molecular biological techniques including PCR, subcloning, plasmid preps, transient transfection, stable transfection, as well as with radioligand binding and cell culture techniques. We are looking for highly motivated people with excellent analytical and communication skills who want to join a rapidly growing company. Please send your résumé to: **Cloning, Receptor Biology Inc., 10,000 Virginia Manor Road, Beltsville, MD 20817. FAX: 301-210-6266.**

RESEARCH SCIENTIST ASSISTANT. Tuxedo, New York. Assist in analyses of gene expression in biological samples including tissue biopsy from cancer patients or laboratory animals and also tissue culture; perform molecular biology work as well as development and/or modification of microarrays and gene chip techinques to monitor gene expression using knowledge of biostatistics including cluster and factor analysis using Minitab v.12, SAS, and SPSS. Master's or higher degree in environmental medicine plus familiarity with above areas and techniques required. FAX résumé to: **Dr. Lung Chi Chen, New York University, Department of Environmental Medicine, FAX: 914-351-5472.**

POSITIONS OPEN

RESEARCH SCIENTISTS

Xenogen Corporation is a San Francisco Bay Area development stage company with a patented platform technology that allows for monitoring and imaging bacterial and fungal infections and other biological processes rapidly, in real time, in living animals. We seek well-qualified individuals at the Ph.D. level for the following:

PROJECT MANAGER INFECTIOUS DISEASE

This Ph.D.-level position will work with fungal and/or gram-positive organisms and their development for use in drug discovery animal model systems using optical reporters. Expertise in microbial and molecular biology, gram-positive bacterial and/or fungal gene cloning, and gene technology is essential, as well as experience with microbial genetic systems, gene replacement, and expression techniques. Experience in DNA molecular biological techniques, bacterial genetic techniques, and DNA sequence homology analysis. Industry experience is a plus.

IVDD PROJECT MANAGER TRANSGENIC MOUSE GROUP

This Ph.D.-level position will work in our transgenic mouse program and the development of these animals for use in drug discovery model systems using optical reporters. Expertise in molecular biology, gene cloning, and gene technology is essential, as well as experience with standard transgenic technology, gene replacement, and expression techniques. Industry experience is a plus.

For confidential consideration mail or FAX your curriculum vitae to:

Human Resources Department
Xenogen Corporation
860 Atlantic Avenue
Alameda, CA 94501
FAX: 501-291-6196

Equal Opportunity Employer.

PHYSICIAN RESEARCH

We are seeking a clinically trained Researcher to join a multidisciplinary research effort designed to study radiation dosimetry in the application of brachytherapy for treatment of coronary artery disease. The candidate should have an in-depth experience in clinical medicine, nuclear medicine, and application of radiation therapy for coronary artery disease. The requirements include a minimum of two years of formal interventional cardiovascular training, one year of radiation therapy–related experience, and Board certification in cardiovascular disease. The incumbent Research Fellow will be expected to establish and implement independently funded research programs; but must also have the ability to interact collaboratively. Salary range is of a Research Fellow ($50,000.00 to $52,000.00). Curriculum vitae and three letters of reference to: **The Heart Institute Beth Israel Medical Center, 5 Baird Hall, 350 East 17th Street, New York, NY 10003, Attn: Kristen Graves.**

STAFF SCIENTIST

The Gene Therapy and Therapeutics Branch of the NIDCR, NIH is recruiting a Staff Scientist to work on its ongoing salivary gland gene transfer program. The successful individual should have Doctoral-level training in eukaryotic molecular biology, an M.D., D.D.S.-D.M.D., or Ph.D. as well as postdoctoral training, and broad experience with recombinant viral vectors, including chimeric vectors, as well as familiarity with salivary gland biology. Experience with *in vivo* animal models of gene transfer desired. Salary and benefits are equivalent to a GS-13/1 level. Send curriculum vitae, bibliography, and three letters of reference to: **Ms. Judith Dulovich, NIH/NIDCR, 31 Center Drive MSC 2290, Building 31, Room 2C39, Bethesda, MD 20892-2290** by August 16, 1999. *The National Institutes of Health is an Equal Opportunity Employer.*

FINISHING MANAGER

The DOE Joint Genome Institute (JGI) is a merger of the DOE Genome Centers at Los Alamos National Laboratory (Los Alamos, NM), Ernest O. Lawrence National Laboratory (Berkeley, CA), and Lawrence Livermore National Laboratory (Livermore, CA). The JGI Production Sequencing Facility in Walnut Creek is seeking an individual to administer leadership and supervision to the Finishing Team. Individual will take responsibility for the oversight and technical guidance of the draft completion of genomic clones from their draft/shotgun phase to their finished phase, and develop standards and metrics for the draft production process. Duties include defining automation, new biochemical approaches and software to complete significantly larger volumes of genome sequence than is possible today, as well as providing guidance and leadership in the type and amount of draft sequence to be performed, and the methods JGI utilizes to provide this information to the genome community. Additionally, represent the JGI as one of the senior managers in contact with both internal and external collaborators.

Position requires a Ph.D. in Biochemistry, Molecular Biology, Computer Science or equivalent with extensive experience in the management of large-scale research and/or production programs. Extensive experience in various sequencing, automation and software applications applicable to high-throughput genomic sequencing. Experience in leadership and management of people, coupled with a proven record of meeting demanding schedules and milestones is essential. Experience in establishing external collaboration, effective communication skills, and the ability to interact with members of the scientific community are also critical. Dept. BS-9151

Send your resume and three letters of reference to: University of California, LLNL, DOE Joint Genome Institute, 2800 Mitchell Drive, B100, ATTN: Sarah Wenning, Dept. AJSC869BS, Walnut Creek, CA 94598. Or fax to: 925-296-5710. An equal opportunity employer, with a commitment to workforce diversity.

GRANTS

Program Officer
Science Program

The David and Lucile Packard Foundation's Science Program is inviting nominations and applications for the position of Science Program Officer. Under the direction of the Science Program Director, you will review proposals, make recommendations regarding their disposition, serve as a liaison to internal and external groups, and prepare correspondence and reports.

We seek a seasoned professional with a Ph.D. degree or equivalent in a field of science or engineering, five to ten years of experience and ability to work in fields other than own expertise. A strong record of research and education is required. Management and policy experience is desirable.

For additional information about the Foundation, see our website at **www.packfound.org**

To apply, send a cover letter, resume, and names of at least three professional references no later than August 27, 1999 to: Dr. Jaleh Daie, Director, Science Program, The David and Lucile Packard Foundation, 300 Second Street, Suite 200, Los Altos, CA 94022. No phone calls or e-mail inquiries please. The David and Lucile Packard Foundation is an equal opportunity employer.

The David and Lucile Packard Foundation

BIOTECHNOLOGY

FibroGen,

Director, In Vivo Models/Pharmacology

a privately held biotechnology company located in South San Francisco, uses its expertise in extracellular matrix biology to discover and develop innovative therapies for fibroproliferative disorders, such as deep organ fibrosis and scarring, as well as therapeutics related to tissue repair and regeneration. FibroGen is also the world leader in the development of human recombinant collagen and recombinant gelatin for use in the medical device, pharmaceutical and fine chemical markets.

This position is responsible for the overall leadership of our in vivo programs. Duties include: design and direct in vivo studies for drug response and efficacy, develop and implement novel in vivo models, direct the histological examination of in vivo tissues, analyze data and communicate the results through presentations, regulatory submissions, scientific publications and project team reports, while fully collaborating with multiple departments i.e. chemistry, molecular biology, cell biology, etc.

A Ph.D. or equivalent in pharmacology or related scientific field and 7+ years biotechnology experience. A strong background in directing in vivo studies, with experience in fibrosis preferred, including development and use of in vivo models, study design for pharmacokinetic and proof of efficacy studies, ability to use statistics for data analysis, and writing comprehensive reports. The successful candidate will have excellent written and oral communication skills, experience in managing outside contract and collaborative studies, working in a project team environment, as well as supervisory/management experience.

We offer a competitive compensation and benefits package, including equity participation. If you enjoy the challenge of a start-up, and thrive in a world of first class science, send your CV or resume to:

FibroGen, Inc.
Attn: Human Resources
225 Gateway Blvd.
South San Francisco, CA 94080
Fax: (650) 866-7204
Email: hr@fibrogen.com

www.fibrogen.com

FIBROGEN

Fibrogen Is an Equal Opportunity Employer

POSITIONS OPEN

FRED HUTCHINSON CANCER RESEARCH CENTER, SEATTLE

The Division of Human Biology at the Fred Hutchinson Cancer Research Center is soliciting applications for positions at the junior faculty level. The newly formed Division combines programs in molecular medicine, cancer biology, and mammalian genomics/genetics with a goal of fostering interdisciplinary research on the biological basis for human diseases. We are seeking individuals with research interests that would enhance any of these three emphasis areas. The Division laboratories are part of the new lakeside campus and include state-of-the-art research facilities. Additional information about the Division can be found at **website: http://www.fhcrc.org/science/human_biology/**. Candidates should send a curriculum vitae, a concise research plan, and three letters of reference to:

Human Biology Faculty Search Committee
Fred Hutchinson Cancer Research Center
Division of Human Biology
Mailstop: A2M-015
1100 Fairview Aveue North
P.O. Box 19024
Seattle, WA 98109-1024

Application deadline is October 15, 1999.

FHCRC is an Equal Opportunity Employer committed to work force diversity and provides a smoke-free environment. Applications from female and minority candidates are strongly encouraged.

HARVARD MEDICAL SCHOOL

Our focus is on eukaryotic gene transcription using TNF-alpha as a model system. We also study the role of TNF-alpha and related molecules in the immunopathogenesis of AIDS and tuberculosis. Candidates should hold a recent M.D. or Ph.D. Previous experience in molecular biology, biochemistry, cellular biology, or immunology is required. Please send curriculum vitae, statement of research interests, and the names of three references to:

Anne E. Goldfeld, M.D.
The Center for Blood Research
800 Huntington Avenue
Boston, MA 02115
FAX: 617-278-3454
E-mail: oldfeld@cbr.med.harvard.edu

The Center for Blood Research is committed to Affirmative Action, Equal Opportunity, and the diversity of its workplace.

ASSISTANT RESEARCH MICROBIOLOGIST

Full-time Assistant Researcher in biochemistry/microbiology to carry out molecular biological and biochemical studies of multidrug efflux pumps in Gram-negative bacteria. Qualifications: Ph.D. in biochemistry, molecular biology, or microbiology. Postdoctoral experience and demonstrated knowledge in molecular genetics of bacteria and in membrane biochemistry are required. Salary range: $50,000 to $65,000 per year. One-year appointment. Send résumé, description of research experience, and bibliography by September 4, 1999, to: **Dr. Hiroshi Nikaido, Department of Molecular and Cell Biology, University of California, 229 Stanley Hall, #3206, Berkeley, CA 94720-3206.** *The University of California is an Equal Opportunity/Affirmative Action Employer.*

POSTDOCTORAL POSITION is available to study the molecular regulation of neutrophil priming and activation. Present studies include investigation of (1) mechanisms of neutrophil apoptosis; (2) neutrophil activation by immune complexes; and (3) role of MAPKs in neutrophil responses. Expertise in molecular biology or cell biology required; immunology background desirable. Send curriculum vitae and names of three references to: **Dr. Kenneth R. McLeish, Department of Medicine, University of Louisville Health Sciences Center, 615 South Preston Street, Louisville, KY 40202-1718. FAX: 502-852-4384; e-mail: k.mcleish@louisville.edu.** *Affirmative Action/Equal Opportunity Employer.*

POSITIONS OPEN

United States Food and Drug Administration, Center for Veterinary Medicine, Office of Research, Laurel, Maryland is seeking a **DEPUTY DIRECTOR** to provide scientific leadership, counsel, and stimuli necessary for developing a cohesive work force focused on critical research and evaluation of data to support FDA policy. Incumbent will be a member of a team with the responsibility to establish priorities and manage the initiation, expansion, or curtailment of research to investigate the safety of animal drugs, animal feeds, and veterinary devices intended for use in the diagnosis, cure, prevention, or treatment of diseases of animals or poulty. Of particular focus is the safety of animal drug residues to humans consuming animal-derived food. Included in this research is the issue of antimicrobial resistance resulting from the use of antimicrobial products in food-producing animals and the development of residue detection methods to assess the safety of animal drug residues in animal-derived food. The position requires experience as a Manager (preferably, Research Manager) and research scientist in one of the following: pharmacology, microbiology, toxicology, experimental biology, animal nutrition, analytical chemistry. Candidates with five years of experience and Ph.D. preferred. Positions are permanent and salary is commensurate with experience ($80,658 to $104,851). *U.S. citizenship required.* Please contact **Telephone: 301-827-4287** to receive a FAX copy of the vacancy announcements. Announcement FDA 9-0113 is for candidates with no previous government experience, non-status. Submit applications to: **FDA, OHRMS, 5600 Fishers Lane, Parklawn Building, Room 7B-44, Rockville, MD 20857.** Announcement FDA 9-4027 is for candidates with previous government experience, status employees. Submit applications to: **FDA, OHRMS, Room 211, Metro Park North 1, HFA-423, 7520 Standish Place, Rockville, MD 20855.** All applications must consist of an Application for Federal Employment and/or résumé with transcripts. Applications will be accepted through August 31, 1999. FDA has a smoke-free environment. *FDA is an Equal Opportunity Employer. All applications will receive equal consideration without regard to race, origin, color, religion, sex, disability, or any other nonmerit factor.*

BIOINFORMATICS APPLICATIONS SPECIALIST

Position available in our Medical Genetics and Molecular Medicine Department for a Computational Molecular Biologist with a B.S. (or M.S.) in computer science with knowledge of bioinformatics software and databases or molecular biology with equivalent computing experience. Responsibilities include sequence data mining and analysis, use of dedicated tools (e.g., *Human Mutat.* **12**:153–171), and development in Perl, C/C++, and HTML in a UNIX Solaris environment. The candidate will also support genetic linkage, laboratory automation, and expression profiling software. Working knowledge of molecular biology is preferred, although laboratory experience is not required. Submit résumé to: **Valerie Bani-Nasur, Recruiter, Children's Mercy Hospital and Clinics, 2401 Gillham Road, Kansas City, MO 64108. FAX: 816-855-1989; e-mail: vbaninasur@cmh.edu.**

RESEARCH FELLOW POSITION (two to five years in duration) is available in the Functional Genomics Unit, National Institute of Dental and Craniofacial Research. The Functional Genomics Unit is seeking a Molecular Neurobiologist with interest in neuronal migration or brain corticogenesis (**Ohshima et al.,** *J. Neurosci.* **19**:6017). Candidates should have two to three years of postdoctoral experience. Applicants will be considered with any of the following degrees: D.D.S., D.M.D., Ph.D., M.D., or the equivalent. Salary will be based on experience. Interested applicants should send a curriculum vitae and three names of references to: **Chief, Functional Genomics Unit, FGU, NIDCR, NIH, 30 Convent Drive, MSC-4326, Bethesda, MD 20892-4326.** Application materials must be postmarked by the closing date of September 7, 1999.

NIH is an Equal Opportunity Employer.

POSITIONS OPEN

SOIL SCIENTIST. U.S. Department of Agriculture, Agricultural Research Service, Appalachian Farming Systems Research Center, Beaver, West Virginia. Permanent full-time scientist to conduct research and participate as a team member; to develop knowledge and technology that increases the profitability of Appalachian agriculture enterprises, including diversified small-scale family farms, while enhancing environmental stewardship. The incumbent provides leadership in the definition and evaluation of soil management, soil quality, and rhizosphere processes and its importance in plant/soil/animal production systems. The incumbent conducts integrative (biological, chemical, and physical) research in soil science, with an emphasis on soil organic matter transformations, reactions with abiotic and biotic soil fractions, and processes associated with root function. A Ph.D. is desirable. *U.S. citizenship is required.* Salary commensurate with experience, $47,891 to $56,951 per year plus benefits. For information on the research project, contact: **Dr. William Clapham, Research Leader, Telephone: 304-256-2858.** For a copy of application procedures and vacancy announcement, contact: **Jamie Carr, Telephone: 301-504-1414.** *ARS is an Equal Opportunity Employer; women and minorities are encouraged.*

BIOLOGISTS

Takasago Institute for Interdisciplinary Science, Inc., is a research development company involved in the study of aromachemicals, fragrance, flavor, and natural products. We currently seek creative, well-rounded scientists with hands-on laboratory experience.

Selected candidates will study the effect of fragrance and flavor materials upon a variety of biological systems as they pertain to personal care, household, and food products. All levels of relevant experience in microbiology, cell biology, molecular biology, or biochemistry will be considered. Strong interpersonal and presentation skills are required. Supervisory experience is desirable.

For immediate consideration, please send résumé to: **Personnel Manager, Takasago Institute for Interdisciplinary Science Inc., P.O. Box 932, Rockleigh, NJ 07647-0932.**

POSTDOCTORAL POSITIONS

Available immediately to investigate the pathophysiology of lung and heart disease using transgenic and knockout mice and current differential gene expression methodologies, including microarrays. Experience in cell and molecular biology or protein biochemistry desirable. Send curriculum vitae to: **Dr. Jeanine D'Armiento, Columbia University, Department of Medicine, Division of Molecular Medicine, 622 West 168th Street, New York, NY 10033. E-mail: jmd12@columbia.edu.** *Affirmative Action/Equal Opportunity Employment Employer.*

POSTDOCTORAL POSITION AT UNIVERSITY OF MINNESOTA APPLIED VASCULAR BIOLOGY

A new NIHLBI grant to develop a cell and collagen/fibrin-based bioartificial artery includes postdoctoral funding to focus on cell/molecular biology aspects of cell-matrix reciprocity (see **website: www.cems.umn.edu/~rtt_grp**). Candidates should e-mail a curriculum vitae, a statement of relevant training, and three references to: **Prof. Bob Tranquillo, e-mail: tranquillo@cems.umn.edu.** *University of Minnesota is an Equal Opportunity Educator and Employer.*

POSTDOCTORAL POSITION to study mechanisms of addition of teleomeres to the ends of broken chromosomes, termed chromosome healing, and the role of process in preventing chromosomes instability in mammalian cells (*PNAS* **96**:6781, 1999). Send curriculum vitae, statement of research interests, and the names of three references to: **Dr. John P. Murnane, Radiation Oncology Research Laboratory, University of California San Francisco, 1855 Folsom Street, MCB-200, San Francisco, CA 94103. E-mail: murnane@rorl.ucsf.edu.**

POSTDOCTORAL POSITIONS IMMUNE-MEDIATED CENTRAL NERVOUS SYSTEM DISEASE

Two positions available for candidates interested in applying modern techniques of cellular immunology, cell biology, and genetics to infectious and autoimmune diseases of the central nervous system. One position will examine virus-specific CTL regulation using tetramer technology, including retention and expression of effector function(s) during acute and chronic infection. A second position will focus on the role of sex hormones and age on preferential Th1/Th2 induction and potential therapeutic uses of Th2 cells and/or cytokines in limiting autoimmune disease. Familiarity with *in vivo* techniques, transgenic and knockout mice, cytokine regulation, and assay preferred. Applicants should send a curriculum vitae containing three references to: **Dr. Stephen Stohlman, Department of Microbiology, University of Southern California School of Medicine, MCH 142, 1333 San Pablo Street, Los Angeles, CA 90033. FAX: 323-225-2369; e-mail: garciasq@hotmail.com.**

POSTDOCTORAL POSITIONS in genome instability available immediately to study the molecular, cellular, and genetic factors that contribute to trinucleotide repeat instability, a mutation associated with at least 12 human diseases. Focus will be upon the contribution of DNA replication and DNA repair to genetic instability. Projects will involve working with mammalian cellular and *in vitro* assays as well as patient samples (**website: http://medgen4285.med.utoronto.ca/medgen/pearson.htm**). Individuals should have a Ph.D. and a strong foundation in molecular and/or cellular biology. Experience in mammalian DNA replication, recombination, or repair is an asset. Salaries are commensurate with experience. Please send curriculum vitae and names of three references to: **Christopher E. Pearson, Ph.D., Department of Genetics, The Hospital for Sick Children, Elm-Wing Room 11-135, 555 University Avenue, Toronto, Ontario M5G 1X8 Canada. E-mail: cepearson@genet.sickkids.on.ca.**

POSTDOCTORAL POSITION IN CELL CYCLE RESEARCH

Postdoctoral position available immediately to study cell cycle regulation in mammalian development and human disease (*Genes Dev.* **13**:213; *Nature* **387**:151). Candidates must have a strong background in molecular biology. Research will involve dissecting the interplay between cell cycle control and developmental programs. Reply by mail or e-mail to: **Pumin Zhang, Ph.D., Division of Basic Sciences, National Jewish Medical and Research Center, 1400 Jackson Street, Denver, OC 80206. E-mail: zhangp@njc.org.**

POSTDOCTORAL FELLOWSHIP. Johns Hopkins University School of Medicine. Available immediately to study genomic imprinting in normal development and cancer (see our papers: *Nature* **362**:747–749, 1993; *Nature Genetics* **15**:181–185, 1997; *Nature Medicine* **4**:1276–1280, 1998; *PNAS* **96**:5203–5208, 1999). Candidates should have a recent or pending Ph.D. in molecular biology or genetics with an outstanding record. Please send curriculum vitae, research statement, and names of three references to: **Dr. Andrew P. Feinberg, Institute of Genetic Medicine, Johns Hopkins University School of Medicine, Ross 1064, 720 Rutland Avenue, Baltimore, MD 21205.**

POSTDOCTORAL RESEARCH FELLOW. Experience with rodent surgical models—preferably stroke. Willingness to work with large multidisciplinary group of Investigators in a premier stroke/vascular biology laboratory. M.D. or Ph.D. required. Send résumé to: **Evelyn Smith, Columbia University, College of Physicians and Surgeons, Neurological Institute, Room 431, 710 West 168th Street, New York, NY 10032.** *Columbia University takes Affirmative Action to ensure Equal Employment Opportunity.*

POSTDOCTORAL POSITION COMPUTATIONAL PROTEIN FOLDING
Computational and Molecular Engineering Group
Chemical Technology Division
Oak Ridge National Laboratory

The Computational and Molecular Engineering Group in the Chemical and Energy Research Section, Chemical Technology Division at the Oak Ridge National Laboratory (ORNL) seeks a qualified individual to perform computational research involving the parallelization of existing protein folding algorithms and the development of new protein folding algorithms to be implemented on multiprocessor computing environments. A Ph.D. in science or engineering in computational protein folding or computational biology, and/or postdoctoral experience in computational protein folding, is required. The research duties will be carried out in close collaboration with experienced ORNL staff members, but the applicant should have demonstrated a capability to perform independent research. Interested candidates must have excellent communication skills, both written and verbal, and must have a desire to work in a team environment on challenging problems. Complete information related to the Computational and Molecular Engineering Group can be found at **website: http://flory.engr.utk.edu/mbsf**.

This appointment is available to be filled immediately and applications will be reviewed until a suitable candidate is found and the position filled. The appointment period will be for one year and renewable for up to two additional years. It is offered through the ORNL Postdoctoral Research Associates Program, which is jointly administered by ORNL's Office of University and Science Education and the Oak Ridge Institute for Science and Education.

Interested candidates should complete and submit an "Advertised Position" application for the ORNL Postdoctoral Research Associates Program. This application and a complete description of the program are available at **website: http://www.orau.gov/orise/edu/postgrad/ornlpdoc.htm**.

Specific technical questions related to these positions should be directed to: **Dr. Peter T. Cummings, Oak Ridge National Laboratory, Chemical Technology Division, P.O. Box 2008, Oak Ridge, TN 37831-6181. Telephone: 423-241-4779; e-mail: cummingspt@ornl.gov.**

Please reference project ORNL #99-1 when applying for this position.

The program is open to all qualified U.S. and non-U.S. citizens without regard to race, color, age, religion, sex, national origin, physical or mental disability, or status as a Vietnam-era veteran or disabled veteran.

POSTDOCTORAL POSITION. A Postdoctoral position is available immediately to study the mechanisms of enzymes involved in eukaryotic DNA replication. Studies focus on the mechanism by which DNA polymerase alpha-primase initiates DNA replication and the development of novel inhibitors for these enzymes. Candidates should have a Ph.D. or equivalent in biochemistry, bioorganic chemistry, or molecular biology. Send curriculum vitae and names of three references to: **Dr. Robert Kuchta, Department of Chemistry and Biochemistry, University of Colorado, Boulder, CO 80309-0215. E-mail: kuchta@spot.colorado.edu.** *The University of Colorado is an Equal Opportunity Employer.*

SENIOR POSTDOCTORAL FELLOWSHIP in molecular genetics research available immediately. Candidates must have a Ph.D. in molecular genetics and good publication record. The scientific projects include linkage, mapping, and identification of candidate genes for bone density, soft- and hard-tissue regeneration in animal and human studies. Experience in molecular genetics research required. Salary and benefits competitive; possibly exists for long-term position. Please send cover letter, curriculum vitae, and names of three references to: **Ms. C. Farrell, Loma Linda University, P.O. Box 7210, Loma Linda, CA 92354.** *LLU is an Equal Opportunity Employer.*

POSTDOCTORAL FELLOW IN MOLECULAR SYSTEMATICS AND EVOLUTION

The W. M. Keck Program in Molecular Systematics and Evolution at the Natural History Museum of Los Angeles County seeks applications for Postdoctoral Fellowships. Successful candidate will have a Ph.D. in organismal biology and evolution with an emphasis in ichthyology, herpetology, or invertebrate zoology. Experience with the generation and analysis of molecular sequence data for evolutionary and phylogenetic systematic studies is preferable. Appointments will be made starting January 1, 2000. The tenure will be one year with an option to apply for a second year. Salary is $30,000 per year, with medical and dental benefits included. To apply, send curriculum vitae, reprints, names and contact information for three references, and a brief description of the proposed research, including fieldwork, to: **the W. M. Keck Program, Attn: Dr. Christine Thacker, Natural History Museum, 900 Exposition Boulevard, Los Angeles, CA 90007**. Applications accepted until October 1, 1999.

POSTDOCTORAL FELLOWSHIP UNIVERSITY OF MICHIGAN HEALTH SYSTEM
Pediatric Hematology/Oncology

Funded position available immediately in pediatric hematology-oncology at the University of Michigan in Ann Arbor to study various aspects of the MYC family of transcription factors, from expression to regulation, with a focus on the role of MYC antagonists (MX11, MAD1) in glioblastoma tumorigenesis and glial development in the mouse. Desired qualifications include a Ph.D. with practical research experience in molecular, cellular, or developmental biology. *Due to funding agency restrictions, the position can only be filled by an individual who is a citizen, national, or permanent resident of the United States.* Send curriculum vitae and references to: **Dan Wechsler, M.D., Ph.D., Pediatric Hematology-Oncology, University of Michigan Health System, L2110 Women's Hospital, Ann Arbor, MI 48109-0238. E-mail: dwechsl@umich.edu.** *The University of Michigan is an Equal Opportunity/Affirmative Action Employer.*

POSTDOCTORAL/RESEARCH OPPORTUNITIES MOUNT SINAI SCHOOL OF MEDICINE

Mount Sinai School of Medicine is a leader in medical research and education. Applications are invited for two Postdoctoral positions and a Research Technician position in *Drosophila* developmental biology. Projects involve pattern formation, growth, and differentiation during embryogenesis and the control of these processes by homeodomain transcription factors, nuclear hormone receptors, and signaling molecules. Previous experience with *Drosophila* is not required.

For consideration, please send curriculum vitae and arrange to have three letters of reference sent to: **Dr. Leslie Pick, Department of Biochemistry and Molecular Biology, Box 1020, Mount Sinai School of Medicine, One Gustave L. Levy Place, New York, NY 10029-6574. FAX: 212-860-9279.** *We are an Equal Opportunity Employer fostering diversity in the workplace.*

STEM CELL RESEARCH YALE UNIVERSITY

POSTDOCTORAL POSITION available immediately to study gene therapy and gene regulation with focus on tissue-specific expression in cell lines and animals after bone marrow transplantation. Candidates with a strong background in molecular and cellular biology are encouraged to apply. Send curriculum vitae, statement of research interests, and names of three references to: **Diane Krause M.D., Ph.D., Yale University, 333 Cedar Street, P.O. Box 208035, New Haven, CT 06520. E-mail: diane.krause@yale.edu.**

European Opportunities

THE CENTER FOR GENOMICS RESEARCH
KAROLINSKA INSTITUTET
POST-DOCTORAL OR FACULTY OPPORTUNITIES

Human SNP analysis
For the study of complex disease phenotypes, the applicants need to have experience in current molecular biology techniques. Bioinformatics abilities would be an asset. Contact Anthony.Brookes@cgr.ki.se.

Computational biology (Bioinformatics)
Research on the transcriptional regulation of gene expression. Construction and validation of models to enable the identification of genes selectively expressed in biologically interesting tissues or contexts. Applicants must have demonstrated quantitative/computational aptitude. Contact Wyeth.Wasserman@cgr.ki.se.

Microarrays/transcript profiling
Background in molecular biology and an interest in differential gene expression. Opportunities are either in technology development (Harold.Swerdlow@cgr.ki.se) or in biomedical applications such as in the senescence field (Claes.Wahlestedt@cgr.ki.se).

Microbial functional genomics
Individuals with background in microbiology and/or molecular biology and at least an interest in microbial genetics and the development of new approaches for gene function analyses (incl. antisense). Contact Liam.Good@cgr.ki.se or Claes.Wahlestedt@cgr.ki.se.

For more information on the Center for Genomics Research (CGR) and its links to Pharmacia&Upjohn, please see www.cgr.ki.se. Please direct applications for faculty positions to Dr. Claes Wahlestedt, Director of CGR, Karolinska Institutet, S-171 77 Stockholm, Sweden.

---

illumina™

Illumina, Inc. is an innovative and rapidly growing biotechnology start-up company based in San Diego. Illumina is developing biosensor and chemisensor array technology with applications in genomics. Illumina is currently developing rapid and high-throughput methods of genotyping and gene-expression analysis using its proprietary self-assembled **Array of Arrays™** platform. We are seeking successful individuals for the following position:

Scientist, Data Analysis
You will work closely with experimental scientists to design and implement data analysis algorithms for highly parallel array experimentation. You will have a major role in the analysis of large data sets, and in the design of arrays and experiments. A strong analytical and statistical background with emphasis on the identification and analysis of patterns in complex data sets is desired, as is a track record of finding innovative solutions to computational problems. Qualifications: Ph.D. in Computer Science or Analytical or Computational field with 2+ years experience in data analysis, or similar qualifications. Experience with an object oriented C++ environment, or similar programming (Windows NT is preferred), and familiarity with SQL. Strong communications skills. Basic familiarity with molecular biology and understanding of heterogeneous data sets in DNA, RNA, and protein-based experimentation is a plus.

Other Job Positions:
See Illumina web site for a description of other science and engineering job openings.

Illumina, Inc. offers a highly rewarding work environment with excellent potential for personal career growth. We offer competitive salaries, stock option packages, and great benefits. For consideration, please forward your resume with Job Title to: **Illumina, Inc., Human Resources, 9390 Towne Centre Drive, Suite 200, San Diego, CA 92121-3015. Fax: (619) 587-4297.**

www.illumina.com
An Equal Opportunity Employer

European Opportunities

UNIVERSITY OF COLOGNE

The Faculty of Science (Mathematisch-Naturwissenschaftliche Fakultät) invites applications for the position of a

C 3 Professor for Zoology/Animal Physiology

at the Zoological Institute. The starting date is 8-1-2000.

In teaching the applicant should be able to cover the field of Zoology and Animal Physiology, with emphasis on metabolic Physiology for the undergraduates. The candidate is expected to teach basic lectures in German language. In his scientific work the candidate should develop and lead an outstanding research program in the field of "systems-oriented cellular neuroscience". The research field of the appointee should thereby fit into the research spectrum of the current neurobiology groups.

The University of Cologne is an Equal Opportunity Employer. Women and handicapped persons are especially encouraged to apply.

Applicants should be submitted together with curriculum vitae, a selection of the most relevant publications and a short outline on the future research, names, addresses and phone/fax numbers of three referees by 9-30-99 to: **Dekan der Mathematisch-Naturwissenschaftlichen Fakultät, Universität zu Köln, D-50923 Köln, Germany.**

Mechanisms of Behavior
Dept. of Ecology, Evolution and Behavior
University of Minnesota

The Department of Ecology, Evolution and Behavior invites applications for a 9 month, tenure-track, Assistant Professorship in Mechanisms of Behavior. Possible areas of research expertise include the neural, endocrine or molecular basis of non-human behavior. The department seeks an individual who can interact with colleagues in evolution and ecology, and who will help strengthen the department's ties with the University's existing programs including neuroscience, cognition and cell & molecular biology. The successful candidate will offer an introductory course in "mechanisms of behavior," and maintain an extramurally funded research program addressing basic questions of behavioral mechanisms. The committee will begin its review of applications by 15 October 1999, although applications will be accepted and reviewed until the position is filled. Applications should include 1) a letter of application, including a statement of research and teaching interests; 2) CV; 3) up to 5 reprints. In addition, the applicant should arrange for three letters of reference to be sent to the address below:

Mechanisms of Behavior Search
Ecology, Evolution and Behavior
University of Minnesota
1987 Upper Buford Circle
St. Paul, MN 55108

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

3D DNA MICROARRAYS

Be Part of the PharmaSeq Revolution!

***PharmaSeq** is a start-up company devoted to high-throughput DNA assays utilizing revolutionary three-dimensional arrays of light-powered microtransponders. The company is expanding its activities and seeking highly motivated scientists.*

MOLECULAR BIOLOGIST
You will be responsible for the design of microtransponder-based assays, involving conjugation of nucleic acids to surfaces, DNA hybridization and fluorescence detection. Experience in nucleic acid hybridization on solid phase or microarray technology is a plus.

FLUORESCENCE SPECTROSCOPIST
You will develop methods to detect and quantitate fluorescence from microtransponder surfaces. Familiarity with dye chemistry, fluorescence microscopy or flow cytometry is advantageous.

ORGANIC CHEMIST
Your work will involve surface derivatization and development, conjugation of fluorescent dyes to nucleic acids, as well as combinatorial synthesis.

Positions are available at **managerial, PhD, MS and BS** levels. We are located in an attractive area in the **NJ high tech corridor near Princeton** within minutes of Princeton University and Rutgers. PharmaSeq offers a competitive compensation package including stock options.

Send your resume in confidence to: **Job Code S2**

PharmaSeq, Inc.
11 Deer Park Drive, Suite 204
Monmouth Junction, NJ 08852
Fax: 732-355-0102
Email to: mandecki@pharmaseq.com
Visit our web site: www.pharmaseq.com

POSITIONS OPEN

POSTDOCTORAL POSITION to study molecular mechanisms of high-fidelity chromosome transmission, the organization of chromatin structure, and the regulatory mechanisms that ensure the proper execution of the cell cycle in *Saccharomyces cerevisiae* and its human homologs (*Mol. Cell. Biol.* **16**:2838–2847 and 2848–2856; *Mol. Cell. Biol.* in press, 1999; *Cell* **88**: 243–251; *PNAS* **94**:11472–11477). We are also interested in the characterization of small nonannotated open reading frames (NORFs) that we have identified by serial analysis of gene expression (SAGE). In addition to conventional approaches we will also use DNA microarrays for our studies. Candidates must have a Ph.D. and/or M.D. with less than five years of postdoctoral experience. Experience in molecular biology is essential; knowledge of yeast genetics is preferred. Salary range is $29,000 to $33,500. Send curriculum vitae and contact information for three references to: **Dr. Munira A. Basrai, Department of Genetics, National Cancer Institute, National Naval Medical Center, Building 8, Room 5101, 8901 Wisconsin Avenue, Bethesda, MD 20889-5105. E-mail: basraim@nih.gov.**

NIH is an Equal Employment Opportunity Employer.

POSTDOCTORAL ASSOCIATE

Cell Biologist wanted to fill a Postdoctoral Research position in a molecular parasitology laboratory to conduct immunolocalization studies on the malaria parasite and other apicomplexians. Prefer candidates with a Ph.D. and prior experience in cell culture, development of specific immunoreagents, and modern microscopic methodologies. At least one year of postdoctoral experience desirable. Salary commensurate with experience. Send résumé and names of three references to: **Dr. John B. Dame, Department of Pathobiology, College of Veterinary Medicine, University of Florida, Box 110880, Gainesville, FL 32611-0880. FAX: 352-392-9704; e-mail: damej@mail.vetmed.ufl.edu.** *The University of Florida is an Equal Opportunity/Affirmative Action Employer.*

A **POSTDOCTORAL POSITION** is available immediately in the Laboratory of Molecular and Developmental Biology, National Eye Institute, to study signal transduction pathways regulating lens epithelial cell proliferation. Research will focus on the role of 12(S)HETE and protein kinase C in EGF-dependent signal transduction. *Applicants must be U.S. citizens or permanent residents* with Ph.D. or M.D. and less than five years of postdoctoral experience. Salary range $27,500 to $38,000, depending on experience. To apply send curriculum vitae, bibliography, and list of references to: **Dr. Peggy Zelenka, Building 6/Room 214, 6 Center Drive MSC 2730, Bethesda, MD 20892-2730. E-mail: zelenka@helix.nih.gov**. Closing date: August 20, 1999. *NIH/NEI is an Equal Opportunity Employer.*

POSTDOCTORAL POSITION is available immediately to investigate glial-neuronal interactions in the mammalian retina. Areas of investigation include glial calcium waves and modulation of neuronal activity by glial cells (see **website: http://www.neurosci.umn.edu/faculty/newman.html**). Experience in electrophysiology and calcium imaging desirable. Send curriculum vitae, three letters of reference, and a one-page overview of your research, background, interests, and accomplishments to: **Dr. Eric A. Newman, Department of Neuroscience, University of Minnesota, 6-145 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455. E-mail: ean@tc.umn.edu.** *The University of Minnesota is an Equal Opportunity Educator and Employer.*

POSTDOCTORAL POSITION
NEPHROLOGY DIVISION
UNIVERSITY OF CALIFORNIA, DAVIS

Position is available immediately to study signal transduction with special attention to the cyclin kinase inhibitors. A Ph.D. with experience in transfection techniques is required. Please send curriculum vitae plus three letters of reference to: **Robert H. Weiss, M.D., Nephrology Division, TB 136, Davis, CA 95616.**

POSITIONS OPEN

POSTDOCTORAL POSITIONS
THE DEPARTMENT OF BIOCHEMISTRY AND THE CENTER FOR STRUCTURAL BIOLOGY
at the University of Texas Health Science Center at San Antonio

The Biochemistry Department and the recently completed Center for Structural Biology boast state-of-the-art X-ray, NMR, mass spectroscopy, and analytical ultracentrifugation facilities, as well as instrumentation for characterization of the kinetics, thermodynamics, and solution properties of macromolecules and their reactions (see **website: http://biochem.uthscsa.edu**). Highly motivated individuals with interests in using these technologies in the characterization of the structure and function of biological macromolecules are encouraged to apply. Salaries will range from $25,000 to $35,000 per year, commensurate with qualifications.

Specific faculty research interests include:

Dr. Jeffrey C. Hansen: Solution-state characterization of chromatin structure/function relationships. Projects immediately available include (1) quantitative electrophoretic analysis of the macromolecular determinants and molecular mechanisms that control the higher-order folding of defined chromatin model systems assembled *in vitro* from pure components. Interested individuals should send a curriculum vitae and names of three references to: **Dr. Jeffrey C. Hansen, Department of Biochemistry, University of Texas Health Science Center, 7703 Floyd Curl Drive, San Antonio, TX 78284-7760. E-mail: kreider@biochem.uthscsa.edu.**

Dr. Andrew Hinck: Solution state studies of the structure and dynamics of proteins, protein complexes, and protein-RNA complexes as studied using the tools of multinuclear multidimensional NMR, calorimetry, and fluorescence spectroscopy. Systems of interest include growth factor ligands of the transforming growth factor–beta (TCF-β) superfamily, the ligand-binding domains of their type I and type II signaling receptors, and protein-RNA interactions in the signal recognition particle. Contact **e-mail: hinck@uthscsa.edu.**

Dr. Rui Sousa: Structure, mechanism, and regulation of bacteriophage RNA polymerases. Structural studies of clathrin, clathrin adapter proteins, and clathrin-adapter complexes. Contact **e-mail: sousa@uthscsa.edu.**

POSTDOCTORAL RESEARCH FELLOWSHIPS. Virginia Mason Research Center, Seattle, Washington. Virginia Mason Research Center, a highly interactive biomedical research institute in newly constructed research facilities in Seattle, Washington, invites applications from highly qualified recent Ph.D. or M.D. Investigators for Postdoctoral positions to study the signaling mechanisms of the Smad family proteins of the transforming growth factor-beta and the bone morphogenic proteins in the newly established laboratory of **Dr. Tongwen Wang** and for studies of MHC-peptide-TCR interaction in the laboratory of **Dr. Gerald Nepom**. Applicants should send a statement of research interests, curriculum vitae, and names of three references to: **H. Chase, Personnel Department, Virginia Mason Research Center, 1201 Ninth Avenue, Seattle, WA 98101**. Further information on VMRC programs can be found at **website: http://www.vmresearch.org.** *Equal Opportunity Employer/Affirmative Action.*

NIH-funded **POSTDOCTORAL POSITION** available now to study modified nucleosides in RNA and their role in cell function, with emphasis on *E. coli* rRNA. The six papers listed in *NCBI PubMed* for 1999 illustrate the approaches being used. Salary and benefits according to University of Miami scale, which is similar to NIH. Send curriculum vitae to: **Dr. James Ofengand, Department of Biochemistry and Molecular Biology, P.O. Box 016129, University of Miami School of Medicine, Miami, FL 33101. FAX: 305-243-3955; e-mail: jofengan@molbio.med.miami.edu.**

POSITIONS OPEN

POSTDOCTORAL RESEARCH POSITIONS
MOLECULAR PATHOLOGY
NATIONAL INSTITUTES OF HEALTH
National Institute of Allergy and Infectious Diseases

The Laboratory of Immunopathology, National Institute of Allergy and Infectious Diseases seeks four Postdoctoral Fellows (Ph.D. and/or M.D.) with strong backgrounds in molecular pathology. Interests of the research group are in cancer genetics, mouse and *Drosophila* embryogenesis, tumor suppressor genes, transgenic mice, transcriptional regulation and factors including Zn-finger proteins and nuclear receptors, and mechanics of DNA-protein and/or protein-protein recognition. The focus is on studies of an evolutionarily conserved transcription factor called CTCF with multiple DNA sequence specificity, and a novel candidate tumor suppressor gene. Studies include, but are not limited to, (1) expression regulation of CTCF and by CTCF, (2) mutational analyses of CTCF in human cancers, (3) characterization of embryogenesis and tumorigenesis using recently developed CTCF transgenic mice strains, (4) targeted *in vivo* mutagenesis in a variety of CTCF-target genes, including *c-myc* and *PLK*, (5) function of CTCF in *Drosophila*, (6) structural analyses of combinatorial Zn-finger contribution in multivalent DNA sequence recognition, (7) CTCF protein partners, and (8) cell cycle regulation by CTCF. The positions are open immediately. Applicants must be within five years of receipt of their degree. Starting salary ranges from $27,500 to $42,000 commensurate with experience.

Send curriculum vitae and names of three references to:

Dr. Victor V. Lobanenkov and/or
Dr. Galina N. Flippova
c/o Dr. Herbert C. Morse III
Chief, LIP, NIAID
Building 7, Room 304, MSC-0760
Bethesda, MD 20892-0760
E-mail: vlobanenkov@niaid.nih.gov
cc: liptemp@atlas.niaid.nih.gov

NIH is an Equal Opportunity Employer.

POSTDOCTORAL POSITION in structural biology using computed image analysis available immediately. Candidates with backgrounds in computational methods are urged to apply. Research is focused on understanding the structure of macromolecular assemblies, particularly protein-DNA complexes active in recombination, using computed analysis of electron micrographs. State-of-the-art facilities exist. Applicants should send curriculum vitae plus the names of three references to: **Dr. Edward H. Egelman, Department of Biochemistry and Molecular Genetics, Box 440 Health Sciences Center, University of Virginia, Charlottesville, VA 22908. E-mail: egelman@virginia.edu.** *UVA is an Equal Opportunity Employer.*

POSTDOCTORAL POSITION is available immediately to study molecular aspects of transcobalamin (TC) and cobalamin metabolism. The project will characterize the genetic defect of TC deficiency and study TC expression in cells. Applicants must have a strong background in molecular biology. Experience in cell biology and/or protein chemistry is a plus. Please send curriculum vitae, cover letter, and names of three references (with telephone numbers and/or e-mail addresses) to: **Ralph Carmel, M.D., New York Methodist Hospital, 506 Sixth Street, Brooklyn, NY 11215. FAX: 718-780-3259.**

POSTDOCTORAL POSITION available immediately at University of Miami to study functions of the airway epithelium. Research will focus on basic aspects of ciliary beat regulation and mucus composition. Experience in cell or molecular biology is required. We offer the opportunity to obtain training in polarized airway epithelium cell culture at the air-liquid interface and live, simultaneous phase and fluorescent imaging of epithelial cells. Description of research activities listed at **website: http://129.171.128.167/web/pulmonary.html**. Send curriculum vitae to **e-mail: msalathe@miami.edu**.

European Opportunities

EMBL

European Bioinformatics Institute (EBI)
Hinxton, near Cambridge, UK

The European Molecular Biology Laboratory (EMBL), an international research organisation with its Headquarters Laboratory in Heidelberg (Germany), Outstations situated in Grenoble (France), Hamburg (Germany) and Hinxton (UK), and a Research Programme at Monterotondo (Italy) has the following vacancies at **The European Bioinformatics Institute (EBI) in Hinxton, near Cambridge, UK:**

MACROMOLECULAR STRUCTURE DATABASE DEVELOPERS (3) (ref. no. 99/47)

The EMBL European Bioinformatics Institute, Macromolecular Structure Database (EBI-MSD) is the European centre for the collection and distribution of data about the three dimensional structures of macromolecules. Current projects described on **http:// msd.ebi.ac.uk** are focused on improving the consistency of structural data that already exists, devising efficient techniques to gather data on new macromolecular structures, finding effective methods for querying and disseminating structural data, and integrating the data with genetic sequences, expression data, and other collections relevant to macromolecules. The EBI-MSD works closely with the RCSB Protein Data Bank project in the USA on the management of the world archive of data held in the PDB, as well as with other groups that collate and analyse structural data.

As part of a phased expansion to the provision of services at EBI for the analysis of the three dimensional structure of macromolecules, we are seeking three Macromolecular Structure Database Developers who will form part of the team that develops new software tools and techniques as well as managing the day to day production of EBI-MSD services.

Applicants should have a university degree, experience in software development under Unix, and knowledge of structural biology. In addition, a combination of experience in one or more of, protein structure determination, computational analysis of structure, RDBMS and client-server computing would be an advantage. Informal inquiries may be made to Dr. G. J. Barton, (geoff@ebi.ac.uk).

Closing date: 30/9/99
For full details of EMBL please visit our **Web site: http://www.embl-heidelberg.de/**
EMBL is an inclusive, equal opportunity organisation.

To apply please send your CV, quoting ref. no. 99/47, to:

The Personnel Section, EMBL, Postfach 10.2209, 69012 Heidelberg, Germany
Fax: +49 6221 387555 email: jobs@EMBL-Heidelberg.de

Global Opportunities

RIKEN Brain Science Institute, JAPAN
Senior Staff Scientists

The Brain Science Institute (BSI), RIKEN, Japan, established October 1997, is seeking four young, highly-motivated researchers with postdoctoral experience for newly created senior staff positions. Research in the Institute is organized under the three headings: "Understanding, Protecting, and Creating the Brain" and applicants are invited to apply if they believe they can contribute an innovative research project leading a small independent research team, to the BSI program. Successful candidates will take up their posts as soon as possible after the fall, 1999.

Contracts are yearly renewable for an initial five year period and may be continued after the first five years if the project is independently judged in Year 4 as worthwhile.

Candidates should reside in Japan for the duration of the research.

Applications in the first instance should be sent to the address below and include:

1. Full curriculum vitae + copies of three papers
2. Names and contact details of three referees
3. A research proposal of about 2000 words

Application deadline: September 20, 1999

Brain Science Institute (RIKEN)
2-1 Hirosawa, Wako-shi
Saitama 351-0198, Japan
Fax: +81-48-462-4914
E-mail: search9@brain.riken.go.jp
http://www.brain.riken.go.jp

National Health Research Institutes(NHRI)
Taiwan, R.O.C.

Director Position, Division of Molecular and Genomic Medicine

NHRI, a newly established, non-profit research organization, cordially invites qualified individuals to apply for the Director position in the Division of Molecular and Genomic Medicine (DMGM). DMGM was established to develop strong interactive research programs to identify genetic determinants of diseases that are prevalent in Taiwan, and to serve as a conduit for scientific exchanges between molecular and genomic research in Taiwan and elsewhere. Current emphasis is on the use of contemporary molecular and genetic approaches in the study of regional cancers.

Responsibilities of the division director include leading and overseeing the development and implementation of research and clinical programs in DMGM, and the coordination of these programs with other NHRI divisions. Candidates should hold a Ph.D. or M.D. degree and possess strong leadership qualities in research and administration, with a minimal of 5 years' experience in leadership positions. Candidates are also expected to be familiar with the scientific community in Taiwan and proficient in the Chinese language. Salary will be highly competitive.

Application should include:

(1) A letter of intent
(2) Curriculum vitae and publication list
(3) A copy each of 5 major recent publications
(4) 5 Recommendation letters

Apply to: President Cheng-Wen Wu (Ken@nhri.org.tw)

Address: National Health Research Institutes
128 Yen-Chiu-Yuan Road, Sec II
Taipei 115, Taiwan, R.O.C.
NHRI Website–http://www.nhri.org.tw
Tel: 886-2-2651-3712; Fax: 886-2-2651-3742

Closing Date: November 15, 1999

POSITIONS OPEN

POSTDOCTORAL POSITIONS THE UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER

Two Postdoctoral positions are available immediately at The University of Texas Southwestern Medical Center at Dallas to study the mechanisms of HSF pathways in post-implantation development, protein misfolding, and disease pathogenesis. Outstanding candidates will be selected from major disciplines such as cell and molecular biology, biochemistry, immunology, and mouse genetics. Successful candidates will join an integrated team tackling the mechanisms of mammalian HSP regulation and function using conventional and conditional transgenic and gene knockout models. Candidates must be eligible for NIH training grant support with compensation commensurate with experience ($33,000 to $38,000). Send letter of interest, curriculum vitae, and 2 letters of recommendation directly to:

Ivor J. Benjamin, M.D.
Associate Professor of Medicine
The University of Texas Southwestern
Medical Center at Dallas
6000 Harry Hines Boulevard, NB11.110
Dallas, TX 75235-8573
Telephone: 214-648-1423
FAX: 214-648-1450
E-mail: ivor.benjamin@email.swmed.edu

UT Southwestern is an Equal Opportunity/Affirmative Action Employer. Members of minority groups are particularly encouraged to apply.

POSTDOCTORAL POSITIONS INTRACELLULAR PROTEIN TRAFFIC PRINCETON UNIVERSITY

Several Postdoctoral positions are available in the laboratories of **M. G. Waters** and **F. Hughson**. One position focuses on biochemical, molecular, and cell biological studies of a novel mammalian Golgi protein complex required for intra-Golgi traffic. The second involves application of genetics and biochemistry to study the process of ER to Golgi vesicle traffic in yeast. The third entails biophysical and X-ray crystallographic studies of protein complexes involved in protein trafficking and neurotransmitter release. Please send curriculum vitae, research summary, and names and addresses of three references to:

Postdoctoral Search
Department of Molecular Biology
Princeton University
Princeton, NJ 08544 USA
FAX: 609-258-3980

Princeton University is an Equal Opportunity/Affirmative Action Employer.

POSTDOCTORAL POSITION MOLECULAR CARCINOGENESIS

Postdoctoral Fellow to study development and tumorigenesis in hormonally regulated tissues, with emphasis on environmental hormones including xenoestrogens. Applicants should have recent Ph.D. with experience in molecular techniques including transfection of mammalian cells, cell culture, analysis of steroid action, and tissue specificity. Send curriculum vitae and two references to: **Dr. R. Fuchs-Young, Department of Carcinogenesis, University of Texas M. D. Anderson Cancer Center, Box 389, Smithville, TX 78957.**

We are an Equal Opportunity/Affirmative Action Employer.

POSTDOCTORAL/RESEARCH FELLOW positions. Available immediately to study the regulation of apoptosis in lymphocytes. Projects include regulation of Fas and FasL expression and the role of apoptosis in neuro-immune interactions. Strong background in immunology, signal transduction, and molecular biology is desired. Please send curriculum vitae, cover letter with research interest, and names of three references to: **Dr. Yufang Shi, Department of Immunology, Holland Laboratory of The American Red Cross, 15601 Crabbs Branch Way, Rockville, MD 20855. FAX: 301-517-0344; e-mail: shiy@usa.redcross.org.**

POSITIONS OPEN

POSTDOCTORAL POSITION

Research position available to study signal transduction events associated with tumor cell adhesion. Work focuses on how tumor cell adhesion prevents drug-induced apoptosis. Investigations will include development of drugs to prevent or disrupt signaling pathways associated with cell adhesion–mediated drug resistance. Applicants for this position should hold a Ph.D. with a background in molecular biology and/or signal transduction. Send curriculum vitae, brief description of research experience, and names of three references to: **William S. Dalton, Ph.D., M.D., Moffitt Cancer Center and Research Institute, 12902 Magnolia Drive, Tampa, FL 33612-9497.**

THREE POSTDOCTORAL FELLOWS ECOSYSTEM IMPACTS OF FISHERIES

Three Postdoctoral Fellows are required at the Fisheries Centre, University of British Columbia (UBC) as part of a team working on an innovative approach to assessing the impacts of fisheries on large marine ecosystems. The three Postdoctoral Fellows will assist two Research Associates (a Principal and a Senior Scientist) and two Faculty Professors in the project, and will also be required to collaborate with consultants and supervise work by graduate student assistants. The Project Leader is **Dr. Daniel Pauly** and the Chair of the Project Steering Committee is **Dr. Tony Pitcher**.

The posts are available for 21 months from September 1, 1999. Salary will be competitive according to current position, qualifications, and previous experience.

We are looking for Postdoctoral Fellows with a track record of publication on fisheries, some international experience, a flair for problem solving, an eagerness to help to prove and improve new methods, and a personality suitable for work in a team research environment. Successful applicants will likely already have a high level of expertise in quantitative analysis and modeling leading to policy evaluation in fisheries.

Previous experience of analyzing fisheries in an ecosystem context will be an advantage, although a willingness to innovate while operating within a rigorous scientific methodology is equally important. Training in methods will be provided. One of the posts will concentrate on fisheries catch data series (acquisition, standardization, verification, analysis, maintenance of pertinent databases) and for this position, previous experience in this field will be essential.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada.

Please send a letter of application and a full curriculum vitae to: **Prof. Tony J. Pitcher, Director, Fisheries Centre, University of British Columbia, 2204 Main Mall, Vancouver, British Columbia V6T 1Z4 Canada** by August 21, 1999. E-mail applications (**e-mail: tpitcher@fisheries.com**) are acceptable provided curricula vitae, etc. are sent as MIME attachments in Word format.

POSTDOCTORAL POSITION

A position is immediately available at the Joslin Diabetes Center and Harvard Medical School.

Research is based on discoveries made by the laboratory concerning the regulation of and roles for a critically important regulator of oxidative stress, glucose 6-phosphate dehydrogenase. Project requires a strong background in molecular biology and biochemistry. Funding for this position is available through an NIH training grant.

Send curriculum vitae, cover letter, and three reference letters to: **Dr. Robert C. Stanton, Chief, Renal Division, Joslin Diabetes Center, Boston, MA 02215. FAX: 617-732-2467; e-mail: robert.stanton@joslin.harvard.edu.**

POSITIONS OPEN

POSTDOCTORAL POSITION IN GENE THERAPY

Available immediately to spearhead the development of a nonhuman primate model of Krabbe's disease (globoid cell leukodystrophy). The research will be performed in collaboration with the Tulane Primate Center, home to the only known primate colony that carries a mutation in the disease gene that causes Krabbe's leukodystrophy. This is an outstanding opportunity for a young scientist interested in gene therapy research, and promises to provide comprehensive training in areas of vector development (adeno-associated virus) and *in vivo* testing. Studying vector biology in adult and fetal monkey tissue will be a major focus. The project is funded for two years through the Hunter's Hope Foundation (**website: http://members.aol.com/hunterhope.main.html**) and should contribute to the development of a gene therapy protocol for the treatment of Krabbe's disease. The qualified candidate will have a Ph.D. in molecular and cell biology, virology, or other biological sciences. Applicants should be highly motivated to learn and display good interpersonal skills. Send a brief letter of research interests, curriculum vitae, and the names of three references to:

Krishna J. Fisher, Ph.D.
Director of Research
Tulane Gene Therapy Program
Tulane University Medical Center
Department of Pathology and
Laboratory Medicine SL79
1430 Tulane Avenue
New Orleans, LA 70112
Telephone: 504-584-2427
FAX: 504-587-7389
E-mail: kfisher1@mailhost.tcs.tulane.edu

Tulane University Medical Center is an Affirmative Action/Equal Opportunity Employer.

POSTDOCTORAL POSITION available immediately to study **T** cell activation and migration in the immune response to viral infection, with emphasis on the role of cytokines and costimulatory molecules. Applicants should have a good background in molecular or cellular immunology. Interested individuals should send their curriculum vitae and the names and addresses of three references to: **Dr. Sally R. Sarawar, Division of Molecular Immunology, La Jolla Institute for Allergy and Immunology, 10355 Science Center Drive, San Diego, CA 92121. Telephone: 619-678-4661; FAX: 619-558-3526; e-mail: ssarawar@liai.org; website: http://www.liai.org.**

POSTDOCTORAL ASSOCIATE UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER

Position available September 1999 to study transcriptional regulation of kidney development and kidney-specific gene expression. Experience in eukaryotic gene regulation desired. Send curriculum vitae and names of three references to: **Dr. Peter Igarashi, Chief, Division of Nephrology, University of Texas Southwestern, 5323 Harry Hines Boulevard, Dallas, TX 75235-8856. FAX: 214-648-2071.** *UT Southwestern is an Equal Opportunity/Affirmative Action Employer.*

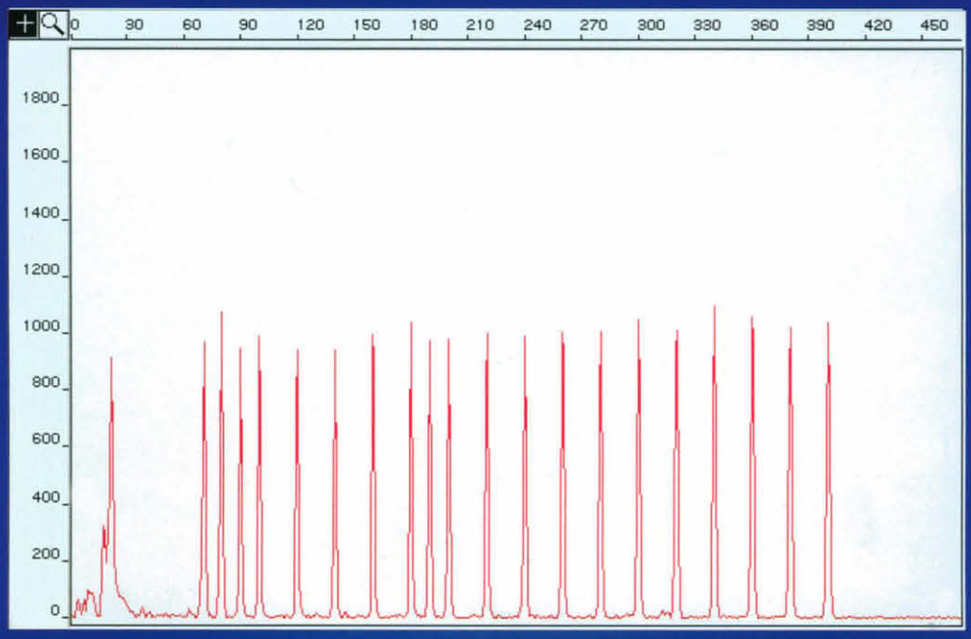
WORKSHOP

SINGLE CELL GEL (COMET) ASSAY WORKSHOP

Dr. Ray Tice at ILS, along with Trevigen, are conducting a Workshop, October 20–22, 1999. Hands-on sample processing, slide preparation, electrophoresis, detection of specific classes of DNA damage, and data capture using image analysis. Lectures on the design, statistical analysis, and interpretation of genetic and standard toxicological studies, and environmental and human biomonitoring studies. For information, contact: **Marie, Telephone: 800-556-5857, ext. 432; e-mail: komet@ils-inc.com.**

MAPMARKERS™

FLUORESCENT DNA SIZING STANDARDS



Example of Rhodamine-X labeled MapMarker 70-400 sizing standard run on ABI model 310 Genetic AnalyzerTM. Marker bands are 70, 80, 90, 100, 120, 140, 160, 180, 190, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400 nucleotides long.

MapMarkers are compatible with all fluorescent based separation systems.

MapMarkers provide consistent intensities and migration patterns.

MapMarkers are available labeled with your choice of the most commonly used fluorescent dyes

TO ORDER OR OBTAIN INFORMATION TOLL FREE

Circle No. 42 on Readers' Service Card

BioVentures, Inc.

Phone 877-852-7838 FAX 877-286-0322

Molecular Biology Reagents

from R&D Systems

Accessory Reagents Also Available

New Expression Arrays

mRNA Expression Profiling

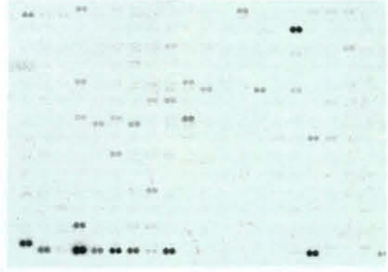
Cytokine Expression Array

R&D Systems' Expression Arrays allow simultaneous monitoring of multiple gene-specific mRNAs on a semi-quantitative basis. Our cytokine array consists of 375 different cloned cDNAs, printed as PCR products onto a charged nylon membrane.

Features

- Includes cytokines, chemokines, interleukins, other immuno-regulatory factors and receptors
- Semiquantitative analysis of mRNAs using one of nine different housekeeping control cDNAs
- All cloned cDNAs are sequenced containing no repetitive elements
- Identify differentially expressed mRNAs by comparing expression profiles from different samples

Expression Arrays are produced in collaboration with Sigma-Genosys



Portion of a Cytokine Expression Array showing analysis of cytokine RNAs expressed in stimulated (1 pg/mL PMA and 10 µg/mL LPS for 4 hours) THP-1 cells. Radiolabeled cDNA was made using poly $(A)^+$ RNA, ^{33}P labeled nucleotide, and oligo $(dT)_{25}$ primer.

Quantikine® mRNA

mRNA Quantitation Kits

Quantikine mRNA is a colorimetric assay that quantitates multiple mRNA targets on the same microplate.

Ask about our RNA Isolation Kit

Kits Available

Human:

- IL-1β
- IL-6
- GAPDH
- IL-2
- IL-10
- IFN-γ

Coming Soon

Human:

- TNF-α
- VEGF

Mouse:

- IFN-γ
- IL-1β
- IL-2
- TNF-α

FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC OR THERAPEUTIC PROCEDURES.

North America
R&D Systems, Inc.
614 McKinley Place NE
Minneapolis, MN 55413, USA
Tel: 612 379-2956
Fax: 612 379-6580
info@rndsystems.com

Europe
R&D Systems Europe Ltd.
4-10 The Quadrant, Barton Lane
Abingdon, OX14 3YS, UK
Tel: +44 (0)1235 529449
Fax: +44 (0)1235 533420
info@rndsystems.co.uk

Germany
R&D Systems GmbH
Borsigstrasse 7
65205 Wiesbaden, Germany
Tel: +49 (0)6122 90980
Fax: +49 (0)6122 909819
infogmbh@rndsystems.co.uk

Europe Free Phone
Belgique/België: 0800 10 468
Danmark: 80 01 85 92
France: 0800 90 72 49
Nederland: 060 225607
Norge: 800 11033
Sverige: 020 79 31 49
Switzerland: 0800 55 2482

www.rndsystems.com

R&D SYSTEMS

1-800-343-7475

Circle No. 55 on Readers' Service Card