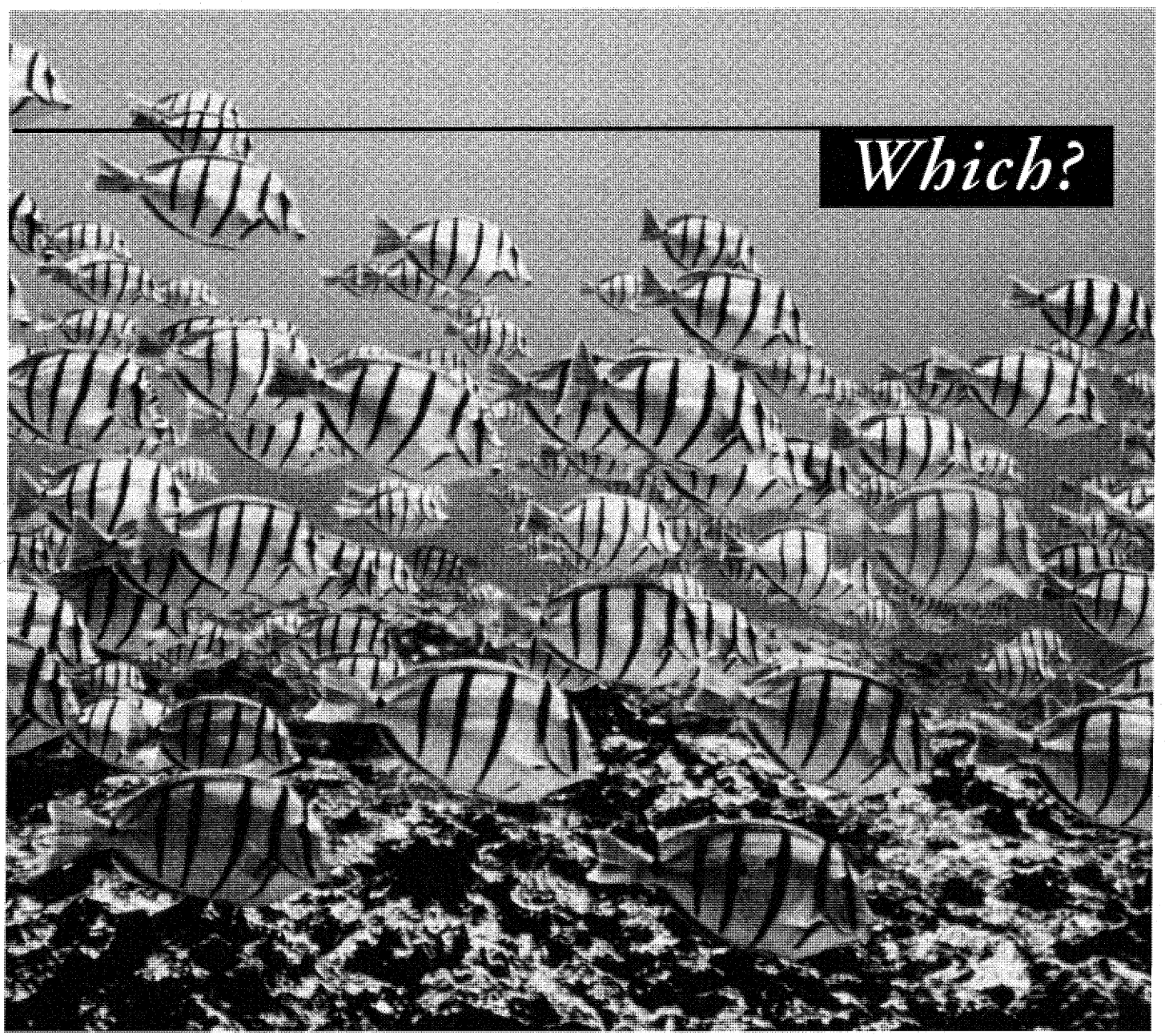

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The new Beacon Designer 2.0 from PREMIER Biosoft International is software for designing probes (called beacons here) used in real-time quantitative polymerase chain reaction (PCR) and other nucleic acid detection methodologies [see N. Walker, *Science* **296**, 557(2002)]. The program provides an excellent flexible format that allows users to design beacons for both of the commonly used real-time PCR technologies, Molecular Beacons and TaqMan, as well as primers for regular PCR.

Considerations in designing beacons for real-time PCR are similar to those of making primers for PCR. They include annealing temperature, self-complementarity, and primer length. For real-time PCR, however, other important factors include lack of complementarity to primers or other contaminating sequences, the ability to discriminate between alleles or single nucleotide polymorphisms (SNPs), and use of beacons in multiplexing (multiple primer) reactions.

Program operation is simple. Users supply an accession number for a sequence of interest from either Entrez or dbSNP, and the program downloads it for analysis. Probe design options include specification of primers for SNPs and allele-specific and multiplexing reactions. The program's ability to perform online BLAST sequence similarity searches allows users to identify closely related sequences or potential false-priming sites in a genome. This is an important consideration in eliminating background noise that can interfere with the quantitative abilities of real-time PCR. Beacon Designer 2.0 contains a built-in database for managing projects, and users can also opt to export results to a spreadsheet format.

Beacon Designer 2.0 is fast (takes only about 1 s to analyze a cDNA) and easy to use. A demo version of the software can be downloaded from the Web. The company provides an online multimedia description of the product that provides considerable information about program functions and operation. They also provide free customer support for the lifetime of the product.

Real-time nucleic acid sequence detection instruments typically come bundled with software that supports only the specific technology used on the instrument purchased. Beacon Designer 2.0 is an independent nucleic acid sequence analysis and beacon design software package that is available at a reasonable price. Its many features and flexible design, including the ability to design standard PCR primers, will make it an attractive option for many researchers. **—Alex J. Ryncarz II**

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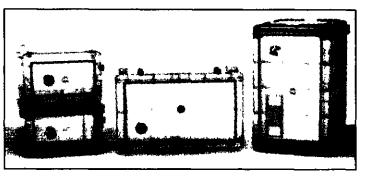

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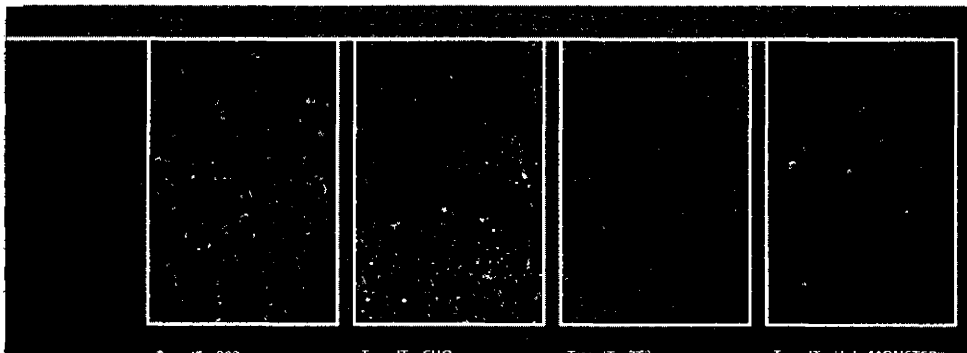

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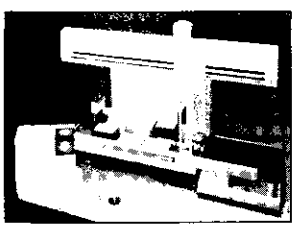

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1) Nat. Biotechnol. **18**, *630-634 (2000)*

2) Proc. Natl. Acad. Sci. USA **97**, *1665-1670 (2000)*

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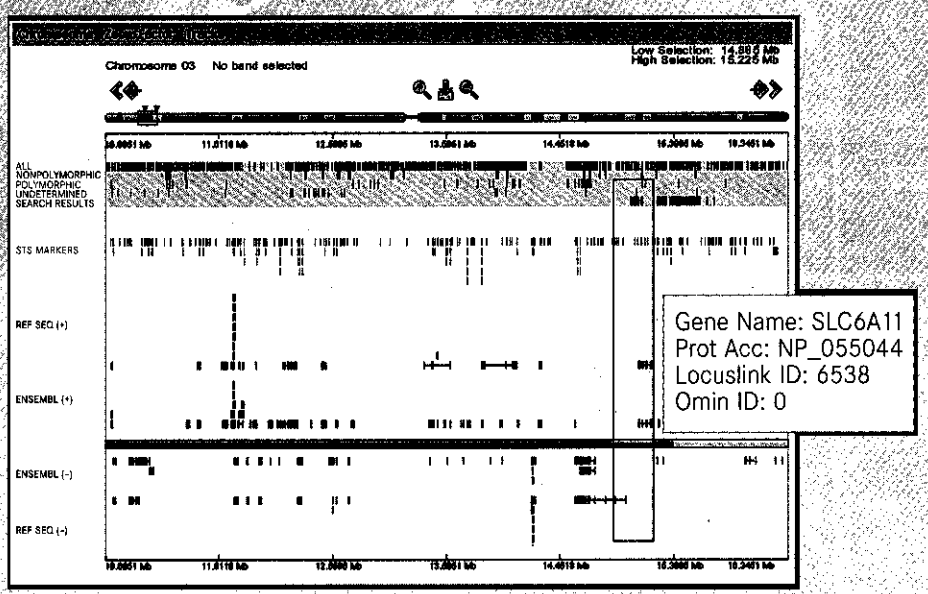

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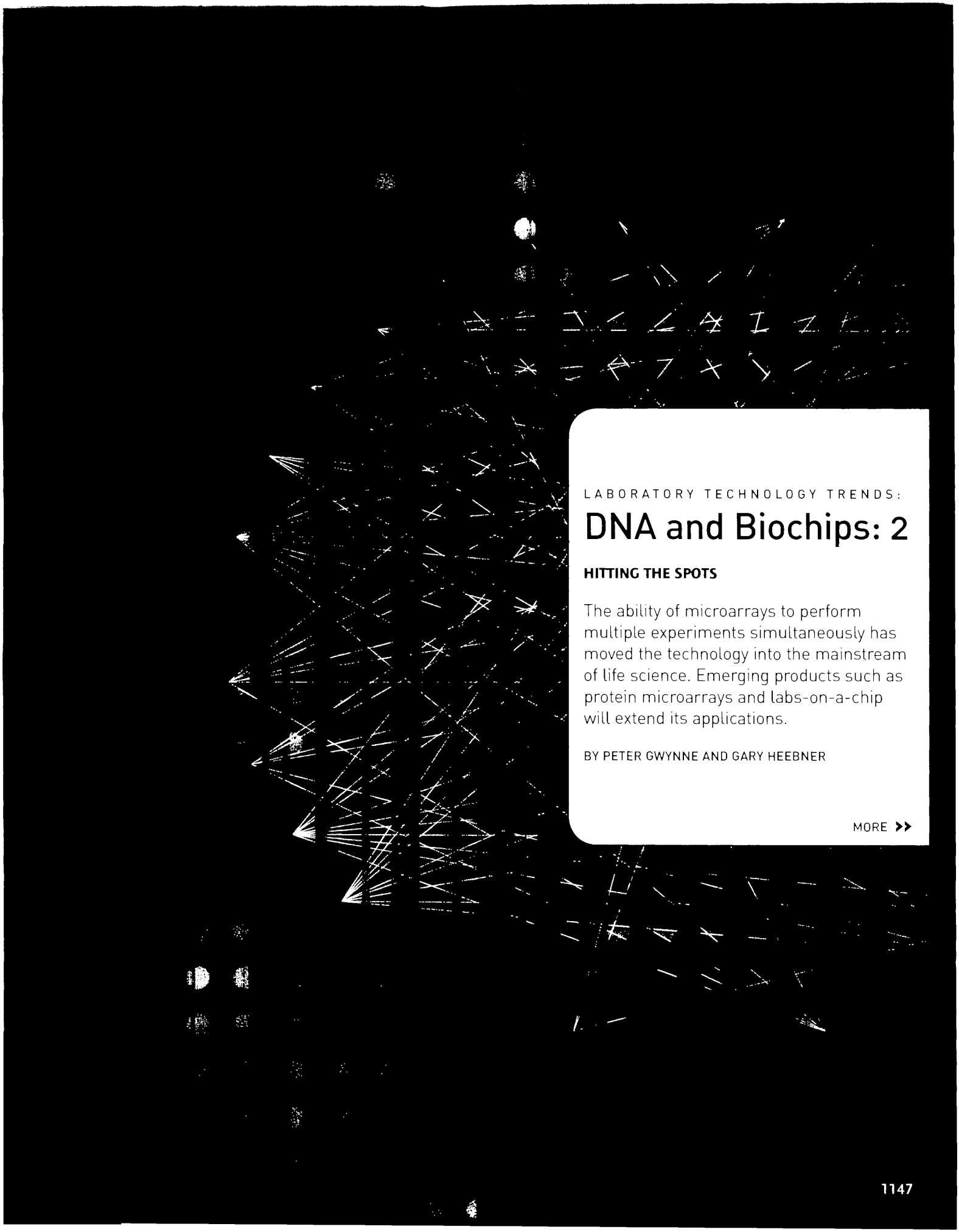

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HITTING THE SPOTS

The ability of microarrays to perform multiple experiments simultaneously has moved the technology into the mainstream of life science. Emerging products such as protein microarrays and labs-on-a-chip will extend its applications.

BY PETER GWYNNE AND GARY HEEBNER

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SECTIONS:

▸▸Once upon a time, in the mid 1990s, most life scientists regarded microarrays as intriguing laboratory curiosities. The ordered arrangements of microminiature spots of genetic material on glass slides or other substrates offered certain practical advantages. But they appeared to have few benefits over the conventional microwell plates in common use.

▸▸That skepticism didn't last long. Today, scientists across the spectrum from academic research groups to pharmaceutical teams involved in drug discovery and development regard microarrays, often known as biochips, as key components of any research lab. "Over the last few years we've seen our technology transition from a scientific novelty to become a fundamental part of any modern biology program," says Stephen Fodor, chairman and CEO of microarray manufacturer **Affymetrix**. "Now that the first draft of the genome is available, researchers will leverage the power of the technology to conduct whole genome experiments to uncover the complexities of important diseases such as cancer." Adds Yuling Luo, chief scientific officer of **GenoSpectra**: "Microarrays are becoming a standard tool in research and in the industry."

▸▸By definition, an array is an ordered arrangement of samples or spots. Scientists can use microwell plates, standard blotting membranes, or slides to set up an array format. They can produce their arrays manually or by using automated robotic systems. The terms "DNA chip" and "DNA microarray" are used interchangeably. DNA microarrays generally contain thousands of spots or features on a single slide. Advances in the technology have consistently reduced the size of the spots, resulting in microarrays that can hold increasing numbers of features on a single slide.

▸▸As a result, the business of firms involved in making and supporting microarrays has boomed. Over the past five years it has matured from a fledgling field to an industry that boasts significant numbers of products and services designed to automate, miniaturize, and virtually mass-produce experiments. The progress shows no signs of faltering. "The microarray business is going to display dynamic growth over the next few years," says Manoj Kenkare, a life science analyst at consulting firm **Frost & Sullivan**. "We estimate the compound annual growth rate to be 58 percent. Our forecasts indicate that the microarray market will reach $1.33 billion per year in 2004." That may be just a start. "If diagnostic tests using biochips become widespread, the market for such products could reach tens of billions of dollars by 2010," predicts Kenkare.

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.*

This is the second of a three-part series. The first part appeared in the 4 January 2002 issue of Science. *The third part will be published in the 18 October issue.*

SOURCES OF GROWTH

The spectacular growth of the microarray business stems from several causes. Most important, the number of users of conventional DNA microarrays has increased as scientists have gained exposure to the technology. "Using microarrays for gene expression is now well accepted, so more products are available," says Wilson Woo, marketing manager for bioresearch solutions at **Agilent Technologies**. "In addition the price is coming down. That makes the technology more available for more scientists."

Vendors have also started to respond to scientists' demands by creating new types of microarray as research teams sequence the genomes of an increasing number of organisms. Michael Kane, vice president for genomics at **Genomic Solutions**, explains that users want more than the conventional microarrays. "We're hearing of more interest in rat, human, *Arabidopsis*, and zebrafish arrays as cDNA libraries or more sequence information come along for the nontraditional areas," he says.

The brave new microarray world accommodates more than DNA microarrays. "One main change is the onset of protein microarraying," says Mark Truesdale, product manager for reagent products at British firm **Genetix**. "The use of proteins or antibodies spotted onto microarray slides has increased in the past year or two." That's hardly surprising, adds William Rich, president of **Ciphergen Biosystems**. The reason: "Almost every biological scientist does proteomics. There's a huge market there."

Technologies loosely related to microarraying have also started to make their mark in research labs. For example, advances in microfluidics – the ability to manipulate minutely small amounts of liquid samples – have facilitated the production of lab-on-a-chip devices and other biochips that can carry out several functions commonly found in the research laboratory. "I think of microfluidics and microarrays as the two major enabling technologies available to the bioscience research community," says Dan Kisner, CEO of **Caliper Technologies**. "The two technologies largely coexist rather than competing." Microfluidics, he adds, "is clearly being established as relevant to research in life science. We're at the beginning of a very big opportunity."

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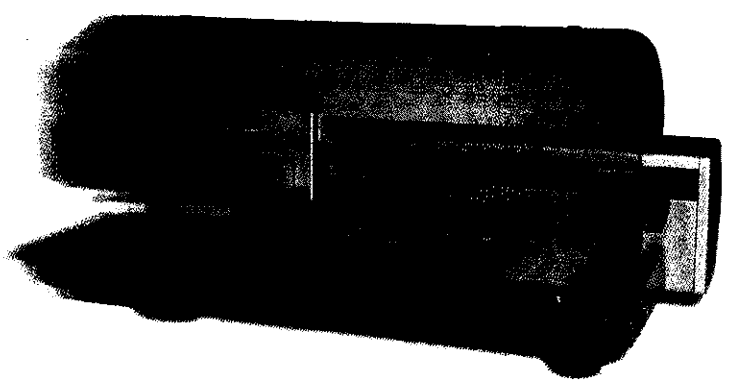

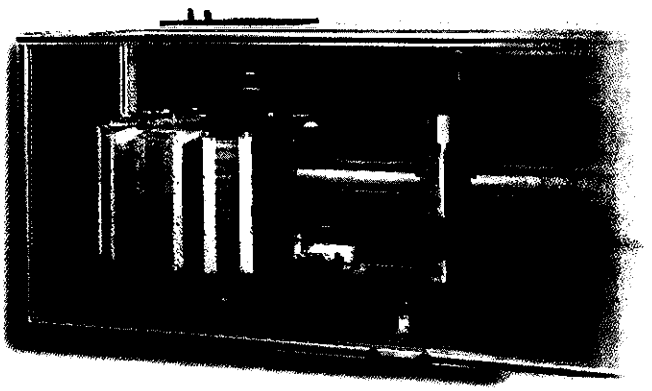

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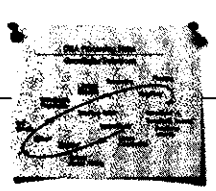

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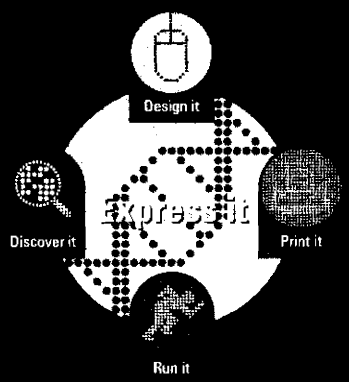

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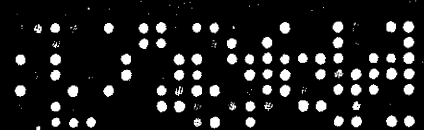

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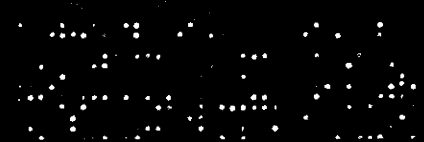

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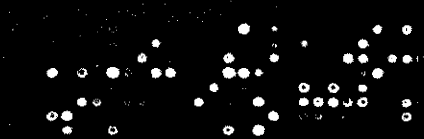

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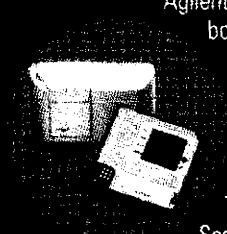

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But even those involved no more than a few hundred genes. Today scientists are adopting microarray products to perform thousands, tens of thousands, and even more mini-experiments in the same tranche. "Our technology allows individual researchers to do whole genome experiments previously reserved only for major organizations," says Affymetrix's Fodor.

Microarrays and related technologies have a multitude of applications. At present, most researchers who use the technology apply it to analysis of gene expression. "This is the predominant application," says Agilent's Woo.

Other uses are following close behind. For example, studies of single nucleotide polymorphisms (SNPs), the natural variations among DNA sequences that can indicate predispositions to certain genetic illnesses, have recently started to benefit from microarrays. "It is possible that newly developed chemistries will allow multiplexed SNP analyses on microarrays or other biochips, making large scale SNP studies of the general public more affordable and therefore more common," says Kenkare of Frost & Sullivan. "A few years from now it won't be unusual for a doctor to do a small SNP profile on a patient to determine the most efficacious and safest drug to prescribe," predicts Kurt Petersen, founder and president of microfluidics company **Cepheid**.

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Biochips have proven their utility in clinical applications as well as diagnostics. "Microarrays have been used to differentiate subcategories of cancers – specifically acute myeloid leukemia and lymphoblastic leukemia, which are difficult to tell apart using standard methods, as well as subclasses of non-Hodgkin's lymphoma," Kenkare continues. "Pathologies that do not manifest themselves as distinct, gross abnormalities can be more easily detected and characterized by studying their gene expression profiles on a large scale. Cancers are particularly conducive to gene expression studies because their processes are so drastically aberrant."

AREAS OF APPLICATION

The technology has great potential for use in drug development. "One of the targets is big pharmas' toxicology studies," says Roland Green, vice president and chief technology officer of microarray manufacturer **NimbleGen**. "They screen a lot of compounds for toxicity only in animal trials. We're developing microarrays with effective toxic assaying that would identify toxic compounds well before the animal trials." By identifying toxic compounds as early as possible, that facility has the potential to save pharmaceutical developers the costs of further developing drug candidates that will prove fruitless.

Pharmacogenomics also stands to benefit from biochips. Defects in certain genes are associated with adverse reactions to commonly prescribed drugs. Current tests for those genes are expensive. Kenkare foresees microarrays becoming inexpensive enough to present an effective alternative means of testing.

The events of last September 11 have brought another potential application of biochips to the fore. "About a quarter of our business is in biothreat defense," says Cepheid's Petersen. "We're seeing a speeding up of work in this area."

Microarrays' uses don't end with human medical practice. Affymetrix launched the first *Arabidopsis thaliana* plant microarray nearly one year ago. Agilent and **Paradigm Genetics** recently announced that they will commercialize their first *Arabidopsis* genome microarray. "Our customers will be large agricultural and agrochemical companies and smaller agricultural biotechnology companies, as well as academic and nonprofit research institutions," forecasts John Hamer, Paradigm's chief scientific officer.

That spectrum of uses illustrates the diversity of microarrays and related technologies. "The beauty of microarraying," says Truesdale of Genetix, "is that you can adapt the technology to a lot of different applications."

FISHING TRIPS AND BEYOND

As applications of microarrays have expanded, so has the nature of users' demands. Scientists who originally used the technology to gain broad-brush understanding of complete genomes now want their arrays to provide answers to more focused questions. "The early adopters planned to use high-density arrays for fishing trips and follow on with more specific arrays," says Kane of Genomic Solutions. "Current users don't want the fishing trips. They want the focused array for what they're working on, with information on the genes that the array contains in the software."

NimbleGen's Green makes a similar point in the pharmaceutical context. "We see two types of arrays that depend on the exact application that the pharmas are looking for," he says. "The first is for fishing expeditions looking for leads in which you need genomewide scans. But once you've found your target you'll want a subset of genes on smaller arrays. Arrays available now tend to be of the throughput and density to support the fishing expeditions. What the market needs is a low-cost, high throughput miniarray."

Scientists have made microarray manufacturers fully aware of their changing needs. "Most of our customers are doing genome scanning, screening microarrays with more than 10,000 genes in them," says Agilent's Woo. "Once they find what they need, they start to narrow down. Other users know what specific genes they want to explore."

Affymetrix's Fodor offers a different perspective. "There's a lot of interest in focused and custom chips," he says. But he notes that the focused work is in an early stage at present. "The absolute magnitude of those studies is much lower than what people are doing at the whole genome level," he says. "In general the market is still very much in the whole genome space. There is still so much more to be learned about the genome as a system."

CUSTOM SERVICES

Large manufacturers of off-the-shelf microarrays have responded to the demand by setting up custom operations. Affymetrix, for example, made its GeneChip CustomExpress service generally available last November; previously it had manufactured custom chips for only a few large pharmaceutical

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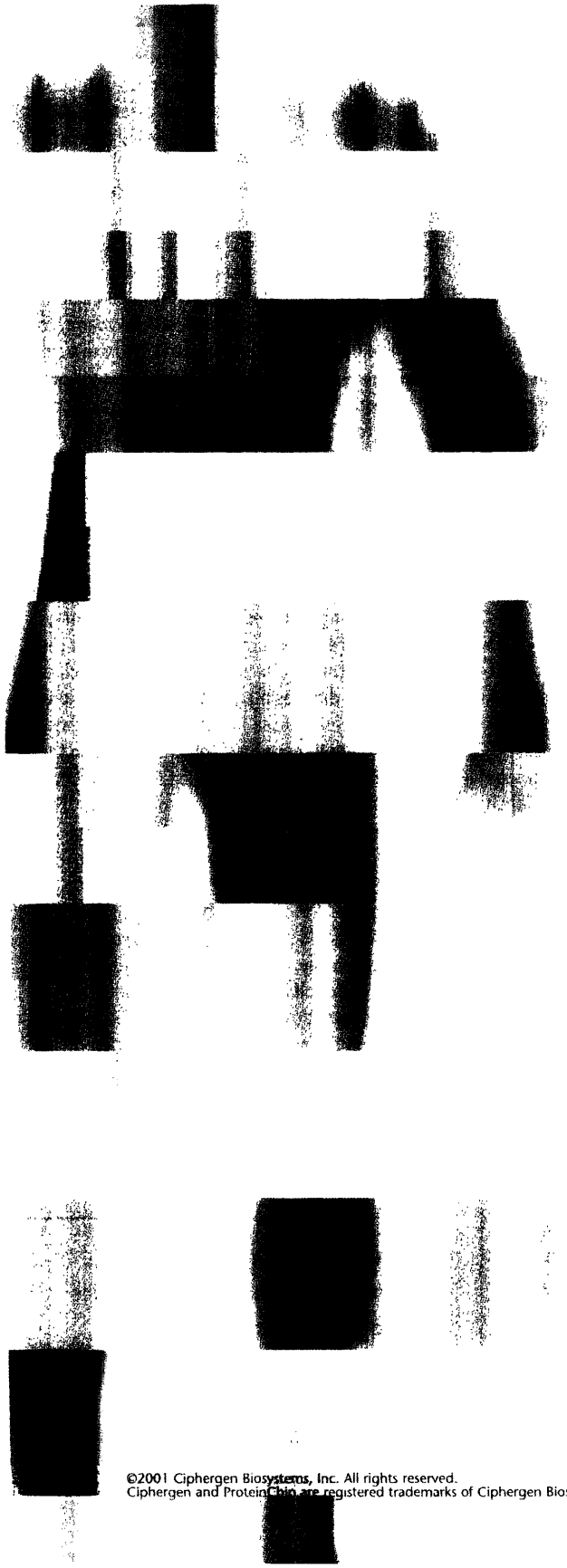

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companies. Agilent also offers customizing. "The client comes with a set of genes or sequences and asks us to design an array based on them," Woo explains. "We believe there is strong market potential in customizing the narrow type of microarray."

Custom microarrays produced by specialist fabricators of biochips should help to overcome a potential problem in the industry: the lack of comparability among microarray experiments in different laboratories. "In the short term we think the market needs a high quality format system that will expand the market," says Ralph Sinibaldi, GenoSpectra's vice president for product development. "People producing their own chips need a high quality open format."

Another industry trend appeals to researchers who want to carry out their microarraying quickly and painlessly. Increasing numbers of suppliers offer complete ranges of services for microarray work. They will help design microarrays, conduct research, or analyze experimental data. "Customers who want to contract out their microarray work send us their DNA," explains Truesdale of Genetix. "We spot it out and send them the glass slides. Alternatively we can hybridize their chips from the RNA samples." Other companies that offer microarraying services include **Cellomics**, Genomic Solutions, and **Operon Technologies**.

Simplicity of operation has emerged as a major theme of all vendors involved in microarrays and related technologies. "We make our systems for naïve users – technicians in a hospital and assistants in a medical office rather than skilled microbiologists," says Petersen of microfluidics firm Cepheid.

METHODS OF MANUFACTURE

The starting point for making any microarray is the deposition of the gene sequence or other material onto the substrate. Array makers use two main methods: spotting and photolithography.

To create spotted microarrays, scientists use robotics that accurately place each spot on a slide and control the volume of sample deposited in each spot. Developed by the Pat Brown and Ron Davis laboratory at **Stanford University**, spotting has become a common means of making arrays. Several companies, including **Amersham Biosciences**, **Clontech**, Genomic Solutions, and Operon use the method to produce premade arrays. Those arrays help researchers to avoid the purchase of expensive microarrayers and to skip the training required to use them. The list of molecular biology companies that offer some form of ready-to-use DNA macro- or microarrays has grown significantly in the last several years.

Spotting can also be accomplished with ink-jet methods, such as those that Agilent and **Packard BioScience** use for conventional printing. This method produces an array similar to those based on the Brown and Davis laboratory's methods.

The other production technique uses sophisticated photolithographic methods to create DNA microarrays. Affymetrix pioneered this approach in the early 1990s, producing very high-density DNA microarrays via a patented technique similar to the process used in fabricating semiconductor chips. In doing so the company created the market for ready-to-use DNA microarrays. As the market has grown since then, so has the density of microarrays. "For every spot in our original microarrays there are 500 commercial spots now," says Fodor. The company's latest offering: the GeneChip Human Genome U133 set that gives researchers access to the most comprehensive, up-to-date version of the human genome sequence available on a microarray platform.

NimbleGen has joined the market recently with a different type of production technique, developed and patented by the University of Wisconsin. This so-called "maskless" array production process uses computer-controlled micromirrors to control photolithographic-based chemical synthesis on the microarray substrate. The micromirrors can change the features or spots on the microarray without the costly, time-consuming process of creating a new photolithographic mask. "Our major strength is our ability to design custom arrays in very short time," says Green.

Another newcomer to the market, GenoSpectra, uses proprietary fiber optic technology to deposit offline synthesized oligonucleotides on the microarray in a massively parallel fashion with simultaneous machine vision-based quality control. "That gives us better control of the quality," says chief technology officer Steve Chen. "It also gives us high throughput. And we can upgrade our chips very quickly."

TWO FUNDAMENTAL FORMATS

DNA arrays come in two fundamental formats. One uses probes of the DNA sequences known as oligonucleotides while the other uses complementary DNA (cDNA) probes.

Oligonucleotides can be synthesized either in place on the chip or by conventional DNA synthesis techniques for later application to the slide's surface. The microarray that results is then exposed to sample labeled DNA and hybridized, allowing complementary sequences to attach to their counterparts on the surface. Affymetrix uses this process to produce its GeneChip arrays, intended to determine the DNA sequence in a sample. Agilent, Genomic Solutions, and NimbleGen also offer DNA arrays with oligonucleotide probes.

To create cDNA, scientists apply reverse transcriptase to messenger RNA (mRNA). The probes can also be spotted onto a solid surface such as a membrane or glass slide using robotics, according to the basic method developed by Brown's and Davis's laboratory. Researchers use this type of microarray to determine the level of expression that occurs in a cell by measuring the amount of mRNA that the cell produces at any given moment. The chips contain specific sets of DNA sequences known to give rise to the mRNA of interest. Producers of cDNA chips include Agilent, **Ambion**, Genomic Solutions, **Invitrogen**, and **Sigma-Genosys**. Several manufacturers specialize in one particular area of research, such as cancer or heart disease.

Researchers in academic and industrial labs have increasingly turned to chips or microarrays based on SNPs. These promise to help discover the genes that cause disease. They have particular potential in diagnosing conditions such as diabetes and heart disease in which several different genetic variations each have some influence on the disease. Physicians could also use SNP chips to tailor treatment to a patient's genetic makeup. The chips could additionally find use in predicting a patient's drug response. That would reduce the potential for the adverse drug reactions that cause more than 50,000 deaths annually.

SNP chips could someday become powerful diagnostic tools in the emerging field of personalized medicine. To exploit and develop SNPs' potential, 10 large pharmaceutical companies have formed the **SNP Consortium**. This nonprofit organization has the goal of identifying SNPs. The current release of the consortium's database consists of 1,034,034 SNPs. The consortium has made this information public to prevent other companies from patenting the SNPs before their functions are known.

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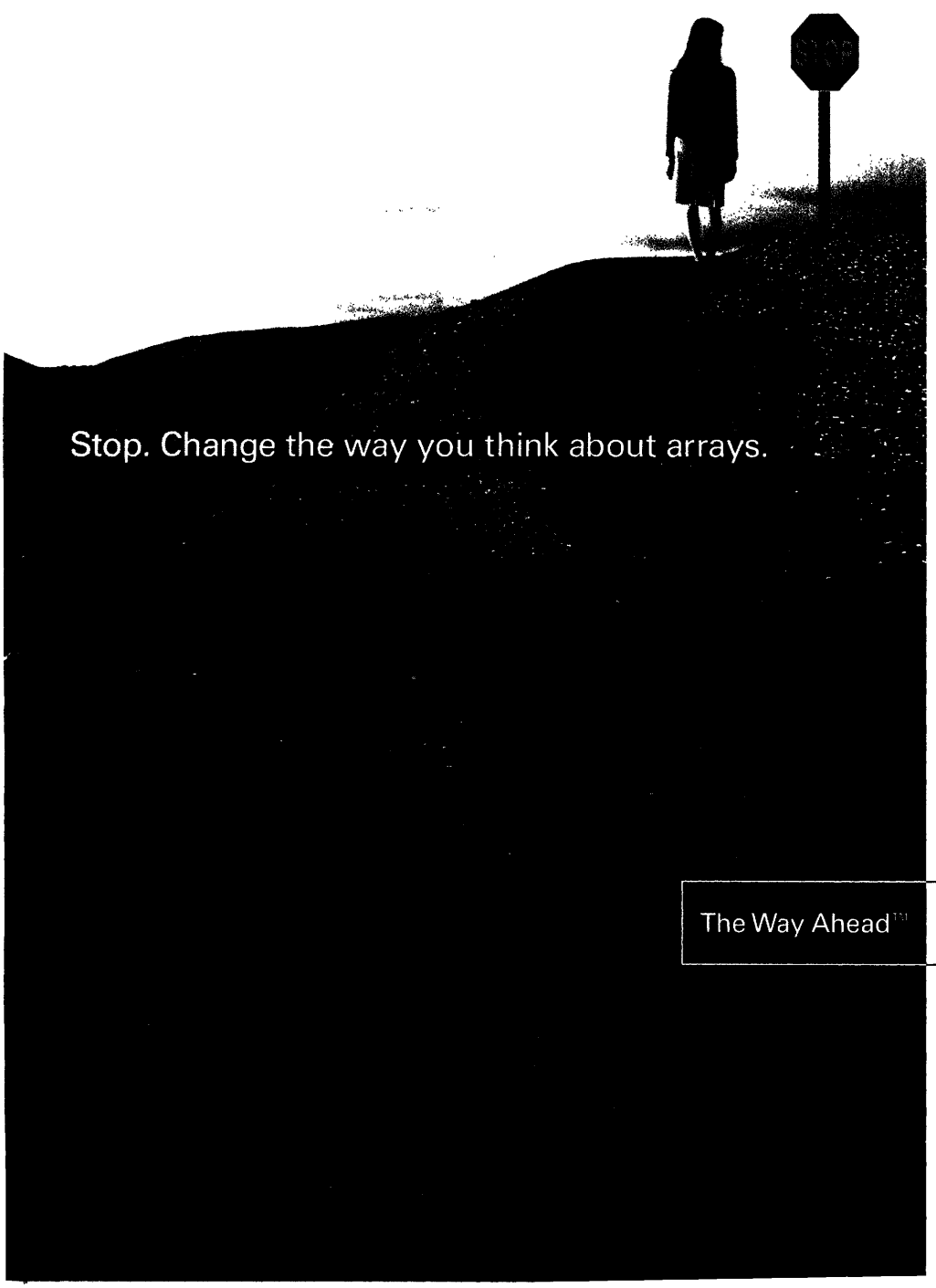

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DETECTION AND INTERPRETATION

To determine the results of a DNA microarray experiment, scientists must detect the signals emitted by the array. The specific method of detection depends on the type of label used for an experiment. Common tagging methods include fluorescent, radioactive, and enzymatic techniques. Affymetrix, Agilent, **Axon Instruments**, Genomic Solutions, **Hitachi Genetic Systems**, **PerkinElmer Life Sciences**, and other firms offer systems that detect signals created by each of these approaches.

To detect fluorescent labels, scientists rely on confocal laser scanners specifically designed for use with DNA microarrays. The scanners often include software that can analyze and interpret the data. They can eliminate unwanted background fluorescence by limiting the locations from which they pick up signals to those above the plane of the array where the substrate is located. That minimizes detection of stray fluorescent signals from the substrate, dust particles, or the slide itself. Vendors in this area concentrate, among other things, on reducing the prices of their instruments. "This year we have a new two-color microarray scanner that costs much less than its predecessor," says Kane of Genomic Solutions.

Radioactive labels can be imaged with a phosphorimager or – much less glamorous but still effective – autoradiography film. The most common radiolabels for this procedure are ^{32}P and ^{33}P. The former produces a stronger signal and costs less while the latter can be used over a greater range. Radiolabels are most often used with nylon membrane macroarrays, such as those offered by Clontech.

Scientists can also apply enzymatic detection to nylon membrane macroarrays. They need simply to use a spectrophotometer or visual inspection to determine what's on the membrane when the experiment ends. **Azign Bioscience** and **Genzyme** carry systems for enzymatic detection – a method that is significantly less common than fluorescent labeling and radioisotopes.

Having completed their experiments, scientists must interpret the results. At this point they face a problem of volume. DNA microarrays, replete with thousands of samples or spots, can produce huge amounts of data. Storing and analyzing the data can cause a serious bottleneck in laboratory research. Some researchers aim to get around the difficulty by performing array experiments first with large comprehensive chips and then down-sizing their research efforts by focusing on a specific family of genes. "More and more companies are generating libraries specific to a target tissue, feeding the focused array approach," says Kane of Genomic Solutions.

PROTEIN PROBLEMS ...

While cDNA microarrays can measure the levels of mRNA expressed in a cell, they can't yield direct measures of either the proteins produced by these messengers or protein functionality. Protein chips on the other hand can directly measure both the relative level of proteins and their interactions with other molecules. Companies that have entered the protein chip business include Ciphergen, **Large Scale Proteomics**, Packard BioScience and **Phylos**. They are betting that proteomics will emerge as the next wave of research in basic life science and drug discovery.

The principle that underlies protein microarrays is simple. When the protein microarray is exposed to a mixture of other proteins, molecules that naturally interact with the proteins fixed on a slide bind to the protein probes. The proteins bound to the probes can be labeled and visualized in much the same way as the gene sequences in DNA microarrays. Molecules with strong affinities to the probes represent good candidates for leads in drug discovery, because a drug must bind to its target to be effective.

Making a protein biochip is technically much more challenging than making a DNA chip, however. Proteins are far less stable than DNA. They tend to be bioactive only when in their native state with the correct three-dimensional structure. Changes in pH, temperature, or the ionic strength of a solution can cause native proteins to change shape and denature, rendering them inactive. "DNA is such a wonderful molecule to deal with; the affinity of one DNA for its partner is exquisite. So you have a wonderful system for microarraying with optical detection," says Ciphergen's Rich. "Proteins by contrast are nasty little guys. They don't have exquisite affinity and they travel in complexes of proteins. And they don't tag easily. If you tag them you change them from their native state. So they are very difficult to analyze."

...AND SOLUTIONS

To meet the challenge of protein instability, Rich says, "We let the customer put the proteins on fresh. That avoids storage problems." The difficulties don't stop there, though. "In genomic parlance microarrays refer to thousands of elements," he continues. "In proteomics there's tremendous difficulty in getting accurate data from that number. You'll probably see the evolution of lower density arrays in the protein field. We have attacked that detection problem by using surface enhanced laser desorption/ionization (SELDI) mass spectrometry techniques. This gives us very high specificity of detection."

Protein microarrays have only just begun to make an impact on the life science community. "It's an emerging area that's not very significant yet," says Woo of Agilent. Certainly several companies have invested heavily in protein biochips, viewing them as the tools that will enable rapid progress in the study of proteomics. But the supply situation is fluid at best. Rich likens it to the situation in the mid 1920s when the United States had 50 automobile manufacturers – a number that fell to a handful within 15 years. His advice to clients: "You have to be technology-agnostic, know what problems are out there, and work on the best ways to solve them."

Whatever the fate of individual protein microarray companies, it is clear that, for scientists, the days of studying proteins one at a time have long passed. Protein microarrays will permit researchers routinely to study families of proteins in their efforts to understand the complex interactions of protein systems inside cells.

'SEXY STATE OF THE ART'

Protein microarrays represent just one thrust in the commercialization of miniaturization technology. Another wave now under way involves the manipulation of small sample volumes in automated systems. Several companies have started work on microarrays that prepare samples and then conduct experiments on the same chip. Biochips are beginning to appear on the market for high throughput screening, flow cytometry, thermal cycling, and sample preparation. "Sample preparation is a big problem," explains Cepheid's Petersen. "As microarray systems get more popular we feel that there's going to be a big need to make it easier for scientists to use them by automating sample preparation."

Cepheid has developed a micromachined, microfluidic technology that creates high surface areas on silicon substrates. The structures can be designed to create channels or arrays that allow controlled fluid flow and liquid-surface interactions. Chips made this way have internal volumes no more than several microliters. They collect DNA and concentrate it into smaller volumes, permitting sample preparation on a microarray scale.

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Microfluidics technology also enables DNA amplification and detection to complement DNA microarrays. "Microarrays themselves don't do a very good job in quantitation," Petersen says. "So we find a lot of people wanting to buy real-time PCR systems to do quantitation of the targets after they've done their microarray experiments. In addition microfluidics is a very sexy state of the art – complex technology that is very interesting and will have a big impact." Cepheid's first product, the Smart Cycler System, carries out PCR with real-time optical detection. A product under development, called GeneExpert, will perform sample preparation and other functions.

LABS ON CHIPS AND CDS

Another emerging technology based on microfluidics involves building microminiature laboratories on chips. "Some of the tasks that scientists can do on microarrays can also be done with labs-on-a-chip technology," says Caliper's Kisner. "There are some examples of potential synergy using lab-on-a-chip devices as up-front tools for arrays. For instance, with Agilent we sell an RNA analysis chip that has become the standard quality control test for specimens going onto a DNA array."

In fact only a few stand-alone lab-on-a-chip products have reached the market so far. However, scientists recognize that this type of tool holds great promise to miniaturize and automate routine research applications. Some products perform variations of electrophoretic separation via capillary electrophoresis. Caliper and Agilent sell a flow cytometry chip that runs on the Agilent 2100 Bioanalyzer. Companies such as **Micronics** and **Vitae** are developing microfluidic chips that resemble flow cytometers, for studying cells. Firms such as **Aclara,** Agilent, and Caliper are working on high throughput screening (HTS) systems to help increase productivity in the lab. "Last September we launched the Caliper 250, an HTS system for screening chemical libraries against therapeutic targets," says Kisner. "The system is capable of screening tens of thousands of experiments per chip, using nanoliters of reagents. It uses continuous flow sipper chip technology to access the libraries out of 384-well plates."

Caliper also has a program to make customized microfluidic chips. Here, the company has five ongoing collaborations inside and outside life science. Caliper, together with Agilent, offered its first product line, the Agilent 2100 Bioanalyzer, in 1999. It runs a menu of applications commonly used in drug discovery laboratories, including RNA analysis, DNA sizing and quantitation, protein analysis, and cell fluorescence.

Lab-on-a-chip products will make it possible for researchers to move minute amounts of fluids in microscale channels on integrated microfluidic devices. That will enable a range of techniques from biochemical reactions to cell based assays on a microscale, opening the prospect of having all the assays routinely performed in a biochemistry laboratory available on a microchip.

Microfluidics isn't restricted to labs-on-a-chip. Several companies, including **Burstein Technologies**, **Gyros AB**, and **Tecan** are developing microfluidic devices on compact discs (CDs). Swedish firm **Åmic AB** provides fabrication services for this type of CD and other microsystems. "We are making high precision masks in combination with replication techniques," says Ove Öhman, Åmic's executive vice president. "We have a platform of techniques that can manufacture cost-effective, high-parallel, high-function devices. We can complement arrays and in some cases add on to arrays."

ENTICING PROSPECTS

The most enticing prospect for microarrays and similar technologies is the promise they offer in therapeutic applications that range from genotyping to determining drug resistance in patients. Companies such as **DNA Sciences**, **Genaissance**, and **Myriad Genetics** have already started to work with patients' samples to correlate SNPs to diseases and drug responses.

Sequenom uses a novel population genetics approach with disease related genes. The company aims to identify potential disease related genes that affect the most significant portions of the overall population. It bases its approach on its MassARRAY system, a powerful high throughput screening technology. "We use a mass spectrometer that analyzes naked DNA," explains Toni Schuh, Sequenom's CEO. "We claim that our system is the most powerful genetic discovery platform. We have already converted more than 1.9 million SNPs into assays. That's a dramatic advance; you can use a SNP only when you have an assay for it. Of that number 400,000 are actually available in our refrigerators."

To date the company has sold more than 66 MassARRAY systems. "Large pharmas and major players in sequencing the human genome, such as the National Institutes of Health, the Sanger Centre, and the Whitehead Institute, are using our systems," says Schuh. By focusing on disease genes with a broad population impact, Sequenom expects to play a critical role in bringing new therapeutic products to the market while maximizing the return on drug development.

Affymetrix, meanwhile, has formed **Perlegen Sciences** to leverage its technical capability toward new developments in this rapidly growing market. Perlegen will leverage the latest Affymetrix technology to scan entire genomes at single base resolution to discover patterns of variation between individuals that can be used to find the genetic basis of health, disease, and drug response. Perlegen uses whole wafer technology containing up to 60 million probes to scan through chromosomes and identify common variations among individuals. The information processing power of the wafers enables the company to identify patterns of SNPs rather than individual SNPs, and to understand how these patterns, or haplotypes, relate to various human conditions.

What will come next in the microarray world? "In expression, we now see customers using the technology downstream in the clinical aspects of drug efficacy and development. However, in the long term, we will see a major thrust into the study of human diversity and its relationship to expression profiling," forecasts Fodor of Affymetrix. "That's an area in which a few big projects will have to teach scientists how to use the technology."

Ciphergen's Rich sees proteomics as the wave of the future. "You can always expect the unexpected," he says. "But the trend will be toward tagless detection; tagging is such a perturbing element to proteins. One other area is probably most important: Proteomics presents huge problems in protein fractionation and purification. If you could rapidly fractionate any subset of proteins you wanted, you would have the equivalent of protein PCR."

Woo, from Agilent, looks at the broad picture. "More people in the medical field will use microarray technology to understand diseases," he predicts. "The technology also has potential in toxicology and clinical trials. The price of microarrays will continue to come down, and more companies will collaborate to put out new applications. There's a general push to establish a more acceptable industry standard and data formats. We'll see the market mature and a few small companies survive in the market among the big corporations. And we're beginning to see the market become more standardized."

Peter Gwynne is a freelance science writer based on Cape Cod, Massachusetts, U.S.A. Gary Heebner is a marketing consultant serving the scientific industry, based in Foristell, Missouri, U.S.A.

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www.amershambiosciences.com

Åmic AB
lab-on-a-CD fabrication
www.amic.se

Axon Instruments, Inc.
microarray readers
www.axon.com

Azign Bioscience A/S
enzymatic detection kits
www.azign.com

Burstein Technologies, Inc.
lab-on-a-CD
www.bursteinlabs.com

Caliper Technologies
microfluidic chips
www.calipertech.com

Cellomics, Inc.
microarray services
www.cellomics.com

Cepheid
microfluidic chips
www.cepheid.com

Ciphergen Biosystems, Inc.
protein microarrays
www.ciphergen.com

Clontech Laboratories
microarrays
www.clontech.com

DNA Sciences, Inc.
SNP analysis
www.dna.com

Frost & Sullivan
market research
www.frost.com

Genaissance Pharmaceuticals, Inc.
SNP analysis
www.genaissance.com

Genetix, Ltd.
DNA microarrays
www.genetix.co.uk

Genomic Solutions
DNA microarray systems
www.genomicsolutions.com

GenoSpectra, Inc.
microarrays
www.genospectra.com

Genzyme Corporation
enzymatic detection kits
www.genzyme.com

Gyros AB
lab-on-a-CD
www.gyrosmicro.com

Hitachi Genetic Systems
microarray detection systems
www.hitachi-soft.com/gs

Invitrogen Corporation
DNA microarrays
www.invitrogen.com

Large Scale Proteomics
protein chips
www.lsbc.com

Micronics
microfluidic chips
www.micronics.net

Myriad Genetics, Inc.
SNP analysis
www.myriad.com

NimbleGen Systems, Inc.
DNA microarray systems
www.nimblegen.com

Operon Technologies – A Qiagen Company
microarray services
www.operon.com

Packard BioScience Company
microarray spotting instruments
www.packardbioscience.com

Paradigm Genetics
biotechnology/drug discovery
www.paradigmgenetics.com

PerkinElmer Life Sciences
microarray detection systems
www.perkinelmer.com

Perlegen Sciences, Inc.
SNP analysis
www.perlegen.com

Phylos, Inc.
biotechnology
www.phylos.com

Sequenom, Inc.
SNP analysis
www.sequenom.com

Sigma-Genosys
DNA microarrays
www.sigma-aldrich.com

SNP Consortium, Ltd.
scientific organization
www.snp.cshl.org

Stanford University – Pat Brown and Ron Davis Laboratory
spotted microarrays techniques
cmgm.stanford.edu/pbrown

Tecan
lab-on-a-CD
www.tecan.com

Vitae, LLC
microfluidic chips
www.vitaellc.com

POSITIONS OPEN

FACULTY POSITIONS
Neurobiology in Biomedical Engineering
University of Rochester

Applications are invited for tenure-track **ASSISTANT/ASSOCIATE PROFESSOR** positions within an extensive multidisciplinary neuroscience and biomedical engineering (BME) community. Applicants should have a Ph.D. and/or M.D. with training in both engineering and cellular neuroscience and should have established an independent research program. Particular areas of research interest include neural tissue engineering, sensory and motor cellular neuroscience, and neural prosthetics. Successful candidates will form a productive, independent, and externally supported research laboratory and will also lead the establishment of a multidisciplinary focus connecting cellular engineering with neuroscience within the BME program. Participation in teaching activities in both the BME and neuroscience programs is expected. Competitive start-up packages are included. Salary is commensurate with rank and experience. Appointments may begin as early as July 2002. Applications including curriculum vitae, statement of career goals, at least three letters of recommendation, and several publications should be sent to: **Richard E. Waugh, Chair, Department of Biomedical Engineering, University of Rochester, 601 Elmwood Avenue, Box 639, Rochester, NY 14642**. *The University of Rochester is an Equal Opportunity/Affirmative Action Employer.*

FULL OR ASSOCIATE PROFESSOR
Emory University

Emory University School of Medicine, Department of Physiology, currently has an opportunity for a Full or Associate Professor with tenure in the area of regulation of membrane proteins and transport. Individuals should have a Ph.D. and/or M.D. degree; several years of faculty experience; and a strong record of publications, research funding, and teaching. Applicants with interests in membrane protein genetics, gene regulation, cell signaling pathways, and trafficking of membrane proteins are encouraged to apply. Application review will begin May 1, 2002, and continue until position is filled. Send application, curriculum vitae, description of research program and interests, and names of three references to: **Dr. Robert B. Gunn, Chairman, Department of Physiology, Emory University School of Medicine, Whitehead Biomedical Research Building, Suite 601, 615 Michael Street, Atlanta, GA 30322-3110. Website: http://www.emory.edu**. Please reference Job Code Number 133994 when applying. *Emory University is an Affirmative Action/Equal Opportunity Employer.*

A cancer research laboratory is seeking a self-motivated and creative **PH.D.** and/or **M.D. FELLOW** with expertise in immunology, especially in mechanisms of immune suppression/tolerance, immune activation by costimulation, or gene array analysis. The candidate will participate in an exciting research program in immune-modulated cancer therapy. Apply with updated curriculum vitae and bibliography plus three letters of recommendation sent directly to: **Dr. Shu-Hsia Chen, Carl C. Icahn Institute for Gene Therapy and Molecular Medicine, P.O. Box 1496, Mount Sinai School of Medicine, New York, NY 10029. FAX: 212-803-6740; e-mail: chens01@doc.mssm.edu.**

The Kansas City area Life Sciences Institute, Inc., in Kansas City, Missouri, is seeking a **DIRECTOR, PROGRAM DEVELOPMENT**, to promote the advancement of life sciences initiatives among eight regional institutions. Ph.D. in biorelated field required. Send curriculum vitae and statement of research interests to: **Human Resources, KCALSI, 4520 Main Street, Suite 935, Kansas City, MO 64111**. Salary is commensurate with experience. *KCALSI is an Equal Opportunity Employer.*

POSITIONS OPEN

Department of Medicine and the Center of Excellence at the University of Tennessee Health Science Center, Memphis, Tennessee, are seeking two to three Rheumatologists to fill tenure-track faculty positions at the level of **ASSISTANT, ASSOCIATE,** or **PROFESSOR**. Successful applicants are expected to develop an independent clinical or basic research program in areas related to rheumatic or bone diseases and participate as members of The Connective Tissue Research Group, an internationally recognized, multidisciplinary research group at the University of Tennessee Health Science Center.

Interested persons should contact:

Arnold Postlethwaite, M.D.
University of Tennessee Health Science Center
College of Medicine
Department of Medicine
Division of Rheumatology
956 Court Avenue, Suite G326
Memphis, TN 38163
Telephone: 901-448-3344
FAX: 901-448-7265
E-mail: apostlethwai@utmem.edu

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JUNIOR FACULTY POSITION (ASSISTANT PROFESSOR)
Vascular Research Division
Department of Pathology
Brigham and Women's Hospital
Harvard Medical School, Boston, Massachusetts

Seeking applicants for a Junior Faculty position (Assistant Professor, tenure-track appointment) to develop independent research program in the Vascular Research Division, Department of Pathology, Brigham and Women's Hospital, and to interact as a staff member in the Center for Excellence in Vascular Biology, Brigham and Women's Hospital. Prefer interest/expertise in genomic/functional proteomics approaches to characterize phenotypic modulation of vascular cells in health and disease. Opportunity to teach. M.D., Ph.D., or M.D./Ph.D. required. Please send curriculum vitae and brief statement of proposed research program to:

Denisa D. Wagner, Ph.D.
Chair, Search Committee
The Center for Blood Research
Harvard Medical School
800 Huntington Avenue
Boston, MA 02115

Equal Opportunity/Affirmative Action Employer. Women and minority candidates are encouraged to apply.

ASSISTANT PROFESSOR
Neural Development

Assistant Professor position in the Department of Anatomy and Neurobiology at Boston University School of Medicine available beginning 2002 or 2003 for a Neuroscientist who uses molecular techniques to study the development of the mammalian central nervous system. The ideal candidate will also have expertise in electron microscopy and the ability to contribute to team-taught medical school courses in histology, gross anatomy, or neuroanatomy. For current information about the Department, see **website: http://www.bu.ed/anatneuro**. Send curriculum vitae, names of three references, up to three reprints, and a statement of how your research might complement existing faculty interests and departmental programs to:

Dr. Julie Sandell
Department of Anatomy and Neurobiology
715 Albany Street
Boston, MA 02118
E-mail: jsandell@bu.edu

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Discover the Future with Incyte.

Incyte is looking for Scientists to staff our new facilities in Newark, Delaware.

For more than a decade, Incyte has laid the groundwork for drug discovery by creating the world's most extensive databases of novel content. We have the largest collection of full-length genes anchored to the genome and linked to comprehensive expression, annotation, and genetic information for researchers looking for novel molecular approaches to disease prevention. You will have access to our superior technology and the richest portfolio of patents and applications in the world. Incyte will lead the way to the future by leveraging its genomic information to discover cures for the diseases that afflict humanity. We are recruiting personnel to take us to the next step — the conversion of our proprietary genes and information into drug candidates.

Staff Scientists

We have several immediate openings in our drug discovery group to assist with assay development and target validation. You must have a BS/MS degree and experience in cell biology, mammalian cell culture and *in vitro* techniques including ELISAs, Westerns, receptor binding assays and FACS analysis. A background in inflammation/immunology or oncology and some industry experience are preferred. Excellent computer skills and the ability to work in a team-oriented environment are essential. Job Code: CG6024PS

Staff Scientists

We have several opportunities for BS/MS-level biologists to join our drug discovery team. Qualified candidates will have broad technical experience in mammalian molecular/cell biology, and demonstrated critical thinking and organizational skills. Specific experience should include: DNA and RNA manipulations; cloning; design and construction of recombinant cDNAs for new target implementation; mammalian cell line construction; radiolabeling methods; PCR methodologies; site-directed mutagenesis protocols; immunoprecipitation; and immunofluorescence methods. A BS/MS degree in Biology with at least 3 years of experience in the areas of inflammation and cancer are preferred. Job Code: CG6023KS

Research Scientists/Senior Research Scientists

We have several immediate openings in the discovery biology group for PhD-level biologists. Candidates will be responsible for the identification and characterization of novel drug discovery targets in inflammation and oncology. Expertise in cell biology with an emphasis on receptor pharmacology or signal transduction is preferred. Effective communication skills, some supervisory experience and the ability to work in a team-oriented environment are required. Job Code: CG6050PS

Senior/Principal Research Scientist

We have an immediate opening for a scientist with expertise in G-protein coupled receptor biology/pharmacology. You will be responsible for assay development, analysis of receptor/ligand interaction pharmacology and definition of agonist/antagonist interactions with receptors. The candidate must have a PhD with a minimum of 2 years postdoctoral training in cellular, molecular or biochemical biology. Experience in receptor pharmacology, membrane isolation and receptor reconstitution is preferred, as are computer skills of sufficient depth to provide expertise in analyzing ligand-receptor interactions. Job Code: CG6051BN

Senior/Principal Research Scientists

We have immediate openings for PhD-level biologists to join our multidisciplinary drug discovery team. Utilize your extensive technical expertise in molecular biology and mammalian cell biology to identify, validate and implement novel therapeutic targets in support of the overall drug discovery process. Demonstrated supervisory experience and the ability to design, execute and manage multiple experiments are required. In addition to a PhD, you must have at least 2 years of postdoctoral experience. Candidates with previous experience in either inflammation/immunology or cancer are preferred. Job Code: CG6052KS

At Incyte, your work will be valued and rewarded. We provide an outstanding benefits package. We work in an environment where excitement, dedication and cooperation are constantly renewed. Above all, you will experience the promise and thrill of discovery. Please send your resume, indicating the appropriate Job Code number, via email to Incyte Genomics, Inc. at sciencemag@incyte.com or fax to (302) 283-6555. EOE F/M/V. Incyte Genomics is proud to be an Equal Opportunity Employer and recognizes the talent of its diverse workforce. Please visit our website at **www.incyte.com** for more information and complete job descriptions.

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HARVARD UNIVERSITY

Faculty of Arts & Sciences

CENTER FOR IMAGING AND MESOSCALE STRUCTURES

Principal Cleanroom/Fabrication/Processing Technologist

The Harvard University Center for Imaging and Mesoscale Structures (CIMS) seeks a highly skilled technologist to manage cleanroom facilities used for research and fabrication of a wide range of nano-and-mesoscale structures. The position will assume immediate responsibility for the management of two existing cleanrooms and associated processing equipment used for device fabrication. Implement state-of-the-art techniques and equipment into operations. Specify and purchase new equipment. Introduce users to the latest processing techniques and instruct them in the use of equipment. Establish integrated procedures for the safe operation and maintenance of facilities. Plan for new fabrication and processing facilities to be included in a new cleanroom scheduled for completion in early 2004.

Technical degree or exceptional relevant expertise; and demonstrated, hands-on experience in a university/industrial cleanroom/processing/fabrication facility required. A thorough knowledge of state-of-the-art techniques for fabrication and patterning of nano- and mesoscale structures; and the capability to extrapolate this experience to a research and educational environment. A proven ability to manage staff, and work well with a diverse and growing group of faculty and student users. The position has significant opportunity for growth as CIMS expands. Salary will depend on qualifications and experience. **Req #13250**

To learn more about CIMS see www.cims.harvard.edu.

For more information on careers or to apply on-line, visit www.hr.harvard.edu/employment or send your resume and cover letter to Harvard University, Req. #13250, Resume Processing Center, 11 Holyoke Street, Cambridge, MA 02138.

At Harvard University, diversity is an essential source of vitality and strength.

R. Gaurth Hansen Assistant Professorships in Biochemistry
Department of Chemistry and Biochemistry
Utah State University

Applications are invited for two R. Gaurth Hansen Assistant Professorships in Biochemistry in the Chemistry and Biochemistry Department at Utah State University. Qualified applicants will have a Ph.D. and postdoctoral experience in biochemistry or a related area. Successful applicants are expected to develop competitive research programs in biochemistry, with preference given to areas that complement existing strengths in the department. These positions are in honor of the late Dr. R. Gaurth Hansen, former Provost and Academic Vice President at Utah State University and are supported by his former student, Dr. William J. Rutter, co-founder and former Chairman of the Board of Chiron Corporation.

The Department of Chemistry and Biochemistry **(http://www.chem.usu.edu)** offers Ph.D. and M.S. degrees in Chemistry and in Biochemistry and several degrees at the undergraduate level. Utah State University is a land-grant institution with an enrollment of approximately 20,000 undergraduate students and 4,000 graduate students and is located in Cache Valley, 90 miles north of Salt Lake City, in the Wasatch Range of the Rocky Mountains **(www.usu.edu)**.

The Search Committee will screen applications until the positions are filled. Applicants for the position should send a complete curriculum vitae, and the names, mailing addresses, phone numbers, and email addresses of three references to:

R. Gaurth Hansen Search Committee
Department of Chemistry and Biochemistry
Utah State University
0300 Old Main Hill
Logan, UT 84322

Further information about the position can be found at **http://personnel.usu.edu and http://www.chem.usu.edu.**

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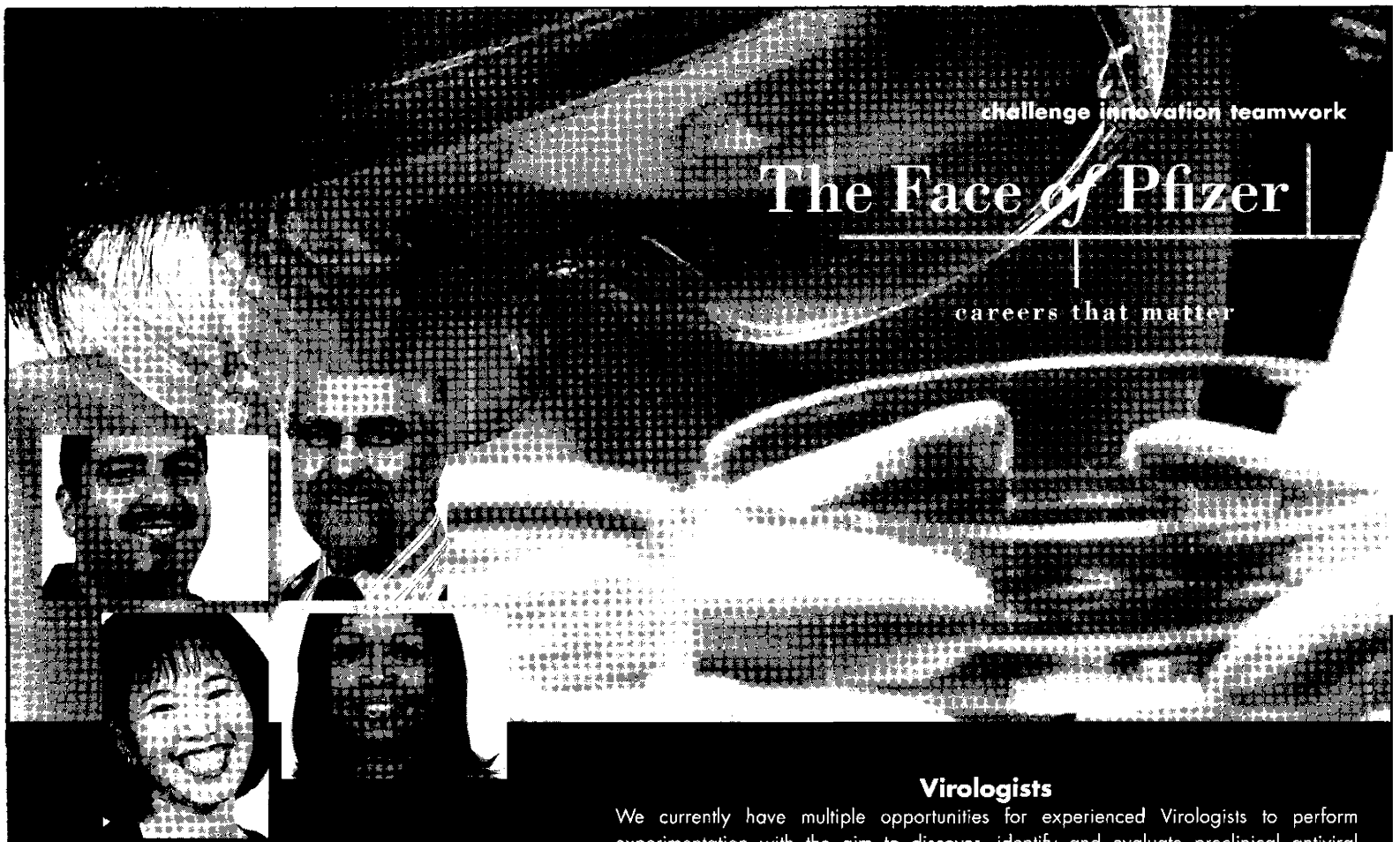

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Pfizer

Global Research & Development

Virologists

We currently have multiple opportunities for experienced Virologists to perform experimentation with the aim to discover, identify and evaluate preclinical antiviral compounds. These positions require a PhD in Virology or Molecular Biology and a comprehensive knowledge of virology as it applies to molecular biology and biochemistry methods that can lead to novel antiviral assay development. Experience with positive strand RNA virology and/or retrovirology is preferred, and industrial drug discovery experience is advantageous. **Req. #02Apr0212188**

Group Leader and Research Scientist

Two positions are available within the Ophthalmology Therapeutic Area for experienced scientists to identify and develop new targets and approaches for the treatment of age-related macular degeneration, diabetic retinopathy and other serious ocular diseases. The Group Leader will lead a pharmacology group dedicated to the discovery and testing of novel therapeutics, and requires 8+ years experience in drug discovery and a thorough knowledge of retinal diseases. A minimum of 2 years postdoctoral experience is sought for the research scientist position. Both require familiarity with *in vitro* and *in vivo* models of ocular angiogenesis. When applying, please refer to **Req. #01-0621-5V125SG**, and indicate the appropriate job title.

Associate/Sr. Associate Scientist, Biochemistry

We have an immediate opening for a BS/MS-level Biochemist. Responsibilities include conducting enzyme assays, analytical protein purification and detailed characterization of enzymes. In addition to a BS/MS in Biochemistry or Chemistry, you must have 2+ years of laboratory or industrial experience. Also essential is a strong background in chemistry, math, computer and graphing programs, enzyme kinetics and protein purification/characterization. Senior applicants and candidates with experience in modern liquid handling or assay automation equipment who wish to diversify their biochemistry laboratory experience are encouraged to apply. **Req. #01-0776-5V135CL**

Pfizer offers an exceptional work environment complete with competitive salaries, excellent benefits and training opportunities designed to develop your professional talents. We encourage all applicants to apply by emailing your resume, indicating the appropriate Req. # in the subject field, to SCI@pfizerresumes.com. If necessary, you may also mail your resume, indicating Req. #, to Pfizer Resume Processing Center, 630 Boston Road M-104, Billerica, MA 01821, Attn: Softshoe Resumes. An equal opportunity employer, Pfizer offers a workplace rich with diversity and potential.

Molecular Mechanisms of Aging

D. E. Shaw & Co., a leading investment and technology development firm with majority ownership positions in several drug discovery ventures, is seeking an expert in the biology of aging to identify and assess long-term opportunities for pharmaceutical interventions having the potential to attenuate the aging process.

We are particularly interested in exploring the long-term potential for developing drugs that target the molecular mechanisms of aging in a manner analogous to caloric restriction. Other potential areas of investigation include mitochondrial biochemistry, the role of telomeric DNA, and transcriptional silencing.

The ideal candidate will combine world-class scientific credentials in aging-related research with entrepreneurial skills, strong business judgment, and a track record of outstanding professional and/or academic accomplishment. Commercial experience with drug development would be desirable, but consideration will be given to exceptionally well-qualified individuals from any of a number of disciplinary and professional backgrounds.

Please send CV (including list of publications, thesis topic, and advisor, if applicable), along with GPAs and standardized test scores (SAT/GRE/MCAT) to *career@world.deshaw.com.*

career@world.deshaw.com

D E Shaw & Co

THE SALK INSTITUTE

A post-doctoral position is immediately available for a person knowledgeable about chromatin structure, and interested in investigating the protein-DNA interactions required for initiation of DNA replication in mammalian cells. Our lab has developed a unique approach for identifying the cis acting elements at which DNA replication initiates in mammalian cells (i'e', origins). We have now identified small DNA sequences capable of initiating replication in mammals, and mutational analyses have pinpointed the functionally important regions. This paves the way for studies of protein-DNA interactions, chromatin changes, and clever genetic and microscopic approaches to elucidate the molecular and cellular biology underlying the decision to initiate. People who have experience with chromatin analysis, DNA footprinting, and chromatin immune precipitation are encouraged to apply.

Applicants should submit a current CV, names of three references, and an indication of the experimental direction they would like to pursue to: **Geoffrey M. Wahl, Ph.D Professor, The Salk Institute for Biological Studies, Gene Expression Laboratory, 10010 N. Torrey Pines Road, La Jolla, CA 92037 FAX(858) 457-2762 e-mail: wahl@salk.edu.**

The Salk Institute is an Equal Opportunity Employer

www.salk.edu

BRIDGEWATER STATE COLLEGE

Assistant Professor Physiology

Full-time, one-year position. The Department of Biological Sciences, Bridgewater State College, Bridgewater, Massachusetts, invites applicants for a full-time, one-year position for the 2002-2003 academic year. The successful candidate will be eligible to apply for the corresponding tenure-track position which is anticipated to begin in Fall 2003, pending funding. The position requires teaching human anatomy and physiology, animal physiology, introductory biology and upper level courses appropriate for the biomedical concentration; advise pre-health students, and participate in equipment procurement. Qualifications required: earned Ph.D. by May 2002, excellent communication skills and strong commitments to teaching and research in an undergraduate setting, as well as supervising original undergraduate research. Teaching experience and post-graduate research are preferred. Applicants should be strongly committed to excellence in teaching and advising, and to working in a multicultural environment that fosters diversity. They should also have an ability to use technology effectively in teaching and learning, the ability to work collaboratively, evidence of scholarly activity, and a commitment to public higher education. Salary will be dependent upon qualifications and experience.

To Apply: submit letter of interest, resume and the names, addresses and telephone numbers of three professional references to:
Office of Human Resources, Bridgewater State College, Bridgewater, MA 02325.
Bridgewater State College is an equal opportunity employer with a longstanding commitment to increasing the diversity of its workforce.

BSC BRIDGEWATER STATE COLLEGE

www.bridgew.edu

MIT

INSTRUMENTATION FACILITY DIRECTOR

The Instrumentation Facility in the Department of Chemistry seeks a director to be responsible for overseeing the operation of the DCIF. Duties include training users in the practice of modern NMR spectroscopy, supervising DCIF staff, helping to acquire new scientific instrumentation, managing the finances of the DCIF, helping set DCIF policy, and working with researchers on a large number of diverse research efforts. The DCIF houses six NMR spectrometers (a 600, two 500, a 400, and two 300 MHz instruments), an EPR spectrometer, a FT-ICR-MS, a GC-MS, a Moessbauer spectrometer, a FT-IR spectrophotometer, a polarimeter, and numerous workstations.

Requirements: Excellent language, communication, and managerial skills. A strong background in NMR spectroscopy is highly desirable, with experience using Bruker and Varian instruments. The position is full-time with benefits. Salary will be commensurate with experience.

Applicants should send a cover letter; resume; and the names, e-mail addresses, telephone numbers, and addresses of three persons that can provide letters of recommendation to: **MIT DCIF Director Search Committee, 18-TFO, 77 Massachusetts Avenue, Cambridge, MA 02139-4307.**

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Ligand Pharmaceuticals Inc. discovers, develops and markets new drugs that address critical unmet medical needs of patients in the areas of cancer, skin diseases, men's and women's hormone-related diseases, osteoporosis, metabolic disorders, and cardiovascular and inflammatory diseases. Ligand's proprietary drug discovery and development programs are based on its leadership position in gene transcription technology, primarily related to Intracellular Receptors (IRs). Located in the Torrey Pines area of San Diego, LIGAND is adjacent to the University of California, San Diego campus, and to other intellectual centers of the city's world-class health science endeavors. Currently, we seek outstanding individuals to join our seasoned team of scientists in the following positions.

Molecular Oncology

Vice President, Molecular Oncology

Direct the Research Discovery team in development of ongoing and novel therapeutics in oncology; manage a team of scientists; recommend, establish, conduct and coordinate discovery and development; evaluate existing and prospective competitive technologies and position the company accordingly; review progress of ongoing projects; develop financial and resource planning budget for group; work closely with Clinical Research to coordinate/support pre-clinical oncology efforts. Ph.D. in life sciences and/or M.D. with strong background in molecular and cell biology, emphasis in basic and clinical oncology. Inflammation background a plus, and a high level of recognition within academic or industry environment. Strong leadership ability, effective team player and goal oriented. Dept: 7500-VP

Research Investigator/ Associate Director

Direct ongoing and develop novel therapeutic programs in oncology; manage a team of scientists; recommend, establish, conduct and coordinate discovery strategies; recommend & implement disease and cellular models; evaluate existing and prospective competitive technologies. Coordinate and support pre-clinical oncology efforts. Ph.D. in life sciences, 10 years' similar experience in molecular and cell biology with an emphasis in basic oncology. Previous management or project experience necessary. Inflammation background a plus. Dept: 7500-DIR

Senior Research Scientist/ Research Investigator

Utilize molecular, immunological, biochemical and cell culture-based techniques to carry out research into the molecular mechanism of nuclear receptor action. This understanding will be translated into novel assays capable of detecting and characterizing small molecule modulators of nuclear receptor function. Utilizing recent advances in coactivator and corepressor-mediated transcriptional regulation, drugs with novel profiles will be pursued. Ph.D. and at least 5 years of relevant post-doctoral experience in biochemistry and molecular biology. Demonstrated expertise in the molecular and cellular aspects of nuclear receptor biology is required. The successful candidate will be highly motivated, with solid communication skills and have a high level of interest in innovative approaches and interdisciplinary teamwork. Dept: 7500-MRI

Assistant Scientist/Scientist

Working within a team, set up, perform and characterize in vivo oncology models monitoring health and evaluating tumor volumes, accumulation and analysis of data, and preparing data slides for presentation. Compound administration and immunohistochemical techniques as well as previous supervisory experience a plus. MS or Ph.D. in Biology or a related field with 4-5 years' experience in a research or industrial setting preferred. In vivo experience is required and experience in oncology models is preferred. Excellent communication, presentation and computer skills are essential. Dept: 7500-SCI

Clinical Pharmacokinetics

For positions within our Clinical Pharmacokinetics group you will implement, conduct and report pharmacokinetic evaluations of clinical development compounds. Work with analytical laboratories and clinical research sites to ensure proper conduct and analysis of pharmacokinetic studies. Provide pharmacokinetic support and updates to Clinical Research and regulatory groups. Prepare pharmacokinetic summaries for clinical investigators and regulatory agencies. Knowledge of and experience with pharmacokinetic analysis methods and programs is required. Experience with advanced modeling (including NONMEM) is valuable. Excellent written and verbal communication skills necessary; experience in design and conduct of clinical pharmacokinetic studies required.

Senior Research Scientist/ Research Investigator

In addition to the description above, prepare and present pharmacokinetic summaries to clinical investigators and regulatory agencies. Experience/education should include a Ph.D. in Pharmacokinetics or Pharm.D. with clinical pharmacokinetic specialization with 5-10 years' industry experience in pharmacokinetics. Experience in the provision of strategic guidance for development of oncology or pain therapeutics is required. Dept: 8260-RICPK

Senior Research Scientist

In addition to the description above, prepare and present pharmacokinetic summaries to clinical investigators and regulatory agencies. Experience/education should include a Ph.D. in Pharmacokinetics or Pharm.D. with clinical pharmacokinetic specialization with 2-5 years' industry experience in pharmacokinetics. Experience in development of oncology agents and oversight of analytical laboratories is beneficial. Dept: 8260-SRSCPK

Scientist/Research Scientist

In addition to the description above, your qualifications should include a Ph.D. in Pharmacokinetics or Pharm.D. with 0-2 years' clinical PK experience or BS/MSc degree with 5-10 years' clinical PK experience required. Experience in oversight of analytical laboratories or monitoring of clinical pharmacokinetic studies is beneficial. Dept: 8260-RS

Medicinal Chemistry

Assistant Scientist/Research Scientist, Computational Chemist

The successful candidate will apply their scientific experience & computational chemistry skills to assist synthetic chemists with lead discovery and optimization. Perform molecular mechanics, quantum mechanical calculations, conformational analysis, molecular dynamics, statistical algorithms, pharmacophore modeling, receptor docking and virtual library screening for the Medicinal Chemistry group. Ph.D. in Chemistry with 1-3 years' postdoctoral experience and experience with molecular modeling as well as statistical methods. Creativity, a commitment to scientific excellence and the desire to work in a multidisciplinary environment are essential qualities for the position. Dept: CCP

Pharmacology

Assistant Scientist

As a member of the Osteoanabolic group, you will support the development, validation and implementation of animal models of osteoporosis and sarcopenia. Responsibilities include organizing and conducting in vivo experiments, radioimmunoassay, histological and DEXA analysis, data analysis, and presentation. BS or MS in a life science, compound administration, histological and microscopy techniques are required. Expertise in bone histomorphometry, and densitometry, and previous industry experience are desirable. Dept: 7400-SCI

Research Associate/ Senior Research Associate

As a member of the Endocrine and CNS Pharmacology groups, you will assist in investigating the biological properties of compounds within in vivo model systems, and participate in the development & implementation of assays of endocrine and CNS action in a team-oriented environment. Requirements include: BS/MS in Biology or similar life science degree, familiarity with molecular biology research, preferably in endocrinology and/or CNS is desired and 2+ years' industry experience. Familiarity with molecular biological techniques such as DNA cloning, PCR, real time PCR, hybridization, cell culture & transient gene expression is desired. Experience with data analysis and computer graphic programs a plus. Dept: 7400-FJL

Drug Safety & Development

Senior Research Associate/ Assistant Scientist

Working in our Drug Safety & Disposition department, you will assist in the conduct of pre-clinical studies of absorption, distribution, metabolism and excretion (ADME) of research & development compounds. Experience and skills should include: BS/MS Biology, Pharmacology, Biochemistry, Pharmaceutical sciences or related field; HPLC analysis of small molecules, PC skills (computer data analysis applications), and specific experience in drug metabolism, pharmacokinetic analysis & research documentation. Dept: 7700-PR

Ligand offers an attractive salary and benefits package, including stock options. Visit our website at www.ligand.com for more information. Send us your resume, indicating the Dept. Code to: **Ligand, 10275 Science Center Dr., San Diego, CA 92121. E-mail: jobs@ligand.com. Fax: 858-550-5649.** EOE

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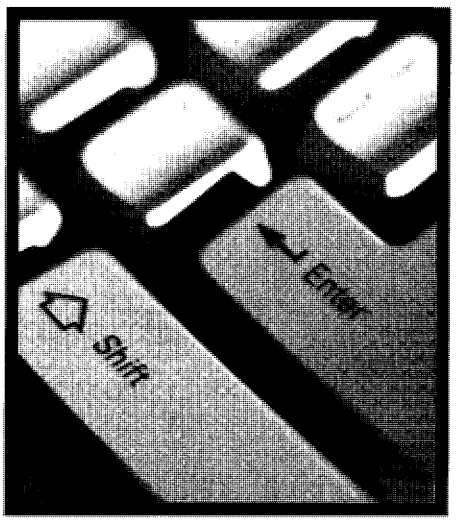

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Fax 202-289-6742
E-mail ..... danderso@aaas.org

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Fax ..... +44(0) 1223 326 532
E-mail ..... dharris@science-int.co.uk

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Assistant Professor of Theoretical Physics

at the Swiss Federal Institute of Technology Lausanne (EPFL)

The EPFL, in close collaboration with the University of Lausanne (UNIL), plans a substantial expansion in the basic sciences, including a significant reinforcement of physics, chemistry and mathematics and a major new effort in biological sciences.

As part of this broad program, we anticipate a tenure track Assistant Professor position in the Institute of Theoretical Physics, tentatively beginning in the fall semester of 2002. We invite applications from outstanding young physicists with well recognized accomplishments in condensed matter theory and a clear promise for future growth. The area of specialization should preferentially be nanoscale condensed matter physics, quantum optics, or statistical physics of soft matter.

The appointee will establish and lead a vigorous independent research program, interact with existing projects in condensed matter physics and will be committed to excellent teaching at undergraduate and graduate level. Start-up resources will be available. Exceptionally experienced candidates seeking a higher level position may also be considered.

We offer internationally competitive salaries and benefits. Applications with curriculum vitae, publication list, concise

statement of research and teaching interests as well as the names and addresses (including e-mail) of at least five references should be sent by **June 30, 2002,** to

Professor Giorgio Margaritondo
Dean
Faculty of Basic Sciences
EPFL
CH-1015 Lausanne, Switzerland

For additional information on the EPFL, please consult:
http://www.epfl.ch, http://sb.epfl.ch/,
http://www-sphys.unil.ch/ipt/ and
http://dpwww.epfl.ch/instituts/ipt/ipt.html

The EPFL is an equal opportunity employer.

Vice President for Programs

The U.S. Civilian Research and Development Foundation, an international non-profit supporting scientific collaboration between American scientists and scientists of the former Soviet Union, seeks a dynamic and results-oriented leader and team builder for the position of Vice President for Programs.

CRDF is a unique private non-profit organization incorporated in the Commonwealth of Virginia for the principal purposes of providing productive civilian R&D opportunities for scientists and engineers in the former Soviet Union (FSU), advancing defense conversion, and assisting in the establishment of a market economy in the region. It accomplishes these purposes by implementing creative collaborative programs between FSU scientists and engineers and US scientists at universities, government labs, and non-profit and for-profit organizations. The CRDF culture is a key to our success and emphasizes hard work, creativity, flexibility, and a team-based approach.

The successful candidate should possess extensive managerial and grant making experience, preferably with experience in the non-profit or government sectors. Substantive knowledge of international science and technology is essential; knowledge and/or experience in the former Soviet Union is highly desirable. He/she must demonstrate an entrepreneurial mindset, as well as outstanding diplomatic, communications and interpersonal skills. Extensive travel to the former Soviet Union is required.

Responsibilities include the supervision of five grant-making and service program divisions and a staff of 40+ people; representing the CRDF in negotiations with FSU governmental and other organizations; reporting to and consulting with U.S. funders including the U.S. government and private foundations; coordinating with CRDF financial, administrative and development departments. The Vice President will also assume the role of Acting Executive Director when the President/Executive Director is absent.

A Master's degree or higher, or an equivalent combination of education and experience is required, along with 10 years of international science and technology experience and at least 5 years of supervisory management experience. Salary is competitive and commensurate with experience.

Please send resume along with a statement of intent by July 15, 2002 to: **CRDF, 1800 N. Kent St., Suite 1106, Arlington, VA 22209, Attention: Human Resources; hr@crdf.org.**

MEDICAL OFFICER OR HEALTH SCIENCE ADMINISTRATOR

The Lung Biology and Disease Program, Division of Lung Diseases, National Heart, Lung, and Blood Institute, NIH is seeking a Physician or Health Scientist Administrator to direct and manage a national program in pulmonary vascular disease and interstitial lung disease. The individual selected will provide leadership in administration of research grants, preparing reports of scientific progress, and identifying opportunities for future research in pulmonary vascular diseases and interstitial lung disease. Essential qualifications are: an M.D. or Ph.D. in health sciences; scientific knowledge and research experience in one or more of the following areas: Pulmonary medicine and biology, pulmonary vascular disease, inflammatory lung disease, genetic medicine, transplantation biology and medicine, and pulmonary embolism; and the ability to communicate and work with others. U.S. citizenship required. Appointments may be made at GS-13/14 grades ($66229-$101742) depending on qualifications. A recruitment/relocation bonus may be considered, A Physician Comparability Allowance (PCA) up to $20K per year may also be considered. Excellent health, life, investment and personal leave benefits. Position requirements and detailed application procedures are provided on the vacancy announcement HL-02-0053, which can be obtained by accessing http://careerhere.nih.gov or by calling 1-800-728-JOBS (fax file #4044) or 301-594-2953. Applicants should submit a cover letter, CV, Knowledge, Skills, & Abilities (KSA) statement,and publications to: Attention: Robin Easter (HL-02-0053)
National Institutes of Health, NHLBI Human Resources Office
31 Center Drive Msc 2484
Bldg. 31 Room 5a28
Bethesda,MD 20892-2484

For additional professional information contact
Dr. Dorothy Gail (301) 435-0222

NIH/NHLBI is an Equal Opportunity Employer

MCP Hahnemann University

Operated by Drexel University

Faculty Positions
Department of Biochemistry
MCP Hahnemann University

Applications are invited for several tenure track positions at the Assistant, Associate, or Full Professor levels. The department is currently being developed with an emphasis on understanding biochemical processes at the molecular level. Candidates working in the areas of cell growth control, cell cycle, cancer biology, gene regulation, proteomics, and chemical and structural biology are particularly encouraged to apply. The department offers a collegial and stimulating environment, and occupies newly renovated space in downtown Philadelphia. Successful candidates will have a PhD and/or MD, relevant postdoctoral experience, and a strong record of research accomplishments. Faculty are expected to develop an independent research program, attract external funding, and participate in graduate and medical education. Applicants should submit a CV, statement of research interests, and contact information for three referees to:

Dr. Jane Clifford
Faculty Search Committee
Department of Biochemistry
MCP Hahnemann School of Medicine
245 N. 15th St., Mailstop 497
Philadelphia, PA 19102-1192

Or electronically to **Pat.Loll@drexel.edu**

http://www.mcphu.edu/medschool/depts/biochemistry/biochemistry.htm

MCP Hahnemann University School of Medicine is operated by Drexel University

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FLORIDA INTERNATIONAL UNIVERSITY
College of Engineering
NANO-SCIENCES AND TECHNOLOGY
FULL/ASSOCIATE/ASSISTANT PROFESSOR
(2 POSITIONS AVAILABLE)

Florida International University is planning to start a new graduate level program in materials with special emphasis on the science and technology of nanomaterials that will build upon the existing strength in the areas of processing at extreme conditions, electronic materials, biomaterials and materials process modeling.

We invite applications for tenure-track or tenured faculty positions in the College of Engineering from scientists with research interest in nanomaterials, including nanofabrication, nanoMEMs and nanostructured materials. Applicants should have a Ph.D. in an appropriate field; senior candidates must have an exceptional research and teaching record; junior candidates must possess outstanding research and teaching potential. Candidates must be prepared to establish a strong sponsored research program in areas complementing existing programs in the College of Engineering. One of the positions may require specialization in application of x-ray crystallography, Raman spectroscopy, and neutron scattering to study inorganic materials. Familiarity in working with large groups will be an added advantage.

Applicants are asked to submit by electronic mail their curriculum vitae, a list of publications and courses taught, an outline of research and teaching objectives and the names and addresses of at least four references to:

Prof. Surendra Saxena
Chair of the Nanotechnology Search Committee
College of Engineering
saxena@fiu.edu

Consideration of applications will begin July 31st, 2002 and will continue until the positions are filled. See **www.eng.fiu.edu/me** for details.

Florida International University
is an Equal Opportunity/Access Employer and Institution

THE UNIVERSITY OF MAINE

PLANT QUANTITATIVE GENETICIST

The **University of Maine** seeks applicants for a research and teaching position in **PLANT QUANTITATIVE GENETICS**, with a focus on genomics approaches to study the quantitative genetics of potato and potato breeding. This is a tenure-track, 70% research-30% teaching, academic-year position at the **Assistant Professor** level in the Department of Biological Sciences and involves a joint appointment with the Maine Agricultural and Forest Experiment Station. This position is one of several hires in the area of genomics at the University of Maine. This researcher will be housed in Orono but will interact with a potato breeder and the Maine potato industry to oversee the potato-breeding program in Aroostook County, Maine. The scientist is expected to contribute significantly to the competitiveness of the USDA special grant to Maine for potato variety development and to establish an externally funded and nationally competitive research program. The successful candidate will be responsible for an undergraduate course in an area of plant biology or genetics each year and a graduate course, potentially team-taught, in the candidate's area of specialization once every two years. A Ph.D. in plant population or quantitative genetics or a closely related field, strong interest in genomics, and postdoctoral experience are required. A background in genetics or molecular biology of potato or other solanaceous crop is preferred. Review of completed applications will begin 1 August 2002 and continue until a suitable candidate is hired. Applicants should submit a *curriculum vitae*, statement of research and teaching interests, and representative published papers. Applicants should also request three references to send letters addressing the applicant's suitability and particular strengths for this position. Applications and supporting letters should be addressed to: **Chairperson, Plant Quantitative Geneticist Search, Department of Biological Sciences, University of Maine, 5751 Murray Hall, Orono, ME 04469-5751.** Information about the department is available at: www.umesci.maine.edu/biology/

The University of Maine is an EO/AA employer. We strongly encourage women and minorities to apply.

A Member of the University of Maine System

MOLECULAR GENETICS POSTDOCTORAL POSITION

We recently helped clone the MEN1 gene, a novel tumor suppressor that has important roles in human tumors. It encodes menin, a nuclear protein that inhibits junD-mediated transcription. We are studying menin roles in normal and abnormal cells. Projects include protein-protein interactions, over or under expression in mammalian and non-mammalian systems, and interactions with DNA and reporters. Many novel approaches are possible. Applicants should have a doctoral degree and an excellent background in biochemistry or in one or more relevant topics. Applicants should not be more than 5 years beyond the most recent doctoral degree. NIH is an EEO employer. Send applications with contact information for three references to: **Stephen Marx MD, Bldg. 10 Rm. 9C-101, NIH, Bethesda, MD 20892. Or use e-mail StephenM@INTRA.NIDDK.NIH.GOV or fax to 301-496-0200.**

Research Electron Microscopist

Dr. Marilyn Farquhar in the Dept. of Cellular and Molecular Medicine at UCSD is seeking a highly motivated person for the immunocytochemistry and EM core facility. The core facility provides state-of-the-art EM and immunofluorescence expertise to investigators working on important cell biological problems, including signaling, membrane trafficking, cytoskeleton and molecular motors, RNA splicing etc., in various systems including mammalian tissues and cultured cells, Drosophila and yeast. Main responsibilities include: processing cells and tissues for TEM; designing and performing experiments using EM and LM combined with immunofluorescence, cryosectioning and immunogold labeling; documenting, evaluating and reporting results using darkroom and digital imaging; preparing data for publication; operating EM's, microtomes, LM's, including those equipped for deconvolution and confocal analysis. Extensive experience in TEM is essential. Practical skills in immunocytochemistry (immunofluorescence and immunogold labeling) and proficiency in digital imaging are highly desirable. Salary commensurate with experience.

Submit resume, research experience and 3 references to: **mfarquhar@ucsd.edu** or **Dr. Marilyn G. Farquhar, Ph.D., Dept. of Cellular and Molecular Medicine, UCSD, CMM-West 210, 9500 Gilman Dr., La Jolla, CA 92093.**

UCSD is an AAEO Employer

NCAUR

Where the future is Created

USDA, Agricultural Research Service, Peoria Illinois

The National Center for Agricultural Utilization Research (NCAUR) has, for 60 years, developed new processes and products from agricultural commodities to benefit the American farmer and public.
With a multi-disciplinary staff of 270, NCAUR's internationally recognized scientists have a proud history of developing and commercializing technical innovations.

Multiple Scientific Career Opportunities:

- *Microbiologist/Molecular Biologist*, GS-11/12/13/14
  Salary Range: $45,285 to $99,150
  Announcement # ARS-X2W-2189
- *Research Chemist*, GS-11/12/13/14
  Salary Range: $45,285 to $99,150
  Announcement # ARS-X2W-2188

Opportunities exist in the following research areas:

- *Fermentation Biotechnology Research* - developing improved technologies to convert agricultural commodities to alcohol fuels and other value-added products.
- *Crop Bioprotection Research* - developing knowledge on the genes that influence the ability of beneficial bacteria and fungi to survive chemical and physical stresses occurring during industrial fermentation.
- *Microbial Genomics and Bioprocessing Research* – developing knowledge on the genetic diversity and population structure of new and known species of foodborne pathogenic bacteria.
- *Mycotoxin Research* - developing strategies that reduce or eliminate the presence of fungal toxins and mycotoxins in human foods as well as animal feeds.
- *Plant Polymer Research* - developing methods for physical and chemical modification of plant derived components to establish new or expanded markets for agricultural commodities.
- *Food and Industrial Oil Research* - developing new uses for vegetable oils, emphasizing soybean oil, as alternative, value-added industrial materials, chemicals and fuels.
- *Cereal Products and Food Science Research* - conducting basic and applied research into the natural physical properties of agricultural materials such as proteins, starches, gums, celluloses, and lignins.

ARS offers competitive benefits packages, a family-friendly work environment, and the opportunity to work on research that touches the life of every American!

For a copy of the announcement and application procedures, visit the ARS Research Scientist vacancy listing at:
http://www.afm.ars.usda.gov/divisions/hrd/index.html,
or contact Kathy John on (309)681-6542.

ars

www.ncaur.usda.gov

ARS is an equal opportunity provider and employer.

POSTDOCTORAL RESEARCH ASSOCIATE
Research Molecular Biologist/ Research Plant Pathologist

The United States Department of Agriculture (USDA), Agricultural Research Service (ARS), Wheat, Sorghum, and Forage Research Unit, in Lincoln, Nebraska, is seeking a Research Molecular Biologist/Research Plant Pathologist with a recent Ph.D. in molecular biology, plant pathology, biochemistry or a related field for a temporary-term appointment at the GS-11 level (starting salary $45,285 per annum). The successful candidate will conduct research to identify host range and other virulence determinants in wheat streak mosaic virus (WSMV), using infectious cDNA clones of several WSMV strains. A combination of molecular biology, plant virology, and biochemistry approaches will be applied to the problem. Experiments will draw on existing knowledge of WSMV molecular biology and pathogenesis, and should lead to important new discoveries in plant virology research. Experience in plant virology/pathology or plant molecular biology is particularly desirable.

Applications should refer to **Announcement Number RA-02-031H**. For information on special requirements, salary, benefits, or application forms, contact: **Lisa Robinson, Human Resources Specialist, USDA/ARS Human Resources Division, 5601 Sunnyside Avenue, Beltsville, MD 20705-5106. Telephone: 301-504-1399; FAX: 301-504-1587**. For specific information on the duties and responsibilities of this position or to submit an application, contact: **Dr. Roy C. French, USDA, ARS, Wheat, Sorghum and Forage Research Unit, Room 344, Keim Hall, University of Nebraska, P.O. Box 830937, Lincoln, NE 68583-0937. Telephone: 402-472-3166; FAX: 402-472-4020; e-mail: rfrench@unlnotes.unl.edu**.

USDA/ARS is an Equal Opportunity Provider and Employer.

NC STATE UNIVERSITY

Bioinformatics Faculty Positions

North Carolina State University wishes to add faculty at all levels to its **Bioinformatics Graduate Program** and its **Bioinformatics Research Center** (bioinformatics.ncsu.edu). The program, which has about 50 students pursuing Masters and Ph.D. degrees in bioinformatics, enjoys strong support from the state, NIH, NSF and industry. The research center is housed in a new facility on NC State's unique multidisciplinary Centennial Campus (centennial.ncsu.edu), and has long-standing strength in statistics and statistical genetics.

Faculty are currently sought to enhance computational aspects of bioinformatics and other complementary areas broadly construed. Each appointee will be associated with the Bioinformatics Research Center and will be appointed to an academic department or departments that best suit his or her area of expertise. Applicants must have a Ph.D. in a relevant discipline.

Send letter of application, CV and the names of three references to Dr. Raymond E. Fornes, Chair; Bioinformatics Search Committee; Campus Box 8209; NC State; Raleigh NC 27695-8209. Review of applications will begin immediately and continue until the positions are filled.

In its commitment to diversity and equity, NC State seeks applications from women, minorities, and persons with disabilities. AA/EOE. Individuals with disabilities desiring accommodations in the application process should contact Ms. Joye Stephenson at joye_stephenson@ncsu.edu, telephone 919-515-7865, or fax 919-515-7668.

CHAIR OF MICROBIOLOGY

The University of Health Sciences-College of Osteopathic Medicine invites applications for the Chair of Microbiology. The successful candidate will direct the operations & administration of the microbiology department in the Basic Sciences Division, and be at or eligible for, the Associate Professor level or higher rank. Solid management/supervision skills are essential. Must have a doctoral degree in microbiology or related area, and be authorized to work in the U.S. Requires teaching experience in pathogenic microbiology, mycology and parasitology at the medical school level. Must have postdoctoral research & be willing to collaborate in education and research efforts; prefer individual committed to a high expectation of extramurally funded research. Interested candidates must also have a strong commitment to advising medical students, University service and other scholarly activities.

Salary will be commensurate with experience and qualifications. UHS offers an outstanding benefits package including an exceptional retirement plan. UHS is in a beautiful, traditional setting near downtown Kansas City, MO. Please send a letter of interest, curriculum vitae, a statement of teaching philosophy and research interests, and contact information for three references to: **Susan M. Schmidt, Assistant Director of Human Resources, University of Health Sciences, 1750 Independence Ave., Kansas City, MO 64106-1453; or E-mail: swharton@uhs.edu, (MS Word); or fax: 816/283-2285. www.uhs.edu Review of applications will continue until the position is filled. Specific questions may be directed to James M. Carl, D.O., M.H.A., Dean & Search Committee Chair, 1-800-234-4847, ext. 2308; or 816-283-2308. Please visit www.kclifesciences.org** for additional information on metropolitan initiatives. EOE

the University of Health Sciences

School of Medicine
New York University

BERNARD B. LEVINE FELLOWSHIP IN MALARIA BIOLOGY AND IMMUNOLOGY

A post-doctoral fellowship is available immediately for studies on the immunobiology of the pre erythrocytic stages of malaria parasites (sporozoites and liver stages). The ultimate goal is to identify new vaccine candidates or new approaches to chemotherapy. The candidate must have a PhD or MD degree, and a solid background in molecular biology. Individuals with training in immunology/cell biology are encouraged to apply. The appointment is for a minimun of two years. The salary is commensurate to experience up to $50,000 a year.

Please send curriculum vitae and the names and addresses of three referees to:

Dr. Victor Nussenzweig
Department of Pathology
NYU School of Medicine
550 First Avenue
New York, NY 10016

E-mail: nussev01@popmail.med.nyu.edu (no attachments please)

Chief of a Newly Established "Laboratory of Biological Modeling"

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health (NIH) invites applications for a tenured position as Chief of the newly established Laboratory of Biological Modeling (LBM). LBM will be comprised of scientists who use computational approaches to understand biological systems. Specific areas of research interest will include: macromolecular biophysics; genomic/proteomic informatics; and regulatory networks. Excellent computational facilities and resources for rapid achievement of research goals are available. Applicants should have an outstanding record of research accomplishments and be equivalent to a tenured university full professor. He/she will be expected to formulate a plan for the development of LBM, provide intellectual and administrative leadership, and pursue an independent research program in one of the specific research areas. The position offers unparalleled opportunities for interdisciplinary collaboration within NIDDK and throughout NIH.

The Laboratory of Biological Modeling of NIDDK will be located on the main intramural campus of the NIH in Bethesda, Maryland, a suburb of Washington, D.C.

Interested applicants should send a Curriculum Vitae and a list of publications, a plan for LBM including research goals and organization, copies of five major publications, a summary of research accomplishments, a plan for future research, and three letters of recommendation to: Dr. William A. Eaton, Chair, Search Committee, Laboratory of Chemical Physics, NIDDK, Building 5, Room 104, NIH, Bethesda, MD 20892-0520.

NIH is an Equal Opportunity Employer

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mayo

RESEARCH FELLOW
Transplant Biology Program
Rochester, Minnesota, U.S.A

A postdoctoral research position is available in the laboratory of Dr. Amy Tang of the Transplant Biology Program at Mayo Clinic in Rochester, Minnesota, (ref *Cell* **90:**459-467, 1997; *Genetics* **148:**277-286, 1998; *Development* **128:**801-813). Applicants must have a Ph.D. and/or M.D. and should have experience in the fields of signal transduction, molecular biology, biochemistry, genetics, or pharmacogenomics. Experience with Drosophila, forward and reverse genetic screens, and mutant analyses is highly desirable.

Salary will be determined by the successful candidate's experience. There is an attractive benefit package. Mayo Clinic is a not-for-profit organization. Mayo integrates research with clinical practice and education in a multi-campus environment. For further information please visit **http://www.mayo.edu/research/.**

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

Dr. Amy Tang
Transplantation Biology
Medical Sciences 2-85
Mayo Clinic, 200 First Street SW
Rochester, MN 55905
507-538-1878
Tang.Amy@mayo.edu

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

St. Jude Children's Research Hospital

ALSAC • Danny Thomas, Founder

St. Jude Children's Research Hospital, located in Memphis, Tennessee, is a premier center for research and treatment of potentially fatal childhood diseases, including cancer and certain blood, genetic, and immunodeficiency disorders. The hospital's mission is to find cures for children with catastrophic diseases through treatment and research. St. Jude is dedicated to providing unsurpassed patient care and to advancing the health of children through biomedical research.

SCIENTIFIC WRITER AND PUBLIC RELATIONS LIAISON

(Job Code: SCI-5266VH)

As the institution's main scientific liaison to all media outlets and the primary point of contact for research-related information, you will work collaboratively with ALSAC, Public Relations, investigators, and senior administration to communicate scientific achievements of the institution, while supporting fundraising efforts and publicizing the institution. Proactively with the VP – Public Relations, you will also contact print and electronic media outlets to promote story ideas and disseminate positive scientific accomplishments of the institution. Establishing and maintaining strong, positive relationships with the Public Relations Department, public relations firms, news media, ALSAC, and other external contacts who are in a position to impact the institution's scientific image is critical to the success of this role.

Ph.D. or equivalent degree in a scientific field preferred. An exceptional candidate with a minimum of a Master's Degree in a scientific field will be considered. Formal training in journalism, communications, or public relations highly desirable. Three years required (five years preferred) working in area of public relations in scientific writing or the scientific media environment such as a science writer for newspaper, television, magazine, or other media. Qualified candidate must have significant training and experience in biomedical research.

St. Jude Children's Research Hospital offers an excellent salary and fringe benefits package. Please submit your resume/CV via e-mail, including job code, to exec.careers@stjude.org

St. Jude is an equal opportunity employer.

POSITIONS OPEN

TENURE-TRACK POSITIONS
Genetic Medicine

As part of a significant enhancement of its basic biomedical science research programs and laboratory facilities, Weill Medical College of Cornell University (formerly known as Cornell University Medical College) is undertaking a major program initiative in the area of genetic medicine and is seeking to recruit tenure-track faculty at all levels to its new Department of Cell and Developmental Biology. We are especially interested in candidates with a focus on identification and characterization of genes regulating tissue differentiation and development, matrix function and remodeling, and cell cycle control and apoptosis. Exceptional candidates in other related/appropriate fields will also be considered. Candidates for junior positions should demonstrate the potential of establishing a vigorous, independent research program. Candidates for senior positions should have an outstanding publication record as well as substantial recent success in obtaining peer-reviewed grant support. Appointment of these independent, tenure-track faculty is anticipated in the Department of Cell and Developmental Biology directed by **Katherine A. Hajjar, M.D.**

Recruited faculty will receive generous start-up support and will occupy newly constructed laboratories. Candidates may participate in the Graduate School of Medical Sciences program, which includes faculty from the Weill Medical College and the Sloan-Kettering Institute, and in the Tri-Institutional M.D.-Ph.D. program, which also includes faculty from The Rockefeller University.

Applications should include curriculum vitae, statement of research interests, and three letters of recommendation. Applications should be sent to: **Jennifer J. Cameron, Genetic Medicine Recruitment Committee (KH), Box Number 27, Weill Medical College of Cornell University, 1300 York Avenue, New York, NY 10021.**

Equal Employment Opportunity/Affirmative Action/Minorities/Females/Disabled/Veterans.

PHYSICAL CHEMIST

Lyon College seeks qualified candidates for a tenure-track position in chemistry at the **ASSISTANT PROFESSOR** level beginning August 2002 or January 2003. A Ph.D. or A.B.D. in physical chemistry is required. Primary teaching responsibilities will include one semester of introductory chemistry and a two-semester physical chemistry sequence. A research program that involves undergraduate students is expected. Demonstrated interest or prior experience in a liberal arts college setting desirable. Additional responsibilities will include participation in advising and college service. Salary will be commensurate with experience. Lyon College is an independent, selective, residential liberal arts college affiliated with the Presbyterian Church (U.S.A.). *U.S. News and World Report* has regularly ranked Lyon among the best regional liberal arts colleges in the South and as a best educational value. Located in the Ozark foothill community of Batesville, the picturesque campus is 90 miles north of Little Rock, Arkansas, and 125 miles west of Memphis, Tennessee. Review of applications will begin immediately and will continue until the position is filled. Interested candidates should send a cover letter; curriculum vitae; statements of teaching philosophy and research interests; unofficial copies of graduate transcripts; and the names, addresses, telephone numbers, and e-mail addresses of three references to: **Dr. Bob Gregerson, Chair, Physical Chemistry Search Committee, Lyon College, 2300 Highland Road, Batesville, AR 72501.** Applications may also be submitted as attachments to **e-mail: rgregerson@lyon.edu; website: http://www.lyon.edu/.**

Screening will begin immediately and will continue until the position is filled. *Lyon College is an Equal Opportunity Employer and encourages the nomination and application of women and members of racial and ethnic minority groups.*

POSITIONS OPEN

UNIVERSITY OF MINNESOTA
Cancer Center

NCI CCC
A Comprehensive Cancer Center Designated by the National Cancer Institute

EXPERIMENTAL THERAPIES

The University of Minnesota Cancer Center and Department of Medicine of the Medical School invite applicants for a tenure-track position focusing on development and testing of novel, immune-based therapy of adult solid tumors. The person selected will be expected to develop a funded, laboratory-based effort in human cancer immunotherapy. This position will interact with a large and expanding human immunology group affiliated with the University of Minnesota Cancer Center and the Center for Immunology. The successful applicant will have an M.D. and/or Ph.D. and laboratory expertise or an established laboratory program in human immunology or immunotherapy. Academic rank and salary will be commensurate with experience. Position will remain open until filled. Please send curriculum vitae, statement of interests and intentions, and contact information for three references to: **Dr. Jeffrey S. Miller, Division of Hematology, Oncology, and Transplantation, c/o Human Resources, University of Minnesota Cancer Center, MMC 806, 420 Delaware Street S.E., Minneapolis, MN 55455.**

The University of Minnesota is an Equal Opportunity Educator and Employer.

DIRECTOR
Children's Memorial Institute for Education and Research

Nominations and applications are requested for the position of Director of the Children's Memorial Institute for Education and Research (CMIER), a part of the Children's Memorial Medical Center. Children's Memorial is the pediatric affiliate of the Northwestern University's Feinberg School of Medicine.

This position presents an outstanding opportunity for a Scientist with superb leadership and management skills to build a thriving research institute into a major national presence in pediatric research. The Board-approved strategic plan, which will directly support the mission of Children's Memorial Hospital, calls for the recruitment of 17 new Investigators; the building of 30,000 new net square feet of laboratory space (slated for completion in late 2003); and the addition of 10,000 square feet of child health research space.

Qualifications for this full-time position include a forward-thinking Scientist (M.D. and/or Ph.D.) whose background and accomplishments demonstrate the ability to lead, recruit, motivate, and guilde a highly skilled team of professionals. The successful candidate should have a research focus in pediatrics or development and must have a strong track record of external, peer-reviewed funding and significant publications.

For further information or to submit an application or nomination:

Thomas P. Green, M.D.
Larry Jameson, M.D., Ph.D.
Co-Chairs, CMIER Search Committee
Children's Memorial Hospital
2300 Children's Plaza, Box Number 86
Chicago, IL 60614
E-mail: tgreen@northwestern.edu or
ljameson@northwestern.edu

Northwestern University and Children's Memorial Hospital are Affirmative Action/Equal Opportunity Employers. Hiring is contingent upon eligibility to work in the United States. Women and minorities are encouraged to apply.

POSITIONS OPEN

DIRECTOR
Center for Medical, Agricultural, and Veterinary Entomology
Gainesville, Florida

This is a Senior Executive Service position with the Agricultural Research Service (ARS), U.S. Department of Agriculture. The Director of the Center for Medical, Agricultural, and Veterinary Entomology (CMAVE) is responsible for providing leadership and direction to six research units conducting investigations in detection and management of insect pests and disease vectors affecting animals, humans, and plants and in crop genetics and environmental quality. Approximately 40 Scientists at CMAVE represent a variety of disciplines including entomology, chemistry, genetics, molecular biology, plant physiology, agronomy, agricultural engineering, botany, microbiology, soil science, and zoology. This position requires considerable flexibility and skill in providing effective research leadership to a diversity of CMAVE programs, many of which are cooperative and multidisciplinary, and involve other ARS laboratories as well as local, state, national, and international government, academic, and private sector laboratories, institutions, and organizations. The Center Director will provide systematic, coordinated planning to achieve broad, goal-oriented research results and to ensure transfer of technology to producers, consumers, and industry. The incumbent must establish and maintain effective work relationships with federal and state action and regulatory agencies, cooperators, and representatives of consumers and industry groups. A Ph.D. in a discipline related to the position is highly desirable. Salary range is $122,000 to $138,000. For program information, please contact: **Dr. Karl Narang, Area Director; Telephone: 706-546-3311; e-mail: skn@saa.ars.usda.gov.** The complete vacancy announcement and information about how to apply is found at **website: http://www.afm.ars.usda.gov/divisions/hrd/vacancy/** or contact **Human Resources Division; Telephone: 301-504-1448.** Applications must be received by June 24, 2002. *USDA, ARS is an Equal Opportunity Employer.*

RESEARCH MANAGER

The U.S. Geological Survey seeks a permanent Research Manager (salary range: $78,265 to $101,742 per annum) for the Patuxent Wildlife Research Center in Laurel, Maryland. Duties include research program planning, development, and coordination of multidisciplinary scientific projects on a regional, national, and international scope. *U.S. citizenship is required.* Candidates must meet the Office of Personnel Management basic qualification requirements for this position. In addition to the basic requirements, candidates must also possess one year of specialized experience equivalent to at least the next lower grade level that is directly related to the position. To apply for the position and review the necessary requirements, see **website: http://www.usajobs.opm.gov.** The announcement numbers are ER-2002-0179 and ER-2002-0180; opens on May 13, 2002, and closes on June 24, 2002. *The U.S. Geological Survey is an Equal Opportunity Employer.*

Interdisciplinary position: **AGRICULTURAL ENGINEER/HYDROLOGIST/SOIL SCIENTIST.** GS-890/1315/470-11/12/13. U.S. Department of Agriculture, Agricultural Research Service, has a full-time permanent position in Phoenix, Arizona, as a team member on research related to the irrigation of turf and cropped land with municipal and agricultural wastewater and associated impacts on recharge and quality of underlying groundwater. The appointment will be at the GS-11 to GS-13 grade levels (starting salary range from $45,285 to $64,542 per year) depending on experience. *U.S. citizenship required.* For more detailed information, see **website: http://www.afm.ars.usda.gov/divisions/hrd/index.html** or contact: **Dr. Bert Clemmens; e-mail: bclemmens@uswcl.ars.ag.gov; Telephone: 602-437-1702, Extension 269.** Applications must include announcement number ARS-X2W-2293 and be received by 28 June 2002. *The USDA is an Equal Opportunity Provider.*

Genetics of Cardiovascular Function and Disease

UNIVERSITY OF CALGARY

Creating the future of health.

THE CARDIOVASCULAR RESEARCH GROUP (CVRG) invites applications from outstanding investigators for a full-time academic position at the Assistant Professor level or higher to develop a vigorous independent research program in the genetics of human cardiovascular function and disease within a multidisciplinary research environment. While duties include undergraduate and graduate teaching, and may also involve clinical care, 75% of time will be protected for research. This position offers an excellent opportunity for an independent research program that collaborates with a productive group of clinical and basic investigators.

Qualifications include an MD and/or PhD, at least two years of specialized training in this field, and a proven record of excellence in research. Applicants with Canadian-certifiable clinical training in cardiology are particularly encouraged to apply. The selected candidate must compete successfully for salary and operating support from the Alberta Heritage Foundation for Medical Research, the Heart and Stroke Foundation of Alberta and/or the Canadian Institutes of Health Research. We anticipate generous start-up funds will be available to a qualified candidate. Eligibility for licensure in cardiology in the Province of Alberta is required if the applicant is a cardiologist.

The CVRG comprises 19 principal investigators and their research teams with interests in the diagnosis, treatment and prevention of arrhythmias, syncope, coronary artery disease and congestive heart failure. It is located in the rapidly growing Faculty of Medicine, which is in the process of building a major new research facility. Research encompasses all aspects of cardiovascular physiology and disease including biophysics, pharmacology and molecular biology of cardiac cells and their role in arrhythmias and syncope; integrative physiology of the heart and cardiovascular system and mechanics, and excitation-contraction coupling of cardiac muscle in cardiac hypertrophy and congestive heart failure. The CVRG now intends to build aggressively on its cores of excellence in molecular biological and clinical studies of cardiovascular diseases. For further information see: **http://www.cvr.ucalgary.ca/**. Calgary is a vibrant, multicultural city of ~1,000,000 near the Rocky Mountains, Banff National Park and Lake Louise with health care facilities serving a larger regional population of about two million.

By **June 30, 2002**, please submit a curriculum vitae and a statement of research interests and arrange to have three letters of reference sent directly, to:

Dr. Robert Sheldon
Chair, Cardiovascular Research Group
Faculty of Medicine, 3330 Hospital Drive N.W.
Calgary, Alberta, Canada T2N 4N1

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. The University of Calgary respects, appreciates and encourages diversity.

www.ucalgary.ca

Bacterial Pathogenesis Faculty Position

Departments of Microbiology & Immunology, Pathology and The Center for Biodefense The University of Texas Medical Branch

The Departments of Microbiology and Immunology and Pathology invite applications for a tenure-track position at the Assistant Professor level. Applicants should have a M.D. and/or Ph.D. and will be expected to develop, or have previously established, an independent research program relating to *Bacillus anthracis*, *Francisella tularensis*, or *Yersinia pestis* with an emphasis on molecular pathogenesis. Individuals with research programs focused on Class B BWA may also be considered. Current research programs include molecular pathogenesis of bacterial and viral infections, host defenses, vaccine development, investigation of intracellular pathogens, with NIH training programs in tropical and emerging infectious diseases, and mucosal immunology. We offer an ideal interactive environment with complementary programs in emerging and tropical diseases through the Center for Tropical Diseases, biohazardous pathogens with the pending construction of a BSL 4 laboratory, and the newly established Vaccine Development Center and Center for Biodefense. A competitive start-up package and modern laboratory space are available. For full consideration, please send a curriculum vitae, a summary of past accomplishments, future research plans, and the names, and contact information of four references to:

Bacterial Pathogenesis Search Committee
The University of Texas Medical Branch
301 University Boulevard
Galveston, TX 77555-1019

For additional information about the departments, visit:
http://microbiology.utmb.edu
http://www.utmb.edu/pathology/

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Join us in our mission to transform technology through research in materials processes.

Established in 1996, the **Institute of Materials Research and Engineering (IMRE)** conducts research in selected fields of materials science and engineering. As part of our continuing development and expansion, we aim to enlist the best talents to join our dynamic team to build IMRE into a center of excellence for materials research. We currently have openings for:

A. MANAGERS in core competence areas:

- Materials Physics
- Biomaterials, Organic and Inorganic Materials
- Micro and Nanosystems
- Optoelectronics and display systems

Candidates must have at least 5-years experience in managing research in an academic or industrial research setting and an outstanding record of team and personal accomplishments. They must hold a PhD degree in a relevant area.

B. PROJECT LEADERS in research areas including:

- Optoelectronics
- Organic Light-emitting display and devices
- Functional polymers, nanocomposites and hybrid materials
- Biomaterials and tissue engineering
- Materials Characterization
- Materials Theory and Modelling
- Micro- and Nano- Systems:- sensor and actuator materials, micromachining, nanopatterning, and process integration

Project leaders are expected to formulate their own research plans and lead a team to execute their ideas. Research plans must be novel, feasible and have high technological or academic impact. They must hold a PhD degree and have at least two years postdoctoral working experience with an outstanding track record. The PhD degree should be in one of the following areas: Physics, Chemistry, Materials Science, Medical or Biological Sciences, Chemical Engineering, Mechanical Engineering or Electrical Engineering.

Candidates will be selected based on their qualifications and accomplishments. Remuneration will commensurate with qualification and experience.

Interested candidates, please write to us, enclosing a two-page research plan, full resume (stating current and expected salaries), copies of academic transcripts, a list of publications, a list of references and a recent non-returnable photograph, to the address below:

IMRE

The Recruitment Officer
Institute of Materials Research and Engineering
3 Research Link Singapore 117602
Website: **http://www.imre.org.sg** • Fax: **(65) 6872-5373**

We regret that only shortlisted candidates will be notified.

POSITIONS OPEN

FACULTY POSITIONS: virology and bacterial pathogenesis. The Department of Microbiology at U.T. Southwestern Medical Center is seeking new faculty at the **ASSISTANT PROFESSOR** (tenure-track) level. Faculty will be expected to develop front-rank, competitive, independent research programs in their chosen fields and contribute to the teaching of medical and graduate students. For virology candidates, some preference may be given to those with interests in STDs (e.g., HSV, HPV) or bioterrorism agents, but all outstanding candidates are encouraged to apply. For bacterial pathogenesis, areas of particular interest include STDs, emerging/reemerging pathogens, cellular microbiology, bioterrorism agents, and opportunistic infections. Attractive start-up packages including a competitite salary and new laboratory space are available to conduct research in an expanding, dynamic environment. For exceptional candidates, an Endowed Scholars Program offers start-up funds of $600,000 over a four-year period. More information can be found at **website: http://www3.utsouthwestern.edu/microbiology/**. Candidates should have a Ph.D. and/or M.D. degree with at least two years of postdoctoral experience and an exceptional publication record. Candidates please forward curriculum vitae, three letters of recommendation, two or three representative publications, and a brief summary of future research to: **Dr. Michael V. Norgard, Chair, Department of Microbiology, U.T. Southwestern Medical Center, 6000 Harry Hines Boulevard, Dallas, TX 75235-9048. FAX: 214-648-5905.** *U.T. Southwestern is an Equal Opportunity University.*

CELLULAR BIOLOGIST POSITION AVAILABLE

The Creighton University Biomedical Engineering (CUBE) Center and the Department of Orthopaedics, Omaha, Nebraska, are presently in the process of recruiting a Cellular Biologist to join our faculty. Candidates should have extensive training in cellular biology with an emphasis on skeletal cell biology. The successful candidate will be offered a highly competitive salary and availability of tenure commensurate with academic rank. The overall package will include funds for laboratory start-up and relocation. Our goal is to develop a joint program centered within the Department of Orthopaedics and the CUBE Center. Creighton University is committed to fostering collaboration between basic sciences and the clinical aspects of orthopaedic research. For more information, please contact: **Reginald Q. Knight, M.D.; Telephone: 402-280-4342; FAX: 402-280-4584; e-mail: rqknight@creighton.edu**.

VICE PRESIDENT, LIFE SCIENCES

Established, growing biotechnology company is looking for a Vice President of Life Sciences. This executive-level management position will report directly to the President and will direct the work of the Organic Chemistry, Biochemistry, Enzyme Immunoassay, and Analytical Chemistry Departments. The successful candidate will have a Ph.D. in chemistry/biochemistry and a minimum of eight years of experience in pharmaceutical/biotechnology with at least five of those involving supervision and management. Must be able to communicate and collaborate with outside consultants and motivate a productive workforce of several dozen Scientists and technicians. Cayman Chemical offers a relaxed atmosphere and competitive salary and benefit packages. Interested candidates should send résumé to: **Cayman Chemical, Attention: Human Resources, 1180 East Ellsworth Road, Ann Arbor, MI 48108. E-mail: hr@caymanchem.com**.

SCIENTISTS, RESEARCH ASSOCIATES
Medicinal Chemistry

How to apply: FAX your résumé to **FAX: 510-293-6857** or mail to: **Metabolex, Inc., Human Resources Department, 3876 Bay Center Place, Hayward, CA 94545.**

Equal Opportunity Employer; Minorities/Females/Disabled/Veterans.

POSITIONS OPEN

FACULTY POSITION

The Department of Biochemistry of the Kirksville College of Osteopathic Medicine invites applications for a full-time, tenure-track position at the rank of **ASSISTANT PROFESSOR**. The Department is currently composed of six full-time faculty members and is committed to excellence in both education and research. Candidates must have a Ph.D. in biochemistry plus at least two years of postdoctoral experience and *U.S. residency*. Preference will be given to individuals with teaching experience at the medical school level and with an established record of research productivity. Teaching responsibilities will include full participation in the lecture, conference, and laboratory sections of two courses in biochemistry and one in nutrition. Research responsibilities will include maintaining a productive research program and securing the extramural multiyear funding to support this program. Although candidates in all fields of biochemistry can be considered, a backgound in endocrinology is desirable. Applications must be received by July 1, 2002. Applications should submit a résumé, copies of two or three recent publications, an outline of their proposed research program, and the names and addresses of at least three references to: **Dr. Richard J. Cenedella, Chair, Department of Biochemistry, Kirksville College of Osteopathic Medicine, 800 West Jefferson, Kirksville, MO 63501**.

The Kirksville College of Osteopathic Medicine is an Equal Opportunity/Affirmative Action Employer.

POSTDOCTORAL/RESEARCH ASSOCIATE POSITION
Evolutionary Biology

The Plant Genome Initiative at Rutgers University (**website: http://pgir.rutgers.edu/**) seeks an applicant who applies evolutionary studies to comparative genomics in cereal plants (see *NSF Award* Number 9975618 for abstract). Applicants with experience in large molecular weight DNA analysis, DNA sequencing, and computational tools are preferred. Requirements include a Ph.D. in evolutionary biology or related field and good writing skills because of the opportunity to publish extensively. Candidates with postdoctoral experience would qualify for **RESEARCH ASSOCIATE** level. Please **e-mail: messing@waksman.rutgers.edu** or mail your application and ask three references to e-mail or mail their recommendation to: **Dr. Joachim Messing, Director, Waksman Institute, Rutgers, The State University of New Jersey, 190 Frelinghuysen Road, Piscataway, NJ 08854-8020**.

Several **POSTDOCTORAL POSITIONS** are available in the Department of Pharmaceutical Sciences in the following areas: pancreatic β-cell dysfunction (**Dr. Anjan Kowluru; e-mail: akowluru@wizard.pharm.wayne.edu**) and cellular mechanisms of cutaneous drug reactions (**Dr. Craig Svensson; e-mail: cks@wizard.pharm.wayne.edu**). Potential candidates must have background in biochemistry, cell biology, immunology, pharmacology, or related field. Further information on specific positions available at **website: http://wizard.pharm.wayne.edu/psc.html**. Applicants may send curriculum vitae and three references to Investigator electronically or to: **Department of Pharmaceutical Sciences, Wayne State University, Detroit, MI 48202**.

POSTDOCTORAL POSITION to study the receptor(s) for the IL-7/HGF bera chain hybrid cytokine (*J. Immunol.* **167**:3550, 2001). Experience in molecular biology and membrane receptor analysis preferred. Send curriculum vitae, statement of research interests, and names of three references to: **Dr. Irving Goldschneider, Department of Pathology, University of Connecticut Health Center, 263 Farmington Avenue, Farmington, CT 06030-3105. FAX: 860-679-2936; e-mail: zeff@neuron.uchc.edu**. *UCHC is an Equal Opportunity Employer; Minorities/Females/Veterans/Persons With Disabilities.*

POSITIONS OPEN

TENURE-TRACK POSITION
Department of Anatomy and Cell Biology
University of Saskatchewan

The Department of Anatomy and Cell Biology invites applications for a tenure-track appointment at the rank of **ASSISTANT PROFESSOR** effective July 1, 2002. Areas of departmental research include cell and molecular biology, developmental biology, and neurobiology. A variety of cell and molecular biology techniques are used by faculty members. With the construction of a synchrotron on campus, the appointee will have the opportunity to use synchrotron X-ray and infrared analyses in his/her research. Applicants must have postdoctoral training and a strong research program involving the application of molecular biology/cell biology approaches in one of the above areas. The successful candidate will be expected to teach gross anatomy. Previous teaching experience will be considered an asset. An application including curriculum vitae; names of three references, and a statement of previous teaching experience and research interests should be submitted by August 31, 2002, to: **Bernhard H. J. Juurlink, Department of Anatomy and Cell Biology, University of Saskatchewan, 107 Wiggins Road, Saskatoon S7N 5E5 SK Canada**. For further information about the Department, see **website: http://www.usask.ca/anatomy/** and for the College and its programs, see **website: http://www.usask.ca/medicine/**.

The University is committed to Employment Equity. Members of designated groups (women, aboriginal people, people with disabilities, and visible minorities) are encouraged to self-identify on their applications. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority.

POSTDOCTORAL RESEARCH FELLOWSHIP

A Postdoctoral position is currently available in the Department of Neurology and Developmental and Molecular Biology (DMB) of the Albert Einstein College of Medicine in New York City. The position is funded to study the regulation of cell cycle and differentiation in normal cells and their alterations in cancer of the nervous system. The main focus of our laboratory is to study the role of the protein Id2 in cell cycle, differentiation, and tumorigenesis. The ideal applicant should be highly motivated and should have expertise with cellular and molecular biology techniques. Previous work with transgenic animals will also receive high consideration. Applicants should send curriculum vitae and the names and addresses of three references to: **Dr. Antonio Iavarone, Department of Neurology, Albert Einstein College of Medicine, Jack and Pearl Resnick Campus, 1300 Morris Park Avenue, Bronx, NY 10461. Telephone: 718-430-3347; FAX: 718-430-8785; e-mail: iavarone@aecom.yu.edu**. *Equal Opportunity Employer.*

POSTDOCTORAL POSITIONS

A Postdoctoral position is available to study signal transduction in tumors. The areas include signaling by a naturally occurring variant EGF receptor, the Gab1 docking protein, JNK in tumorigenesis, and proteolytic processing of CD44 (*Nature* **379**:560; *PNAS* **94**:12419; *JBC* **273**:2817; *J. Cell Biol.* **155**: 755). A second Instructor/Postdoctoral position is available with the Department of Neurosurgery. This involves assisting a clinical trial using antisense/dendritic cell therapy for brain tumors (*J. Clin. Oncol.* **19**:2189). Previous experience in cellular immunology is essential and experience with tumor vaccines is preferable. Based on qualifications, the applicant may qualify for a faculty position. Please send or e-mail curriculum vitae to: **Albert Wong, M.D., Kimmel Cancer Institute, Thomas Jefferson University, BLSB 1002, 233 South 10th Street, Philadelphia, PA 19107 U.S.A. E-mail: albert.wong@mail.tju.edu**. *Equal Opportunity Employer.*

PENN
UNIVERSITY of PENNSYLVANIA

POSTDOCTORAL POSITION

Sensory System Signal Transduction

Postdoctoral position to study molecular mechanisms of proliferation and differentiation in the inner ear. Biochemical and molecular biologic approaches are used to study signaling involved in hair cell regeneration and regulation of potassium channel gene expression. Strong background in biochemistry and/or molecular biology required.

Send CV, statement of research experience, and names of three references to:

Dr. J. Carl Oberholtzer
Dept. of Path. & Lab. Med.
613B Stellar-Chance Labs
University of Pennsylvania
School of Medicine
422 Curie Boulevard
Philadelphia, PA. 19104
FAX: (215) 573-7738
Email: oberholt@mail.med.upenn.edu

Equal Opportunity/Affirmative Action employer. Women and minority candidates are encouraged to apply.

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For more than three decades now, SCIENTIFIC PROTEIN LABORATORIES, INC., has been a leading supplier of high quality bulk pharmaceuticals. Our Active Pharmaceutical Ingredients serve the pharmaceutical, food, veterinary and diagnostic industries on a global scale. As a division of Wyeth, we are setting the pace for the business of tomorrow.

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We are expanding our contract drug development and manufacturing business, and are seeking a highly motivated and experienced molecular biologist to enhance our expertise in the process and assay development areas. Reporting directly to the Vice President, Business Development & Research, your responsibilities will include conducting process and assay development, lab scale and pilot scale fermentation and purification of pharmaceutical products, communicating with clients, and project management. This position requires a PhD and 5+ years postdoctoral experience in Molecular Biology or a closely related field. Experience in the biotechnology/pharmaceutical industry is highly desirable. Selected candidate must have excellent oral, written and interpersonal skills. Good organization and planning skills, excellent project management skills, attention to detail, and effective problem-solving skills are required. The ability to travel, on occasion, is required.

Our organization offers a competitive salary, a comprehensive benefits package and a pleasant work environment. Forward resume and cover letter to: **Scientific Protein Laboratories, Attn: Human Resources, 700 E. Main Street, Waunakee, WI 53597-0158. Fax: 608-849-4053. E-mail: splhr@splpharma.com** Equal Opportunity Employer M/F/D/V. Principals only please.

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nature

seeks a **BIOLOGY EDITOR**

Nature the international weekly journal of science seeks to appoint a Biology Editor to join a team dedicated to publishing the world's best original research in the biological sciences. The successful candidate will play a key role in determining how biological sciences are represented–through the selection and preparation of manuscripts for publication and by acting as *Nature*'s interface with the relevant research communities. This is a demanding and intellectually stimulating position, and calls for a keen interest in the practice and communication of science.

The ideal candidate will have a strong track record of research in molecular biology, in particular in the areas of gene expression (including transcription and DNA replication/translation), but highly qualified candidates from other areas of the biological sciences are also encouraged to apply. Applicants should hold or expect shortly to receive a PhD or equivalent degree.

This position will be based in *Nature*'s San Francisco offices. The job will involve extensive travel to meetings and laboratories, both in the US and internationally.

Applicants should send a CV (including their class of degree and a brief account of their research and other relevant experience), a concise discussion of which recent scientific developments they have found particularly exciting (stating why) and a brief covering letter. Mark the application "Biology editor", and send it to Human Resources, Nature Publishing Group, 345 Park Avenue South, 10th Floor, New York, NY 10010; email: admin@natureny.com; fax: 212-696-9594 as soon as possible and **no later than Friday June 7th**. Please find more information at http://npg.nature.com. EOE

Faculty Position in Computational Modeling of Biological Systems

The Johns Hopkins University Department of Biomedical Engineering invites applications for a tenure-track faculty position in the general area of computational modeling of biological systems, with a particular interest in computational approaches to problems in functional genomics and systems biology. Appointments at all academic levels will be considered. The successful candidate's primary appointment will be in the Department of Biomedical Engineering (www.bme.jhu.edu) of the Whiting School of Engineering and he/she will be a member of the Whitaker Biomedical Engineering Institute (www.wbmei.jhu.edu). This newly formed Institute provides a highly interactive environment in which multidisciplinary teams of engineers, biologists, computer scientists, and mathematicians address biomedical problems of fundamental importance. The Institute builds on internationally recognized research programs based in the School of Medicine and the Whiting School of Engineering. New faculty will be based in Clark Hall, a recently completed Institute facility on the Homewood Campus of Johns Hopkins University. Successful applicants will be expected to establish independently funded research programs, and will participate in the graduate and undergraduate educational activities of both the Department of Biomedical Engineering and the Institute.

Interested applicants should send a curriculum vitae, names of three references, and a statement of future research goals to: **Dr. Murray Sachs, Whitaker Biomedical Engineering Institute, The Johns Hopkins University, 3400 N. Charles Street, 316 Clark Hall, Baltimore, Maryland 21218 USA**. In order to ensure full consideration, applications should be received no later than August 1, 2002.

The Johns Hopkins University is an EEO/AA employer. Women and minorities are strongly encouraged to apply.

POSITIONS OPEN

RESEARCH ASSOCIATE/ POSTDOCTORAL FELLOW

The CONRAD Intramural Preclinical Research Program at the Eastern Virginia Medical School (EVMS) is seeking qualified, motivated Investigators to work on discovery, characterization, and development of novel molecules with antifertility and antimicrobial properties under the direction of **G. Doncel, M.D., Ph.D.** Main research lines in the laboratory are (1) cellular and molecular mechanisms common to mammalian fertilization and microbial infection. This is a multidisciplinary collaborative project focused on ligand-receptor recognition, signal transduction, and membrane dynamics. Emphasis is placed on discovery and characterization of novel compounds with antifertility and antimicrobial activity, particularly against STD pathogens such as HIV. Other projects in the laboratory include (2) signal transduction mechanisms controlling sperm function, (3) characterization of biological markers of vaginal inflammation, and (4) cellular and molecular mechanisms mediating spermatogenic arrest in male contraception.

Applicants should have a Ph.D. or equivalent degree. Expertise in reproductive biology, microbiology, or pharmacology is preferred. Qualified candidates please send updated curriculum vitae, brief description of career goals and interests, references, and salary requirements to: **Gustavo Doncel, M.D., Ph.D., Director, CONRAD Intramural Preclinical Program, Eastern Virginia Medical School, 601 Colley Avenue, Norfolk, VA 23507. E-mail: doncelgf@evms.edu.** *Affirmative Action/Equal Opportunity Employer/drug free.*

PROFESSOR OF IMMUNOLOGY AND INFECTIOUS DISEASES Harvard School of Public Health

HSPH is seeking applications for a Professor with expertise in molecular immunology. Applicants should have an established research program emphasizing cell biological, molecular, or genomic approaches to address important questions of gene regulation and signal transduction in the immune system. Broad research interest in diseases of public health importance and demonstrated capacity for multidisciplinary research preferred. The successful candidate will participate actively in both research and training programs. Send curriculum vitae, letter of current and future research interests, and the names and contact information for three references to: **Chair, Senior Search in Immunology and Infectious Diseases, c/o Office for Academic Affairs, HSPH, 677 Huntington Avenue, Room 1010, Boston, MA 02115.**

Harvard University is committed to increasing the number of women and minorities in its faculty and encourages applications from such individuals.

The Nature Publishing Group seeks a full-time **COPY EDITOR** for its prestigious journal *Nature Genetics* to perform substantial editing of complex technical manuscripts to make them clear and consistent with our style. Requires advanced degree in genetics/molecular biology, excellent literary abilities, precise attention to detail, strong interest in communication of scientific ideas, and preferably one to two years of scientific copy editing experience. Send cover letter; salary history; and résumé to: **Human Resources, Nature Publishing Group, 345 Park Avenue South, New York, NY 10010-1701** by May 31, 2002. **FAX: 212-696-9594; e-mail: admin@natureny.com.** Find more information at **website: http://npg.nature.com.** *Equal Opportunity Employer.*

POSTDOCTORAL POSITION to study cardiac muscle gene expression, apoptosis, and intracellular signaling events involved in various forms of heart disease. We use transgenic and gene-targeted mouse models as well as molecular approaches in cell-based systems. E-mail your curriculum vitae to: **Jeffery D. Molkentin, Ph.D., Children's Hospital, 3333 Burnet Avenue (MLC 7020), Cincinnati, OH 45229 U.S.A. E-mail: jeff.molkentin@chmcc.org.** *Equal Opportunity Employer.*

POSITIONS OPEN

POSTDOCTORAL POSITIONS Molecular Microbiology and Microbial Pathogenesis

Postdoctoral positions funded by an NIH training grant are available at the University of Colorado Health Sciences Center in Denver. *All applicants must be United States citizens or permanent residents.* Training on molecular mechanisms of bacterial infections, viral infections, innate immunity, and cytokine biology is available with members of the training program faculty. Candidates with a Ph.D. or an equivalent Doctoral degree in basic science must have experience in microbiology, bacteriology, virology, immunology, molecular biology, genetics, biochemistry, cell biology, or a closely related field. Candidates with an M.D., D.O., D.V.M., or an equivalent Doctoral degree in clinical science must have demonstrated interest and competency for laboratory research related to our training program. Individuals from groups currently underrepresented in biomedical research are encouraged to apply. Stipend is determined by years of prior postdoctoral experience. Submit curriculum vitae, bibliography, representative publications, and names of three professional references to: **Dr. Randall Holmes, Training Program Director, Department of Microbiology, Box B-175, University of Colorado Health Sciences Center, 4200 East Ninth Avenue, Denver, CO 80262.** *The University of Colorado Health Sciences Center is committed to Equal Opportunity/Affirmative Action.*

POSTDOCTORAL/JUNIOR FACULTY POSITION is available in the laboratory for myeloma biology at the Myeloma Institute for Research and Therapy, University of Arkansas for Medical Sciences, to study myeloma-microenvironment interactions. Projects emphasize elucidating the role of myeloma bone disease in disease progression and the role of neoangiogenesis in the disease, using *ex vivo* and *in vivo* studies with the SCID-hu model. The laboratory is part of a prominent and diverse program in myeloma biology and therapy that consists of and offers opportunities for close interactions with Investigators in genomics, proteomics, immunotherapy, and bone histomorphometry.

The ideal candidate will have obtained a Ph.D. or equivalent degree and have a strong background in cellular and molecular biology including viral vector preparation. To apply, please send curriculum vitae, bibliography, and the names of three references to: **Joshua Epstein, D.Sc., Professor of Medicine, Myeloma Institute, UAMS, 4301 West Markham Street, Slot Number 776, Little Rock, AR 72205. Telephone: 501-686-5274; FAX: 501-686-6442; e-mail: epsteinjoshua@uams.edu.**

BIOINFORMATICS TOOLS FOR COMPARATIVE GENOMICS July 15–19, 2002 University of California, Berkeley/LBNL/NHLBI

Designed for Postdoctoral, Medical, and especially Cardiovascular **RESEARCHERS** interested in applying bioinformatics tools to their research. Techniques include database searches, annotation, SNPs, microarray analysis, and more. No tuition. For further information, **e-mail: pgaworkshop@lbl.gov; Telephone: 510-486-4162.** Apply before June 1, 2002, at **website: http://pga.lbl.gov/workshop.**

POSTDOCTORAL POSITION

To work on discovery of novel antimicrobials using a recently developed approach to grow uncultivatable bacteria (see this issue of *Science*, 10 May 2002). Applicants must have a strong background in one or more of the following areas: environmental microbiology, molecular microbiology, natural product isolation. Please e-mail curriculum vitae and names of three references to: **Kim Lewis, Department of Biology, Northeastern University, Boston, MA 02115. E-mail: k.lewis@neu.edu; website: http://www.biology.neu.edu/lewis.html.**

POSITIONS OPEN

POSTDOCTORAL POSITIONS available immediately in the Bone and Mineral Metabolism Unit, Harvard Institutes of Medicine, at Beth Israel Deaconess Medical Center, Harvard Medical School. The successful applicant can join the following projects: (1) characterization of the bimolecular interactions of parathyroid hormone (PTH) and its G protein-coupled receptor. These studies employ photoaffinity scanning of wildtype and mutant receptors (see *J. Biol. Chem.* **275:9**–17, 2000). (2) Study of the bimolecular interactions between RGD-containing ligand and $\alpha v\beta 3$ integrin receptors employing peptide and protein chemistry, photo cross-linking, and molecular biology techniques (see *Biochemistry* **39:** 11014–11023, 2000). (3) Elucidate the cellular and molecular mechanisms underlying the bone anabolic activity of PTH (see *J. Bone and Mineral Metabolism* **16:**1665–1673, 2001). These *in vitro* and *in vivo* studies will involve pharmacology, intracellular signaling, and *in vivo* genetics.

Our laboratory offers interdisciplinary training in a premier research environment. Studies are carried out across several disciplines such as cellular and molecular biology, transgenic and knockout models, pharmacology, and peptide chemistry. The laboratory is located at the Harvard Institutes of Medicine on the campus of the Harvard Medical School in Boston, Massachusetts.

Please send curriculum vitae; summary of research experience; statement of research interests; copies of relevant publications; and names, addresses, and telephone numbers of three references to: **Dr. Michael Rosenblatt, M.D., Bone and Mineral Metabolism Unit, Department of Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School, 330 Brookline Avenue (HIM 944), Boston, MA 02215. Telephone: 617-667-1720; FAX: 617-667-4432; e-mail: michael_rosenblatt@hms.harvard.edu.**

VIRGINIA COMMONWEALTH UNIVERSITY Department of Internal Medicine Division of Hematology/Oncology Richmond, Virginia

The Virginia Commonwealth University Division of Hematology/Oncology is seeking to recruit for a faculty position at the rank of **INSTRUCTOR.** The candidate must have a Ph.D. degree with postdoctoral research experience utilizing advanced molecular techniques and experience working in the area of translational studies aimed at developing a basis for using signal transduction and cell cycle modulatory agents in the treatment of hematologic malignancies. The incumbent must also have a successful publication record and the ability to train others in how to perform advanced molecular biology techniques. The incumbent must have four to six years of experience; the ability to design, conduct, and supervise a research project; and be first author on multiple publications in peer-reviewed scientific journals. Experience in stable and transient gene transfection, kinase assays, leukemia cell biology, and genetic engineering is highly desirable. The application deadline is June 15, 2002. Interested applicants should forward curriculum vitae and three reference letters to: **Karen Scott, VCU Health System, Hematology/Oncology, P.O. Box 980230, Richmond, VA 23298-0230. E-mail: kgscott@hsc.vcu.edu.**

Virginia Commonwealth University is an Equal Opportunity/Affirmative Action Employer. Women, minorities, and persons with disabilities are encouraged to apply.

POSTDOCTORAL POSITIONS to study (1) novel molecular chaperones that assemble, degrade, or regulate secretion of apolipoprotein B or (2) atypical secretion of proteins of medical importance from mammalian and bacterial cells. Requires a strong background in molecular and cell biology or bacteriology. E-mail résumé with names of three references to: **Steve Chuck, Molecular Medicine Unit, Beth Israel Deaconess Medical Center and Harvard Medical School. E-mail: schuck@caregroup.harvard.edu.**

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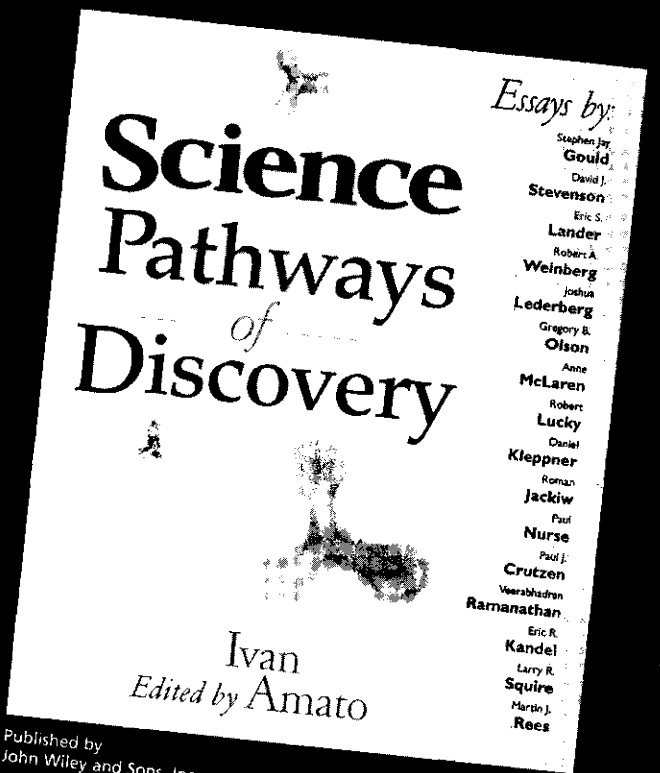

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University of Wisconsin-Madison

Director
The Waisman Center

The University of Wisconsin-Madison announces a search for a director of the Waisman Center. The Center is one of nine national centers that encompasses a Mental Retardation/Developmental Disabilities Research Center and a Center for Excellence in Developmental Disabilities. The director will provide administrative and scientific leadership in basic and applied research in the social, behavioral, and biomedical sciences within the disciplines of human development, developmental disabilities, and neurodegenerative diseases. For more information see http://www.ohr.wisc.edu/pvl/pv_041961.html

Qualifications: A Ph.D. in Social, Behavioral, or Biomedical Science field. Must be tenure eligible as a faculty member and have a record demonstrating excellence in research and scholarly publications with wide recognition in a field of social, behavioral or biomedical science. Administrative experience is required which includes budget, personnel, public policy issues and successful program development. Experience in directing an academic research center is highly desirable. A demonstrated ability to obtain external financial support, particularly from NIH or NIH-equivalent sources through competitive mechanisms that will enhance and strengthen Waisman Center programs. A demonstrated commitment to excellence and scientific leadership.

Salary: Competitive and commensurate with experience.

Application Procedure:

1. A letter of interest and qualifications relative to the requirements and reasons for seeking this position.
2. Comprehensive curriculum vitae.
3. List of three references including names, addresses, telephone number, and e-mail address.

Submit Application Materials to:

Professor Richard Davidson, Chair
c/o Nancy Moltumyr
University of Wisconsin-Madison
Graduate School
Room 333 Bascom Hall, 500 Lincoln Drive
Madison, WI 53706
(608) 262-1044

Applications and nominations must be received by June 20, 2002 to ensure consideration. Later applications and nominations may also be considered.

Unless confidentiality is requested in writing, information regarding the applicants must be released upon request. Finalists cannot be guaranteed confidentiality.

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University of Pennsylvania

School of Medicine
Department of Obstetrics and Gynecology, Center for Research on Reproduction and Women's Health
Professor - Tenure Track

The Department of Obstetrics and Gynecology at the University of Pennsylvania's School of Medicine seeks candidates for a Full Professor position in the tenure track. Applicants must have an M.D. or Ph.D. or equivalent degree, and have demonstrated excellent qualifications in education and research.

The successful candidate will be named the Celso Ramon-Garcia Professor in Reproductive Biology and join a distinguished research and training program in the Center for Research on Reproduction and Women's Health. Applicants should be established investigators. Preference will be given to candidates with expertise in germ and stem cell biology.

Please submit curriculum vitae, letter of interest, and three reference names to:

Jerome F. Strauss , III, M.D., Ph.D.
L. Mastroianni Jr Professor & Director
Center for Research on Reproduction and Women's Health
BRB II/III Suite 1354
421 Curie Boulevard
Phila, PA 19104-6160
fax: 215-573-5408
jfs3@mail.med.upenn.edu

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USDA Agricultural Research Service

RESEARCH CHEMIST/ SOIL SCIENTIST, GS-11/12/13
Beltsville, Maryland

The Animal Manure and By-products Laboratory, Animal and Natural Resources Institute, Beltsville Agricultural Research Center, Beltsville, Md., is seeking applications for a research scientist position to conduct studies on the fate and transport of organic and inorganic degradation products from foundry sand additives and of component blends using foundry sand and agricultural by-products. The mission of the laboratory is to discover and develop animal management strategies and management techniques for agricultural and municipal/industrial by-product application. Salary is commensurate with experience. U.S. CITIZENSHIP REQUIRED.

Applicants must address specific knowledge, skills, and abilities indicated in vacancy announcement **# ARS-X2E-2289**. Applications must be submitted by June 10, 2002. For information on research program contact **Dr. Louis Gasbarre at lgasbarr@anri.barc.usda.gov**. For copy of vacancy announcement, application information, or forms call **301-504-1369**, or view announcement **# ARS-X2E-2289** on Internet under **www.ars.usda.gov**.

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- E-mail: info@broadmedical.org
  Call: 310-954-5091

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BMBF Competition "Nanotechnology"

The Federal Ministry of Education and Research (BMBF) intends to give **young scientists** from Germany and abroad who are **experienced in heading a research group** the opportunity to work on new, basic research-oriented approaches in the nanosciences in Germany, independently and in their own team in order to

- generally improve career prospects in industry or science in Germany or
- encourage self-employment in the private sector (setting up businesses or spin-out companies).

The teams (staff: 1 group leader, 1-2 postdocs, 1-2 doctoral students, 1-2 technicians; investments and expendable materials: depending on the technical support required in each case) are to work for a period of 5 years on topics covering the technological use of physical, i.e., mechanical, electronic and optical phenomena characteristic of the nanometer scale (not mainstream developments aimed at merely reducing the size of today's microstructures, incl. microelectronics and those phenomena which can be achieved with individual molecules).

Non-repayable grants will be awarded to the projects selected by a jury.

Deadlines: 15 June 2002 (first call) and 15 October 2002 (second call).

Further information:
Dr G. Schumacher, PTJ-FZJ, D-52425 Juelich
tel +49(0)2461 61-3545; e-mail: G.Schumacher@fz-juelich.de

POSTDOCTORAL FELLOWSHIP POSITION
The Breast Center
Baylor College of Medicine

The Breast Center at Baylor College of Medicine in Houston, Texas, invites applications for a Postdoctoral training program in translational breast cancer research. We seek to recruit outstanding individuals who are interested in a unique program offering a diverse and organized training in clinical and basic biology of breast cancer. Research areas such as hormone action/endocrine therapy, molecular genetics and breast cancer evolution, growth factors and signal transduction, normal breast development and breast cancer prevention, and gene therapy and novel treatment strategies are focuses of the Breast Center faculty.

Candidates with a Ph.D. or an M.D. degree *and with U.S. citizenship or permanent resident status* should submit curriculum vitae and two letters of reference before September 2002 to:

Dr. Suzanne A. W. Fuqua, Ph.D.
Program Director
Translational Breast Cancer
Research Training Program
Breast Center
Baylor College of Medicine
One Baylor Plaza, MS: 600
Houston, TX 77030
FAX: 713-798-1642

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UNIVERSITY OF MAINE. SEARCH EXTENDED. The Department of Biochemistry, Microbiology, and Molecular Biology (**website: http://www.umaine.edu/bmmb**) seeks applicants for a tenure-track, 75% research, 25% teaching, academic-year **FACULTY POSITION** in molecular/environmental toxicology as one of several hires in genomics. Preference will be given to individuals who apply genomics approaches using small animal model systems, e.g., mice or zebrafish, to study environmental toxicants that impact human health. This individual will be expected to team teach a graduate-level toxicology course and a multiinstitutional genomics course. Contact: **Dr. Rebecca Van Beneden, Molecular/Environmental Toxicology Search Committe, 5751 Murray Hall, University of Maine, Orono, ME 04469-5751. E-mail: rebeccav@maine.edu; website: http://www.umaine.edu/hr/jobs/default.htm.**

POSTDOCTORAL POSITION available immediately to study regulation of protein kinase C and related signaling molecules in *in vitro* and cell-based systems. Relevant experience in molecular biology and/or fluorescence imaging and cell biology sought. Applicants should be highly motivated and have a Ph.D. in biochemistry, molecular biology, cell biology, or related discipline. Send statement of research interests, curriculum vitae, and names of three references to: **Dr. C. D. Stubbs, Department of Pathology, Cell Biology, and Anatomy, Thomas Jefferson University, Room 271 JAH, 1020 Locust Street, Philadelphia, PA 19107. E-mail: chris.stubbs@mail.tju.edu; website: http://www.pkclab.com/.** *Thomas Jefferson University is an Equal Opportunity/Affirmative Action Employer.*

POSTDOCTORAL POSITIONS in molecular pathogenesis of Epstein-Barr (**Drs. Kieff, Wang**) or Kaposi's sarcoma herpesvirus (**Drs. Desrosiers, Jung, Kaye**) infections and oncogenesis at Harvard Medical School. Candidates should have a strong background in biochemistry, genetics, cell biology, virology, or immunology. Submit curriculum vitae and three letters of reference by mail to: **Harvard Viral Oncology Program, c/o Elliott Kieff, 181 Longwood Avenue, Boston, MA 02115. E-mail: elliott-kieff@med.harvard.edu.**

POSITIONS OPEN

POSTDOCTORAL POSITIONS IN IMMUNOLOGY

Applicants are invited to study peripheral T cell tolerance and regulation of gene expression in lymphocytes. Candidates should possess a Ph.D. or M.D. degree and experience in cellular and molecular immunology (see **website: http://www.missouri.edu/~mmiwww/hz.htm**). Submit curriculum vitae and the names of three references to: **Professor Zaghouani, University of Missouri, School of Medicine, Department of Molecular Microbiology and Immunology, M616 Medical Sciences Building, Columbia, MO 65212. E-mail: zaghouanih@health.missouri.edu.** *The University of Missouri is an Affirmative Action/Equal Opportunity Employer. Women and members of traditionally underrepresented minorities are encouraged to apply. To request ADA accommodations, please contact our ADA Coordinator at Telephone: 573-884-7278; e-mail: hensonl@missouri.edu.*

NEUROBIOLOGY POSTDOCTORAL POSITIONS available immediately to study the cellular and molecular basis of odor and pheromone sensing in genetically altered mice (*Nature* **405:**792, 2000; *TINS* **24:**191, 2001; *Science* **294:**2172, 2001). Highly motivated candidates with a track record in either patch clamp recording, Ca2+ imaging, molecular genetics, or mouse behavior are encouraged to apply. Applicants must have a Ph.D. or M.D. Positions offer highly competitive salary/fringe benefits and interaction with Neuroscientists in the Department (**website: http://neurobiology.umaryland.edu**) and the Neuroscience Program (**website: http://neuroscience.umaryland.edu/**). Send curriculum vitae and names of three references to: **Dr. Frank Zufall, Department of Anatomy and Neurobiology, University of Maryland School of Medicine, 685 West Baltimore Street, Baltimore, MD 21201. E-mail: fzufa001@umaryland.edu.**

POSTDOCTORAL POSITION

Available to study T cell development at the American Red Cross Holland Laboratory. Experience in molecular and cellular biology required. Overseas applicants must have at least one publication in a peer-reviewed western journal. To apply, please forward curriculum vitae with contact information for three references to: **Lisa M. Spain, Ph.D., American Red Cross, Holland Laboratory, 15601 Crabbs Branch Way, Rockville, MD 20855. E-mail: spainl@usa.redcross.org; website: http://www.redcross.org.** The Holland Laboratory is the national center for biomedical research and development of the American Red Cross. *Equal Opportunity Employer; Minorities/Females/Disabled/Veterans.*

POSTDOCTORAL FELLOWSHIP IN EPIGENETICS
Johns Hopkins University School of Medicine

A Postdoctoral position is available immediately in the laboratory of **Dr. Andrew Feinberg** for an outstanding candidate with a Ph.D. in molecular genetics or biochemistry to study the molecular mechanism of epigenetic modification in development and cancer. Epigenetics involves heritable non-Mendelian alterations of the genome, and our laboratory has identified human imprinted genes and abnormal methylation and loss of imprinting in cancer. Please e-mail your curriculum vitae, a description of research experience and goals, and names and e-mail addresses of three references to **e-mail: afeinberg@jhu.edu.**

POSTDOCTORAL ASSOCIATE in environmental biotechnology is immediately sought for an industrial collaboration involving development of novel assays to detect an important algal toxin. Experience in molecular biology, protein expression, analytical biochemistry, and toxin chemistry would be major assets. Please contact: **Dr. Edward Moczydlowski, Department of Pharmacology, Yale University School of Medicine, P.O. Box 208066, New Haven, CT 06620-8066. E-mail: edward.moczydlowski@yale.edu.**

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Harvard University

Applications are invited for a research position to begin in the summer or fall of 2002, probing ligand/receptor interactions using a newly developed tool that allows parallel measurements of the unbinding of single molecules stressed by an applied force. The initial appointment would be for two years with a possible renewal for one additional year. Candidates should send curriculum vitae, publication list, a description of recent research, and the names of at least three references to: **Migdalia Rosa, Assistant, Physics Department, Harvard University, Cambridge, MA 02138.** *Harvard is an Equal Opportunity/Affirmative Action Employer. We encourage applications from qualified women and/or minority group members.*

POSTDOCTORAL POSITIONS
Harvard Medical School

Immediate openings to study structure, folding, assembly, and biological activity of Aβ and other amyloidogenic proteins (*JBC* **274:**25945, 1999; *Nat. Struct. Biol.* **7:**1095, 2000; *JBC* **276:**35176, 2001; *JMB* **312:**1103, 2001. Expertise in the physical sciences, cell or molecular biology, or neurobiology desirable. Send curriculum vitae, citizenship status, research interests, and references to: **Dr. D. Teplow, Brigham and Women's Hospital, 77 Avenue Louis Pasteur (HIM–756), Boston, MA 02115. FAX: 617-525-5252; e-mail: dteplow@rics.bwh.harvard.edu.**

POSTDOCTORAL POSITION: SIV pathogenesis. A Postdoctoral position is available to study the effects of simian immunodeficiency virus infection on brain tissues. Candidates should be recent/pending recipients of a Ph.D. or equivalent degree and have experience in histopathology, molecular biology, or both. Send curriculum vitae, brief description of research experience and interests, and a list of three references to: **Dr. Todd A. Reinhart, Sc.D., 606 Parran Hall, University of Pittsburgh, Pittsburgh, PA 15261. E-mail: reinhar@pitt.edu.** *The University of Pittsburgh is an Affirmative Action/Equal Opportunity Employer. Applications from qualified women, minorities, and/or disabled persons are encouraged.*

POSTDOCTORAL POSITION
Bacterial Pathogenesis

Position available to study molecular pathogenesis of *Helicobacter pylori* using microarrays, real time RT-PCR, and animal models. Requires recent Ph.D. with strong molecular biology skills. Send letter of interest, curriculum vitae, and names of three references to: **Jay Solnick, M.D., Ph.D., Department of Medical Microbiology and Immunology, University of California, Davis, Davis, CA 95616. E-mail: jvsolnick@ucdavis.edu.**

POSTDOCTORAL POSITIONS

Available immediately to study serine proteases. Candidates must have experience in molecular biology, protein expression, and purification. Contact: **Enrico Di Cera, Washington University School of Medicine, St. Louis, MO. Website: http://www.biochem.wustl.edu/~enrico;e-mail:enrico@biochem.wustl.edu.**

POSITIONS OPEN

POSTDOCTORAL POSITIONS
PEDIATRIC RESPIRATORY MEDICINE
Yale University School of Medicine

Several NIH-funded Postdoctoral Fellow training positions are available. Areas of research include airway epithelial physiology as it relates to cystic fibrosis, neuromuscular physiology and sites of muscle fatigue, mitochondrial gene regulation during hypoxia and chronic stress, and carotid body physiology. Highly motivated individuals with experience in electrophysiology, molecular biology, or biochemistry are encouraged to apply. Send cirriculum vitae and the names of three references to: **Dr. Marie E Egan (e-mail: marie.egan@yale.edu)** or **Dr. Alia Bazzy (e-mail: alia.bazzy@yale.edu), Department of Pediatrics, Division of Respiratory Medicine, Yale School of Medicine, Fitkin 503, 333 Cedar Street, New Haven, CT 06520.**

ISLET BETA CELL PHYSIOLOGY

Two **POSTDOCTORAL POSITIONS** (NIH- and ADA-funded) available immediately to investigate the biochemical and molecular aspects of pancreatic beta cell compensatory growth and hyperfunction during insulin resistance and their alterations during diabetes. Background in hormone secretion, glucose and lipid metabolism, or signal transduction related to growth and differentiation. Excellent scientific environment in islet development, islet imaging, and molecular insulin signaling. Competitive salary. Send inquiry and curriculum vitae to: **Dr. Jack Leahy, Endocrinology, Diabetes, and Metabolism, University of Vermont, Given C–331, Burlington, VT 05405. FAX: 802-656-8031; e-mail: jleahy@zoo.uvm.edu.**

Several NIH-funded **POSTDOCTORAL POSITIONS** are available to study the role of nuclear factor of activated T cells, PLA2s, and eicosanoids in vascular remodeling. Experience with confocal microscopy, microarray, molecular biology, and balloon injury model of restenosis is desirable. Competitive salaries are offered. Interested candidates with a Ph.D. or M.D. degree should send curriculum vitae and three letters of references to: **G.N. Rao, Ph.D., Department of Physiology, University of Tennessee Health Science Center, 894 Union Avenue, Memphis, TN 38163. E-mail: grao@physio1.utmem.edu.** *The University of Tennessee is an Equal Employment Opportunity/Affirmative Action/Title VI/Title IX/Section 504/Americans With Disabilities Act/Age Discrimination in Employment Act Employer.*

POSTDOCTORAL POSITION(S) available to study topics related to cardiovascular tissue engineering. One area pertains to endothelial biology: adhesion, thrombogenicity, quiescence, and manipulation of phenotype with gene transfer approaches. Background in endothelial biology, molecular techniques, and retroviral constructs necessary. A second area relates to exploiting adult stem cells for tissue engineering purposes; a background in isolation, purification, and manipulation of adult stem cells is necessary. Please respond with curriculum vitae and two references to: **Laura E. Niklason, M.D., Ph.D., Room 136 Hudson Hall, Research Drive at Science Drive, Duke University, Durham, NC 27708. Telephone: 919-660-5149; FAX: 919-684-5777; e-mail: willi154@mc.duke.edu.**

A **POSTDOCTORAL RESEARCH POSITION** in cellular neurophysiology is immediately available to study synaptic transmission and plasticity in the mature and developing thalamus. Applicants should have training in electrophysiology and a working knowledge of mammalian visual and somatosensory systems. Candidates must possess a recent Ph.D. in a related field of neurobiology. Interested individuals should send curriculum vitae and names of three references to: **Dr. William Guido, Department of Cell Biology and Anatomy, Louisiana State University Health Sciences Center, 1901 Perdido Street, New Orleans, LA 70112. Telephone: 504-568-7487; e-mail: wguido@lsuhsc.edu.** *LSUHSC is an Equal Opportunity/Affirmative Action Employer.*

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POSTDOCTORAL POSITIONS
Virginia Commonwealth University
Richmond, Virginia

Postdoctoral positions open for studies on reactive oxygen and nitric oxide modulation of cell growth and cellular radiosensitivity with emphases on redox regulation of Tyr phosphatases/growth factor receptors and cGMP/protein kinase G signaling. See **Leach et al.,** *J.Biol. Chem.* **277:15400, 2002; Lammering et al.,** *J. Natl. Cancer Inst.* **93:921, 2001,** and references therein for recent studies. If interested, respond by sending curriculum vitae and names of two references to:

Ross B. Mikkelsen, Ph.D.
Department of Radiation Oncology
Virginia Commonwealth University
P.O. Box 980058
Richmond, VA 23298-0058
E-mail: rmikkels@vcu.edu

POSTDOCTORAL POSITION
Cardiovascular Research

A Postdoctoral position is available immediately to study cellular and molecular mechanisms that contribute to oxidant stress and promote thrombosis. Research areas include (1) the effects of homocysteine on endothelial dysfunction, (2) the regulation and antioxidant function of glutathione peroxidases, and (3) the effects of oxidant stress on nitric oxide bioactivity. The successful candidate should have a Ph.D., M.D., or equivalent. Experience in cell or molecular biology and an interest in vascular biology are desirable. Interested applicants should send their curriculum vitae (including bibliography) and names of three references to: **Dr. Joseph Loscalzo, Director, Whitaker Cardiovascular Institute, Boston University School of Medicine, 715 Albany Street, Boston, MA 02118.**

POSTDOCTORAL POSITION available immediately. The successful applicant will design and study retroviral vectors that display single-chain antibodies or other targeting ligands (cell-type specific vectors). Such vectors shall be tested *in vitro* and *in vivo* (mouse model systems) for future human gene therapy. Applicant should have a solid background in molecular biology (e.g., cloning, tissue culture). Please send résumé to: **Dr. Ralph Dornburg, Thomas Jefferson University, Division of Infectious Diseases, Jefferson Alumni Hall, 1020 Locust Street, Philadelphia, PA 19107.**

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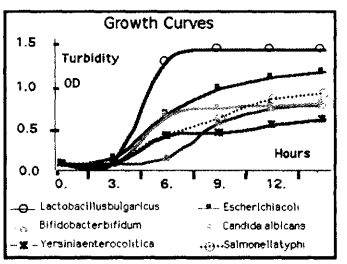

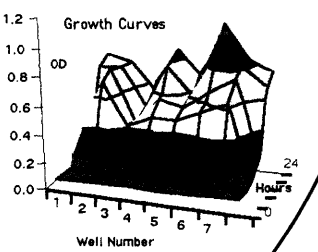

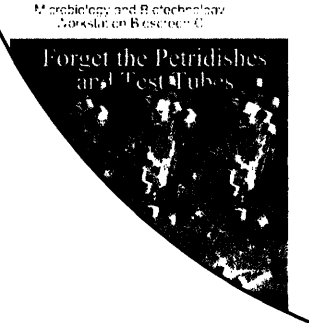

Application areas: microbiological research, food research, food QC, fermentation, growth medium development, medical, pharmaceutical and clinical microbiology, kinetical MIC, development of antibiotics and pharmaceutical, effect of chemicals on microorganisms, soil microbiology, decontamination, biodegradation, nitrification, denitrification, experiments with yeast, veterinary microbiology, environmental microbiology, mutagenicity and genotoxicity, microbiological assay, anaerobic work, periodontology, drinking water and water microbiology, pollution control, aquaculture, biofilters, wastewater treatment, activated sludge, agricultural microbiology, single cell protein production, cell biology, industrial microbiology, gene technology, biotechnology, molecular biology, Space Research

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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: 080 225607
Norge: 800 11033
Sverige: 020 79 31 49
Switzerland: 0800 55 2482

1-800-343-7475

NEW QUANTIKINE mRNA KITS AVAILABLE

Human	Mouse
• Bax-α	• GAPDH
• Bcl-2	• IFN-γ
• Cox-1	• IL-1β
• Cox-2	• IL-2
• ICAM-1	• iNOS
• E-Selectin	• VEGF
• L-Selectin	• TNF-α
• P-Selectin	
• RANTES/CCL5	**Rat**
• Survivin	• IL-1β
• TRAIL	• TNF-α
• VCAM-1	
• VEGF	

Please visit our web site at www.RnDSystems.com for new product information and subscribe to our weekly new product E-mail update.

Quantikine mRNA assays are non-radioactive, microplate-based assays using signal amplification and colormetric detection to quantitate gene-specific mRNA. These assays are as easy as an ELISA and have several notable features.

Features:

- Signal amplification – not target amplification
- High throughput capabilities
- Use cell lysate, total RNA, or poly (A)$^+$ RNA samples
- Measure multiple analytes on one microplate
- Utilize a conventional microplate reader
- Five hours to results
- Non-radioactive

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