under controlled temperature conditions from ambient to 45°C. The reagent line includes an extensive array of primary antibodies and detection kits. Zymed Laboratories and Leica Instruments. Circle 142.

■

Tissue Resistance Measurement Chamber
The Endohm-Snap chamber is designed for use with Costar Snapwell culture cups. Culture cups can be transferred from their culture wells to the Endohm chambers for more accurate measurements than can be made with handheld electrodes. The Endohm-Snap is equipped with a planar electrode designed for low resistance tissue measurement and configured to allow a more uniform current density to flow across the membrane. Concentric electrodes are situated above and beneath the membrane, reducing background resistance from 150 ohms to less than 5 ohms. World Precision Instruments. Circle 143.

■

Literature
Low Cost Gel Accessories gives prices of a line of replacement parts that fit major brand name small and large vertical gel boxes. Combs, plates, and spacers are computer-machined to exact specifications. The Gel Co. Circle 144.


The Importance of Handling Precautions in Manufacturing HCCD Cameras describes the manufacturer's clean room approach to keeping dirt, dust, and electrostatic discharges from affecting camera performance. Anatomy of an HCCD Camera tells how a line of charge-coupled-device cameras is engineered and built to deliver high quality images and reliable quantitative data. Photometrics. Circle 146.

HPLC Automation Solutions to Increase Your Productivity is a 10-page brochure that highlights the automation capabilities of Shimadzu's LC-10A high-performance liquid chromatography series. Shimadzu. Circle 147.

Six Reasons Why Labconco Carts and Benches Are Your Best Laboratory Transportation Value depicts 11 models for every laboratory need from glassware handling to moving heavy equipment or large bottles of solutions. Labconco. Circle 148.

We're Ready When You Are highlights more than 6 dozen substrates, buffers, and other biological chemicals that can be ordered in ready-to-use tablet, capsule, pouch, and liquid form. Sigma Chemical Co. Circle 149.

1996 Molecular and Cellular Pathology Products Catalog lists more than 250 monoclonal and polyclonal antibodies, an automated immunostainer, DNA probe test kits, and enhanced biotin-streptavidin detection systems for use in immunohistochemistry and in situ hybridization. BioGenex. Circle 150.
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October 13-15, 1996

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Proposals should reflect the three central topical themes of the conference: • Diagnosing and Measuring Errors, • Factors Contributing to Errors, and • Strategies for Preventing and Reducing Errors, and may be submitted by e-mail, fax, or mail. Include: (1) a summary of your proposed presentation or session, including bibliographic references, of no more than 1,000 words, and (2) a brief resume or biographical sketch. Applications will be evaluated by a board of reviewers. Successful applicants will receive travel expenses, room and board, and a waiver of registration fees. Deadline for receipt of applications is July 1, 1996. Successful applicants will be notified by August 16, 1996.

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ABBREVIATIONS

ABI PRISM 310 GENETIC ANALYZER

<table>
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<th>Application</th>
<th>Performance</th>
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<td>Cycle Sequencing</td>
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<td>2 nt resolution, 0.5% sizing precision</td>
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<td>Quantitative RT-PCR</td>
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DNA Sequencing Software: Balancing Sensitivity, Speed, Flexibility, and Ease of Use

This article is the first in a new series in SCIENCE on computers and software tools available to the scientific community. Each article will discuss the application and offer a sampling of technology available to researchers in particular disciplines.

The following article on DNA Sequencing software highlights various tools that enable researchers to conduct DNA and protein analysis and have allowed them to understand the evolution of the human and other genomes.

Scientists working in the field of gene discovery often find themselves slipping into clichés these days: you hear of “paradigm shifts” and shifts in “orders of magnitude,” of “new frontiers,” and “cutting edge” technologies. But who can blame them? It’s difficult to describe the changes that have occurred in recent years in genomics without falling into hyperbole. As recently as the mid-1980s, the prospect of identifying a single human gene seemed decades off. By early 1996—one-third of the way into the 15-year Human Genome Project, which aims to decode the three billion base pairs that comprise human DNA—researchers had mapped close to 6,000 human genes.

Today, molecular biologists are moving beyond gene discovery into the realm of genomic organization and evolution. Last July an important milestone was reached when The Institute for Genomic Research (TIGR), in conjunction with researchers at Johns Hopkins University, announced that it had sequenced the entire 1.8-megabase genome of the bacterium Haemophilus influenzae, the first complete genome sequence from a free-living organism.

“What we were able to do was to change the whole paradigm in sequencing projects,” explains Anthony Kerlavage, director of bioinformatics at TIGR. “Typically, people break down a genome into something on the order of 40,000 bases long. Nobody ever thought they could take 1.8 million bases and break it down into tiny pieces and assemble the thing again.”

TIGR uses a random “ shotgun” approach, where large pieces of DNA or an entire genome are “blown apart” into small fragments of 2,000 bases and then reassembled without an intermediary stage. TIGR developed several algorithms to speed assembly: its software looks for fragment and clone pairs, remembering how far apart they have to be to eliminate possibilities; makes use of two different size libraries for comparisons; and flags possible repeat areas to increase sensitivity.

But TIGR’s advances in sequence assembly have all been “rather simple ideas,” comments Kerlavage, adding that it was the “combination of ideas and their implementation in software” that made it possible for TIGR to increase the throughput for sequencing projects. TIGR is presently “outputting” approximately 500,000 bases a day, he adds. “Two or three years from now, we could be sequencing more than six million bases a day.”

With DNA sequencing and gene mapping growing at exponential rates, scientists have come to rely more and more on sophisticated software to collect, analyze, catalogue, and interpret the data. Unlike TIGR, many corporate or academic labs do not enjoy access to automatic sequencers and multiple dedicated workstations for DNA sequencing and assembly.

But today an array of software tools are available for scientists to manage sequencing projects, no matter how large or small. Some of these tools have been around for years and continue to meet the needs of many conventional labs. Others have been released only in the past several months and make use of the latest graphical interfaces and search-and-assembly algorithms, as well as on-line functionality, to keep pace with the ever-increasing demand for faster and more intuitive computer analysis tools. The software packages are available on a variety of platforms. They provide an extensive array of base calling and nucleic acid and protein analysis features; and they handle multiple sequence alignment, contig assembly (piecing together overlapping sequence segments end-to-end), primer and probe design, and database searching.

The arrival of automated DNA fluorescent sequencers revolutionized the field of bioinformatics by enabling molecular biologists to catalogue sequence information hundreds of times faster than was possible with preexisting scanning techniques. Even so, conventional scanning techniques still represent the way most labs work today. Typically, researchers in these labs need reliable base calling and sequence analysis programs that provide them with access to the large public DNA and protein sequence databases. In many cases, their own sequencing requirements are quite limited.

This is why some see today’s sequencing world as divided into two major camps. “The big labs with a lot of money are buying automated sequencers,” explains Bob Luton, product manager for Bio Image. “But 90 percent of sequencing is still done in what I would call ‘manual’ fashion. A person runs a gel, labels it with a radioactive isotope, gets a
film off of it, and then needs to read that film. He's doing a little bit of sequencing every week and needs help interpreting it."

Bio Image's DNA Sequence Film Reader and Sequence Assembly Manager software packages automatically call bases, resolve ambiguities, align sequences, and assemble contigs. Explains Luton, "the software is smart enough to think: 'Does it need to reverse or complement the film?' The assembly manager can handle up to 1,000 individual sequences and build a contig of up to 50 kBases in a "couple of minutes," he adds. "The big genomic centers would say that a 50 kBase contig isn't big enough," Luton says. "We'll accept that and concede that our market lies in labs that don't need to do that."

Bio Image's high resolution graphical output facilitates interpretation of the data, adds Luton. Using the Sequence Assembly Manager, an operator searching for ambiguities in a consensus sequence can click on a base and see that portion of the film image displayed on screen. The software runs on UNIX-based Sun Workstations that Luton says are "powerful enough that you can put a bunch of pictures on the monitor at the same time at very high precision." He adds that Bio Image is currently developing software versions for Windows and Macintosh platforms.

Len Hook, project manager for gel imaging at Scanalytics, a division of CSPI, takes a similar view to Luton with regard to Scanalytics' DNAscan software, a Windows-based package which performs automated image processing and analysis on DNA sequences read from films or images. "It's perfect for the conventional lab using conventional gel electrophoretic techniques," says Hook, a microbiologist and geneticist. "It's designed for the single lab that generates one or two or three gels at a time and is looking for a mechanism to call the base pairs automatically."

DNAscan imports images from various image acquisition devices, explains Hook, including CCD cameras, laser scanners, and phosphor screen imagers, and then analyzes the digital TIFF file. "You supply a few hints to the computer, such as how many lane sets you're expecting to see and the order of the loading of the lanes. Then the software scans the image and locates the lane sets in groups of four and calls out the bases from bottom to top."

The software handles multiple lane sets simultaneously, and, depending on which lanes are of interest, the user can superimpose density profiles. Sequence data can be edited and exported to DNA assembly manager packages. "We're looking at the labs that are doing sequencing on the standard 35 - 40 centimeter gels, exposing them to X-ray film and then digitizing them either with a hand-held scanner or large-format flatbed scanner," says Hook.

In the science of genomic research, computer speed and functionality remain at the heart of researchers' concerns. Much investigation entails searching through massive databases of sequence information as well as manipulating screen images that represent strings of text which, in turn, represent long chains of nucleic acid molecules. Repeatedly running homology searches or assembly algorithms that take minutes rather than hours may be the difference between viable and non-viable science. And making those graphical symbols on the monitor respond in such a manner that they complement the researcher's thought processes requires a thorough understanding of biology. This is why some molecular biologists, seeking better tools for their own research, have seen fit to don a second cap, that of computer software developer.

One example is Bob Gross, a molecular biologist and professor at Dartmouth College, who founded Textco in 1984 with the goal of designing software "from the point of view of a molecular biologist—not a computer scientist."

Several years back, Textco came out with the Gene Construction Kit, a DNA design, manipulation, and drawing tool with an intuitive graphical interface. "By having the segments defined graphically, you could cut and paste the graphical elements and the computer handled the sequence information for you automatically," explains Gross. "That allowed you to sit down and brainstorm, generate constructs, and try out gels on the computer before spending money on restriction enzymes or isotopes."

In February, Textco released a new software package called Gene Inspector, which combines a sequence analysis package with an electronic laboratory notebook that allows biologists to track, edit, and update their analyses. Users have the ability to define a "suite of analyses" that can be performed each time they work with a new sequence and to design custom "style sheets" to specify how their output should look.

Managing and tracking sequence information on computers is often confusing and cumbersome, explains Gross. "You have to select a DNA or a protein sequence, choose a table and parameters, and then the analysis appears in a separate window. You have to save it as a file and remember the name of the file and the parameters you used. You might take a printout and paste it into your lab notebook and write notes, but it's hard to coordinate it all. Ideally, you'd like everything in one place, and to be able to annotate the results and mix the computer analysis with real experimentation, all in a format that makes it easy to make connections."

Gene Inspector, which runs on Macintosh computers, is centered around the "GI Notebook," a word processor with various navigation tools, appendices, bookmarks, and other features that interact with the package's analysis functions. (These include multiple sequence alignment, ORF restriction mapping, dot matrix comparisons, protein motif searching, protein structure prediction, and many other individual analyses.) "Hot Links" attached to interactive output objects in the GI Notebook alert users when an analysis needs to be updated because a sequence has been modified or corrected. "The software takes care of the details and allows you to follow your thought process," says Gross.
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Like Bob Gross, Philip Taylor, a reproductive biologist who is the author of BIOSOFT's DNA Sequencing software package Gene Jockey II, designs software that "works in the way biologists work and incorporates the same assumptions that they make."

Gene Jockey II edits, manipulates, and analyzes nucleic acid sequences, performs sequence alignment and restriction analysis, finds PCR primers, and searches major databases. Most of Gene Jockey's features have been added specifically to solve problems that Taylor has encountered in his research.

"I have used it to assemble the sequences of the various pituitary releasing-factor receptors I have isolated," explains Taylor, who is based at the Centre for Reproductive Biology in Edinburgh, Scotland. "I use it to generate primers for PCR and site-directed mutagenesis, and, in the latter case, made the program generate primers that incorporate not only the desired base change but also a silent mutation that produces a change in the restriction map. This means that the clones generated can be screened quickly by means of restriction digests, thus avoiding lots of unnecessary sequencing."

Taylor credits Apple's User Interface guidelines with helping him make Gene Jockey II simple to use. "There are some wonderful sequence analysis programs around which do not get the usage they deserve," he explains, "because the guy who has been slaving all day over a hot thermal cycler can't bring himself to open a 500-page manual in order to remind himself how to set up a simple analysis.

"If you have used any word processor you can use Gene Jockey II, and you can figure out at least 95 percent of it without even opening the manual."

Taylor sees challenges ahead in the field of bioinformatics - not only for biologists and software developers, but for computer hardware designers. "The explosive growth of the DNA databases is causing serious problems for those who wish to use them from microcomputers. There is no sign of the growth rate abating, so in the long term the only solution I can see to the problem of searching them is parallel processing - increasing the number of processors working on the job. "It's the only way we're going to be able to deal with the increasing workload."

One individual who is trying to help scientists cope with this new workload is Scott Jenkins, a research chemist and the new "Scientific Solutions Evangelist" at Apple Computer. "My job is to go out and get software developers to create solutions and make sure that they're on the Mac. That means bringing them over from other platforms, having them created, or having the community give me the idea and my finding someone to embrace the idea."

Apple is forging an alliance with IBM and their Computer Server Group to develop systems for the Macintosh that will meet the ever-increasing computational processing requirements of scientists, particularly biologists involved in DNA sequencing projects, explains Jenkins. "The chemist or biologist using a desktop computer wants to be able to easily access the information," he says, "but they still need a powerful back end to do the huge overnight parallel processing computational jobs.

"IBM's philosophy is to serve and network. Apple networks extremely well, and it's the front end - where the rubber meets the road. So it's a perfect match."

Over the years, Apple hasn't really done that much to attract the scientific community, explains Jenkins. "This community has self-selected the Mac." Now, he adds, his job as "Scientific Solutions Evangelist" is to consolidate Apple's hold on scientists and satisfy their imminent needs for increasingly powerful processing.

"There are several companies working on new search algorithms and matching software, technology for rapid search strategies, and quite a bit of artificial intelligence," he says. "I see the user having the ability to do all these things and to network them, without even having to understand the power and sophisticated processing that's going on in the back end. Simply to present it to them as this 'intelligent agent' metaphor: 'Find me things that look like this; or every time something hits one of these databases, come and tell me.'"

Much of the infrastructure needed for that technology is just about here, says Jenkins. "It's just a matter of somebody assembling it. That's what I'm pushing for," he adds. "Most scientists just want a computer that gets out of their way."

Some computer programs are designed and written by a few individuals with a particular expertise devoted to a single, circumscribed task; others evolve over years and represent the cumulative contribution of many programmers, technicians, and scientists. This is how the Wisconsin Sequence Analysis Package has grown over the past decade-and-a-half. Work on the package first began in the early 1980s by the Genetics Computer Group (GCG) in the Department of Genetics at the University of Wisconsin-Madison. It was only in 1990, after a decade of program design, that GCG became a private company.

Last August, GCG released Version 8.1 - Version 9 is due out this fall - of the "Wisconsin Package." It's a comprehensive DNA sequence analysis package comprising over 140 programs that handle sequence entry and mapping, fragment assembly, database searching, pair-wise comparison, multiple sequence analysis, evolutionary analysis, gene finding, and nucleotide and protein secondary structure.

The package, which runs on OpenVMS and UNIX platforms, was developed with the input of scientists at numerous institutions around the world. GCG provides its users with support documentation and access to the package's source code and encourages them to modify, extend, and add programs as required. These additions or updates may then be submitted for distribution in future software releases.

"It's an institutional solution," explains Steven Smith, a senior software engineer at GCG. "A large number of people can use the package at once in many different ways."

Most of the Wisconsin Packages' programs are designed to run in succession - the output from one becomes the input for the next.

"I can do a database search with a program like BLAST and get a very nice text report that is wonderful for human consumption," explains Smith. "But if this is the first step in an analysis process, what'd you like to do is take the output of BLAST and move it into another program, maybe generating a multiple sequence alignment from a certain number of hits. And you might want to take the results from that and create a protein profile. And so on.

"Right now with the volume of data out there, people are trying to develop automated systems to perform a lot of these operations," he adds. "The way to do that
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is to have a better way of interconnecting the elements.”

Indeed, interconnectivity and modularity are two of the most frequently uttered buzzwords in the field of bioinformatics today. Like GCG, other software developers offering comprehensive DNA sequencing packages are looking to deliver integrated solutions with a breadth of functionality in order to satisfy the wide-ranging needs of institutes and companies involved in diverse areas of nucleic acid and protein analysis. In many cases, their research crosses scientific disciplines. The goal is to produce software packages that cover all the bases, so to speak.

This is why Warner Yuen, a product marketing engineer at Hitachi likes to describe Hitachi’s two sequencing software packages – DNASIS for Windows and MacDNASIS – as “workhorse programs.” “They’ll do anything from DNA similarity searches against all the major databases to restriction analysis, contig and sequencing management, predicting protein primary or secondary structure, looking for different protein factors, plus provide a full dimension of analysis functionality for any lab.”

Hitachi’s main users are academic labs involved in an array of experiments. “Everyone in the lab will use some features of the software,” says Yuen, “whether it’s drawing a plasmid or map or it’s something more elaborate like putting in restriction enzymes that cut the DNA or looking for specific base patterns.”

For those more directly involved in DNA sequencing, Hitachi also manufactures GENEright, a networkable PC card with its own dedicated processor for homology searches. “It offers a level of sensitivity some people need,” says Yuen. He adds that Hitachi will be including Internet access in its next generation of sequence analysis software. He is quick to mention another approach to data-sharing that the company is presently exploring: the development of “intranet” systems for corporations or institutions in which users need to access files and applications from many different types of computers.

“With intranet access,” explains Yuen, “you’ll have single servers within offices that allow you to run applications independent of platform – much like Internet browsing works today. You’ll just call up your sequencing program, and if you select an application that doesn’t run on your computer – say a particular homology search – when you click ‘OK,’ it will simply send the search off to a server somewhere and come back with the result. It’ll all be transparent to you.”

The development of multi-platform systems is a top concern of Steve Gardner, a protein chemist and senior product manager at Oxford Molecular Group. Gardner sees an opportunity in this area for bioinformatics software developers, particularly those targeting pharmaceutical companies. “A lot of people have been focused on algorithmic advances and much less focused on the method of delivery of a product,” he explains. “Bioinformatics still has to prove itself as a core technology in drug design, and the solutions that are out there – and I would include us – have not generally responded to the requirements of the user bases. They’re asking for systems that are more transparent, more professional, and that meet their requirements for corporate installations. What they’re getting are academic pieces of software with a few twists.”

In the past few years, Oxford Molecular Group has moved to establish itself as a leading player in the bioinformatics software market. In 1994, it acquired IntelliGenetics. Last fall, it announced a strategic alliance with Perkin-Elmer to develop new software solutions aimed at “accelerating and broadening the scope of the DNA and protein sequencing process.” And this year, it acquired two bioinformatics software packages: MacVector and AssemblyLIGN from Eastman Kodak.

MacVector offers Internet access to Entrez, a comprehensive sequence database. It also performs many DNA and protein analyses, including homology searches, PCR primer prediction, restriction enzyme analysis, protein secondary structure, and sequence alignments and assembly. “It’s particularly strong on the PCR side,” says Gardner. AssemblyLIGN, a multiple sequence assembler, allows users to locate patterns and identify gaps and ambiguities in building consensus sequences.

These programs complement Oxford Molecular’s Geneworks, a software package that offers a range of nucleic acid analysis features including interfaces to gel readers, sequence and contig assembly, primer design, multiple sequence alignment, and database searching. The package is “fully integrated,” says Gardner. “All the windows interoperate.”

But Gardner adds that Oxford Molecular’s newest software offerings will take integration further. In the pharmaceutical industry, he notes that “research has increased ten times while new drugs produced have fallen by a half.” What is needed is more rapid throughput. In bio-informatics, this means coping with a technology that produces “vast tracts” of information “very early in the search process.”

“The need to extract information from these vast tracts of data has forced pharmaceutical companies to change the way they do research,” Gardner says. “They’re taking projects out of single departments and setting up multidisciplinary project teams. These include microbiologists, modelers, and chemists – these guys speak completely different languages, work on different machines, and need a way of integrating their work.”

This year, Oxford Molecular released OMIGA, which is designed in modular fashion to take advantage of a new underlying systems architecture developed by Oxford Molecular called “COMMS Manager.” OMIGA will be published as a standard in October 1996, and Gardner says, “will allow people to share corporate data and move around freely between different scientific methods.”

OMIGA provide comprehensive sequence analysis and database searching functionality, interact with the World Wide Web, and support Power PC, Windows, and UNIX platforms with a common user interface. Gardner says that “we’re aiming to achieve the transition from the bioinformatics software being on one specialist’s desk to it being delivered to the whole company, to anyone who needs access to corporate biological information. You need a set of top-quality bioinformatics packages that work across platforms. And what we’re focusing on now is how to deliver all of it directly to people’s desks.”

Like Gardner, Steve Lombardi, a vice president in Applied Biosystems (ABI), the life sciences division of Perkin-Elmer Corporate, sees DNA analysis moving very quickly out of human research and into a variety of corporate applications including pharmaceuticals, plant and animal breeding, forensics, food testing, and environmental testing.
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"In the pharmaceutical industry in particular, there's a real shift in thinking," explains Lombardi, a nucleic acid chemist. "Where companies were investing in biotechnology more as a defensive measure because proteins were a threat to them, now with the advent of genomics, they're looking at biotechnology as a tool to find new drug targets.

"They're moving away from traditional organic synthesis -- search-and-rescue ways of finding drug candidates -- and moving into combinatorial synthesis, an automated high throughput way of building libraries of similar types of compounds.

"But those pharmaceutical companies are sharing the same process of collection of genetic data on the ABI PRISM instruments. So how they're going to build their own core competencies is in bioinformatics. How can company A versus company B give a pharmaceutical company better information? The answer is software."

ABI's DNA Sequencing Analysis package which, like all of its packages, runs on Macintosh computers, automatically calls bases from its ABI PRISM DNA sequencers using a suite of base-calling algorithms. GeneAssist, a multi-user system, performs database searches on GenBank, PIR, SWISS-PROT, EMBL, and custom databases for use in gene identification and characterization studies. Sequence Navigator performs sequence comparison in mutation detection studies, aligning multiple sequences and identifying vectors, regions of ambiguities, and heterozygotes. Auto Assembler reassembles sequence data and resolves ambiguities to produce consensus sequences. And ABI will soon be introducing Primer Express, which will design, analyze and order oligonucleotides, for PCR and other DNA applications.

"The biggest innovation we're working on is the idea of confidence," adds Lombardi. "Right now what comes out of an automated DNA sequencer is the following: this is an A, this is a G, this is a C, or this is a T. What it doesn't tell you is how confident am I that this is an A or G or C or T. Right now, researchers have to analyze data in a somewhat democratic manner. Well, I have three Gs and two Cs, so it's probably a G. But what if you knew that with those three Gs you only had had only 40 percent confidence, but with the two Cs you had 95 percent confidence?"

Lombardi sees the explosion of data in the field of bioinformatics at present outstripping the ability to manage that data. A pharmaceutical company may have a DNA database, he explains, a protein database, a small molecule database, a database of all those interrelationships, and perhaps fifty or one hundred external databases that its researchers are tracking in academia.

"The matrix of data that they've got to deal with has gone up literally five, six, seven orders of magnitude," he adds. "It's crazy. It's human. But that's the challenge."

It's a challenge that has been taken up by DNASTAR, which last September won product of the year from Biotechnology Software Journal for its sequence analysis software package Lasergene. "We've recently upgraded database searching with a newly developed rapid screen search, which has the speed of a BLAST search and the sensitivity of a FASTA search," explains Patricia Hoyle, a chemist and DNASTAR's marketing director.

Lasergene includes a suite of modules that handle sequence entry, restriction analysis and mapping, protein sequence analysis, sequencing project management, multiple and pair sequence alignments, primer and probe design analysis, and a CD-ROM biological database resource containing GenBank, EMBL, Translated GenBank, SWISS-PROT, and NBRF/PIR. "It's a fully integrated solution for the DNA and protein sequence analyst," explains Hoyle.

DNASTAR targets corporations and academic institutions with large networks as well as individual users who need a single copy of the software to run on their desktop computers. Lasergene is currently available for Windows and Macintosh systems, and
DNASTAR is looking to develop a version for UNIX or Windows NT.

"The major question coming out of huge genome projects is what is the functionality of these mysterious pieces of DNA they've discovered. They're trying to deal with a rapidly increasing amount of data and, at the same time, increase sensitivity - which is the worst of both worlds. We offer a creative ability to compare strings or whole sequences of DNA against databases and do queries and reiterative searches," Hoyle explains.

In the coming years, DNASTAR will be focusing on large-scale sequencing groups, says Hoyle, providing support for the genomic as well as cDNA level applications and for gene finding. "The key to offer database searching with more precise, secure results and to be able to accommodate sophisticated queries beyond simple homology." The company's newest sequencing software is "tailored to the needs of modern users of ABI and other fluorescent sequencing technologies," she adds. "The new SEQMAN addresses the key elements of modern genome sequencing: size of project, better data-gathering technology, and the art of reducing the amount of human editing needed."

A major plank in DNASTAR's strategy and product offering is its World Wide Web site. "It's got a huge reference library, and it offers the ability to download software and do a lot of window shopping," explains Hoyle. She adds that DNASTAR will be offering its users "considerably more" web access and functionality in the future.

DNASTAR's investment in the World Wide Web - the company has three T1 access lines - is a risk, concedes Hoyle. But she compares the Web today to automatic teller machines shortly after they were first introduced. "People said they wouldn't work because they took away the human element. But that's precisely why they did take off."

The World Wide Web enables researchers working on virtually any computer platform to access remote databases and run queries at their convenience, and they often receive results in minutes. Still, with the major DNA sequence databases changing nightly, researchers have to spend a great deal of time running searches if they wish to maintain their data on a "continual awareness" basis.

One company that has addressed this problem is Pangea Systems, which recently

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launched a new Web-based service called GeneWorld, a secure service for automating the high-throughput search annotation of DNA and protein sequence data. Researchers can submit batches of sequence data to GeneWorld and have them compared against the major public databases using, in series, BLAST, FASTA, and Smith Waterman algorithms. Sequence databases are maintained nightly, and any unassigned sequences are automatically compared against new updates. GeneWorld handles protein domain and motif analysis as well as DNA sequencing analysis.

"We offer an ability to integrate the various analyses that people would have to do on an individual basis by going to Web sites or having these tools in house," explains Joel Bellenson, CEO of Pangea Systems. Pangea designed Incyte Pharmaceutical's LifeSEQ database, one of the largest genetic databases in the world. "It can be a very tedious process. We automate the throughput of their query sequences so they don't have to deal with the nuts and bolts. The interface integrates all the analyses into a single type of report — as opposed to having to bounce between twelve different Web sites, search, wait half an hour for the result, and then, depending upon the result, search another Web site or use another tool."

Before he founded Pangea Systems in 1991 with a team of molecular biologists, and began developing databases for high-throughput DNA sequencing and compound screening for companies in the San Francisco Bay area, Bellenson developed genetic database systems while running a core facility at Stanford University. Today, he sees the field of bioinformatics poised to expand into a host of new subspecialties.

"I see the field differentiating with more explicit niches developing in it," he says. "I think the general focus will be more on protein as time goes on. The gene codes potentially for a protein, but it's not a perfect connection — so what protein eventually comes out of it and how it gets modified in the cell is very significant information."

Down the road, Bellenson envisions molecular biologists moving further away from DNA and protein sequence homology searching and more into signaling and metabolic pathways — investigating how molecules interact with each other. "Instead of having this very individualistic molecular focus," he explains, "we'll be looking at the cell as an ecosystem of molecules."

Over the next few years, however, researchers and software engineers will have
their hands full just figuring out how to navigate through the expanding ocean of DNA sequence information, particularly human DNA sequence data. "The major challenge is just going to be the enormous growth in the database of human sequence over the course of the next five or six years," explains Francis Collins, director of the National Center for Human Genome Research (NCHGR). In April, the NCHGR announced the funding of what Collins described as the "first really significant large-scale projects to sequence human DNA." These groups, he added, would soon be "cranking out millions of base pairs a year."

Subsequently, any sequencing software designed to perform homology searches or to look for motifs will have to be able to "digest" a much larger database of known sequences than they currently do. "With the entire genome sequence in hand," comments Collins, "there are probably a lot of creative analyses that people could undertake to look for motifs that are just not likely to succeed when you only have a very tiny percentage in front of you -- which is our current state of affairs."

Collins is confident that the Human Genome Project will accomplish its goal of sequencing the three billion base pairs of human DNA "somewhat ahead of the predicted deadline of 2005." A range of technological advances will be necessary for this to take place. For now, the cost is still too high; it's somewhere in the range of 50 cents per base, he explains, adding that it will have to drop down to 20 cents or perhaps 15 cents per base over the next several years.

"There's an intrinsic assumption that the barriers that currently exist will be surmountable by just good, solid, hard work," he explains. "Nobody believes anymore that we have to have bolts from the blue in terms of truly revolutionary, unexpected developments in order to get this project done. The gel-based sequence approach appears to have the appropriate characteristics in terms of its throughput and potentially its cost."

"It means optimization, automation, not just of running the gels but of preparing the templates and analyzing the data. But those seem to be steps that people have clear ideas about how to achieve, so the confidence in the sequence community is pretty high that it is going to be possible to do it."

Collins concludes, "This is quite a contrast to, say, even two years ago when a lot of people were skeptical that the deadline was going to be possible to reach."
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Improving science.

Since opening our doors back in 1980, Genetics Institute has discovered a prodigious number of novel regulatory proteins. To date, nine of these have advanced to human clinical evaluation or commercialization, and the outlook for continued innovation is unprecedented.

Our success as one of the largest biotechnology employers in Massachusetts has been fueled by our collaborative work environment driven by values and focused on the future. This culture attracts and inspires some of the brightest minds whose ideas sustain us as a leader in the industry.

So when you consider why you chose the sciences, consider Genetics Institute. Make an impact.

Post Doctoral Fellowship
Position available in Articular Cartilage section of our Bone and Connective Tissue Department. This group is focused on articular cartilage metabolism, osteoarthritis and cartilage repair, with particular interest in the involvement and effects of bone morphogenic proteins. Research experience in the field of cartilage is desired, but specific emphasis depends on the candidate’s field of expertise, publication of original research and the ability to compliment or expand the existing program. Send curriculum vita and references to Elizabeth Morris, DVM at the address listed below or e-mail EMorris@Genetics.com

G E N E X P R E S S I O N M O N I T O R I N G
Scientists at Genetics Institute, in collaboration with researchers at Affymetrix, have been developing high-throughput, massively parallel Gene Expression Monitoring capabilities based on the use of GeneChip technology. The technology is rapidly moving beyond the proof of concept stage and we now face the exciting prospect of using large quantities of gene expression information to help us better understand biological processes and identify exciting therapeutic factors and targets.

Computational Biologist
We are seeking a highly motivated senior-level individual with experience in data management and information intensive data analysis to build the bioinformatics capabilities to support this program. The qualified individual will develop tools useful for gaining insights into biological systems using gene expression information alone and in combination with other publicly available biological information. This will require a unique combination of skills, where the ability to understand biological problems and formulate appropriate questions will be coupled with the ability to develop information systems in a client/server environment. Additionally, this person will also be responsible for the ongoing design and implementation of a suitable relational database.

The strong candidate will have demonstrated the ability to take full responsibility for user-oriented software development projects. Technical flexibility, persistence and initiative, and the ability to communicate effectively with management, biologists, programmers, and data management experts are all critical skills. Qualifications include a PhD in a relevant field (e.g. computer science, information systems or biology) and 5+ years’ experience developing information systems for biological applications. Important software skills in relational DBMS development, user interface design (especially WWW/HTTP), programming in C/C++ and Perl in a UNIX environment are also a plus.

Genetics Institute offers competitive salaries and benefits, including comprehensive health care, dental and life insurance, three weeks’ paid vacation, 401(k) stock purchase plan, relocation assistance, tuition assistance, and an on-site exercise facility.

For consideration, please send or fax resume, suitable for scanning, to: Human Resources Department, Genetics Institute, Inc., 87 CambridgePark Drive, Cambridge, MA 02140. Fax: (617) 498-8089 or (617) 676-8847. Genetics Institute is dedicated to building strength through diversity.

WHEN SCIENCE AND TECHNOLOGY COME TOGETHER, ANYTHING IS POSSIBLE.

And Everything Is Achieved.

BY MERGING PHARMACEUTICAL SCIENCE WITH GENOMICS TECHNOLOGY, E. LILLY AND COMPANY IS CREATING UNPRECEDENTED OPPORTUNITIES TO BETTER MEET THE GLOBAL POPULATION’S HEALTH CARE NEEDS. UNDERSTANDING THE STRUCTURE AND FUNCTION OF GENES WILL PROVIDE INSIGHT INTO THE INITIATION AND PROGRESSION OF DISEASES. WE ARE USING GENOMIC INFORMATION FOR THE DEVELOPMENT OF NEW THERAPEUTICS TO IMPROVE HEALTH CARE AND MANAGE DISEASES. GENOMICS RESEARCH TOUS A LONG HISTORY OF INNOVATION IN THE HEALTH CARE INDUSTRY AT LILLY THAT HAS MADE US A LEADER IN THE PHARMACEUTICAL INDUSTRY. AND ACHIEVING ALL THIS IS A DEDICATED TEAM OF TECHNICAL PROFESSIONALS. THEIR TALENTS AND SKILLS IN A VARIETY OF TECHNICAL AREAS HAVE CUMULATIVE $6 BILLION COMPANY ON THE CUTTING EDGE. THEY BRING THEIR SCIENTIFIC AND TECHNICAL KNOWLEDGE TOGETHER WITH OURS AT LILLY, AND ACHIEVE EVERYTHING YOU EVER THOUGHT POSSIBLE AND SOME THINGS NEVER EVEN IMAGINED.

Senior Scientist - Bioinformatics

The successful candidate will lead our effort of implementing an interactive and team-oriented program to develop and operate the software systems required in support of gene identification and analysis, structural biology, database and laboratory information management systems. A Ph.D. in the sciences and post-doctoral experience are required. Qualified candidates have significant research experience in both computer and the biological sciences. Interactions with internal and external collaborators will require outstanding oral and written communication skills.

In addition to a competitive salary and benefits, you'll enjoy pursuing your career in a professional environment that encourages you to pursue every possibility for technical innovation. For confidential consideration, please send resume and cover letter suitable for scanning to: E. Lilly and Company, Scientific Recruitment, Dept. AD070089, Lilly Corporate Center, Indianapolis, IN 46285.

We are an equal opportunity employer dedicated to diversity and the strength it brings to the work place.

For other job opportunities, please access our Job Bank at http://www.lilly.com or phone our Jobline 1-800-892-9121.

Eli Lilly and Company

KNOWLEDGE IS POWERFUL MEDICINE

Cadus Pharmaceutical Corporation, a company pioneering the discovery of drugs which regulate G-protein mediated signaling pathways, is expanding its discovery programs based upon our unique proprietary screening technologies and has openings at all levels for motivated scientists.

Scientific Information Systems Manager

Cadus seeks an experienced information systems manager with an advanced degree in systems engineering or a relevant scientific discipline to oversee and integrate bioinformatics and chemical database systems. Supervisory responsibilities in the areas of bioinformatics, chemistry and genomics programming functions. Oversees determination of system requirements, design of subsystems, working parameters for hardware/software and integration of data from multiple databases. Expertise with C++, Perl, UNIX, Mac and PC necessary. Background in scientific database development, ORACLE and statistical analysis highly desirable. Familiarity with informatics needs of pharmaceutical/biotech an advantage. Knowledge of Novell Netware 4.1 or plus. Excellent organizational and communications skills are essential. CODE S-SB

Biological/Chemical Database Administrator

Responsible for planning, coordinating, administering and integrating Cadus’ biological and chemical databases, including base definition, structure documentation, maintenance, long range requirements, operational guidelines and protection in a PC/Mac/UNIX/Novell environment. BS/MS in Computer Science or relevant scientific discipline and knowledge of C++, Perl and UNIX necessary. A background in statistics or biometrics is a plus. Extensive experience in structure based design and analysis also a plus. Excellent organizational and communications skills are essential. CODE S-BC

Cadus offers competitive salaries and benefits as well as excellent opportunity for career growth in a stimulating collaborative environment. Send CV and List of References to Science Search (please indicate code), Cadus Pharmaceutical Corporation, 777 Old Saw Mill River Road, Tarrytown, NY 10591-6705. Cadus is an Equal Opportunity Employer.

Cadus Pharmaceutical Corporation
Johnson & Johnson, with $18.8 billion in sales, is the world’s largest and most comprehensive manufacturer of health care products serving consumer, professional, diagnostic and pharmaceutical markets.

The R.W. Johnson Pharmaceutical Research Institute (RWJPRI) conducts research and development in a variety of therapeutic areas for the Johnson & Johnson companies: Cilag, Ortho-McNeil Pharmaceutical, Ortho Biotech and Ortho Dermatological. Bioinformatics and Information Technology are integral to the operation of RWJPRI as we seek new and innovative ways to discover critical proteins with therapeutic and/or drug target potential.

You can be part of our world-class organization if you meet the requirements of one of the following opportunities with our new Discovery Technology group within the Information Services Department at our campus-like facilities in either southern California or central New Jersey.

SAN DIEGO COUNTY (LA JOLLA) OPENINGS

Postdoctoral Fellows (Bioinformatics)
Requires a PhD in molecular biology, neurobiology, physiology or a related field. Familiarity with Genbank, EMBL, SWISS-PROT, PIR, and Brookhaven Protein Databases as well as experience in sequence analysis software (GCCE, BLAST, etc.) is essential; C programming experience in the UNIX system is preferred.

As a member of our group, you will be joining a growing number of scientists conducting bioinformatics and computational biology in collaboration with our drug discovery teams. You will use state-of-the-art computers and software to search for proteins with therapeutic and/or drug target potentials. You will also develop and implement software tools for database mining and sequence analysis.

Project Manager (Bioinformatics)

Requires an MS or equivalent with 6+ years of experience (or BS with 10+ years) demonstrating comprehensive knowledge/experience in information systems development projects, which must include at least 2 years managing large software development projects. Your background must include project management experience in support of drug discovery and bioinformatics, and demonstrated ability to manage large application development projects with multi-disciplinary teams.

Application Development Consultant

Requires MS or equivalent with 6+ years of experience (or BS with 8+ years) in information systems development, which must include at least 3 years as a senior analyst on complex application development projects. Experience is required in developing client/server applications and working in UNIX, VMS, Oracle and C, C++ languages. Knowledge of drug discovery applications and environment is desired. Responsibilities include problem analysis, system design down to the functional level, and complex code required by system components.

Systems Engineering Consultant

Requires an MS or equivalent in Computer Science with 6+ years of experience (or BS with 8+ years) which must include Open VMS, UNIX, Oracle, Sun OS, SYBASE database environment as well as managing systems in a multi-site environment. Knowledge of drug discovery applications and environment is desired. Responsibilities include troubleshooting complex problems in a Sun OS/UNIX (limited VMS) environment; installing, maintaining and documenting Operating Systems and associated layered products on systems worldwide; serving as on-call Systems Engineer to provide 24X7 support for all layers worldwide.

To apply for one of the above La Jolla openings, please send your resume, including salary requirement and indicating specific position of your interest, to: Human Resources Manager, R.W. Johnson PRI, 3535 General Atomics Court, Suite 100, San Diego, CA 92121.

CENTRAL NEW JERSEY OPENINGS (Midway between Philadelphia and New York City)

Associate Director, IT

Requires BS or equivalent and 12+ years’ increasingly responsible experience demonstrating extensive knowledge of the drug discovery process and related information technology requirements. Advanced degree (MS/MBA) highly desirable. Background must include experience with High Throughput Screening and Bioinformatics Information Systems, and at least 5 years managing complex software development projects. Proven ability to manage a large portfolio of programs and IS activities, handle conflict and seek problem resolution in a collaborative fashion.

Working as part of a matrixed management team, the successful candidate will manage all information management systems activities for Drug Discovery. This will include: developing and leading a professional staff performing analysis, design, testing and support of computer applications; collaborating with business unit management to identify opportunities for IT and evaluating their impact; recommending project proposals to meet organizational objectives. (Dept. 693)

Project Manager, HTS

Requires BS or equivalent and 10+ years’ experience (or MS and 6+ years) demonstrating the ability to manage large application development projects with multi-disciplinary teams. In-depth knowledge of Information Technology in the drug discovery process and 2+ years managing large software development projects are required. Experience with High Throughput Screening and Bioinformatics is highly desired.

Working as part of a matrixed management team, the successful candidate will plan project life cycle by defining project and system deliverables, estimate system development efforts and costs, distribute assignments to team members. We will look to you to provide project control by detecting variances from the plan and applying corrective measures. (Dept. 694)

Applications Development Specialist

Requires a BS or equivalent and 2+ years’ experience (or MS and 1+ years) demonstrating comprehensive knowledge of information system development. Client/Server applications, Oracle and UNIX experience essential. Knowledge of drug discovery applications is highly desired.

The successful candidate will conduct basic analyses, systems design down to the functional level, and develop code required by system components. You will conduct basic feasibility studies, prepare reports, and record activity progress. (Dept. 695)

To apply for one of the above Central New Jersey openings, please forward a copy of your resume, including salary requirements, to: Dept. # for position of your interest, Johnson & Johnson Recruiting, P. O. Box 16597, New Brunswick, NJ 08906-6597.

We are an equal opportunity employer and support diversity in the workplace.
We join windows, requires support setting facile design desirable.

Specific develop provide with professional programming in closely protein anti-microbials.

Experience to _Misa Develop with Scientists include C/C++, programmers, human and demonstrated experience in microbial and anti-microbials.

Experience to assume checking, checkdng, for complex disorders. The individual will be expected to assume a leadership position in the human genetics group.

Provide computational support for Human Linkage Analysis projects. Work closely with scientists to analyze data and develop tools for pedigree data management, error checking, and data exchange. Requires experience in data management, UNIX, C, and Perl. Experience with Linkage Analysis, Macintosh, Pascal, or Fortran is desirable.

Provide flexible software support to research and production groups in molecular biology. Projects may have GUI, mathematical, or specialized data content. Must be able to work independently or as part of a team on large and small applications. Requires a BSCS/EE or equivalent, 2-3 years' professional programming experience, solid knowledge of C, and some experience with UNIX. Experience with any of the following is desirable: C++, Perl, Java, GUI, databases, client/server, Macintosh, robotics, instrument interfaces, and molecular biology.

Develop database applications to support DNA sequencing and disease mapping projects. Requires experience in relational databases, UNIX, C/C++, and web interfaces. Experience with molecular biology, Macintosh, Sybase, or Perl is desirable.

Develop Macintosh applications to support a variety of genomics projects. Applications include both GUI and data analysis components. Requires experience with Macintosh programming, C/C++, and web interfaces. Experience with molecular biology, instrument interfaces, or Perl is desirable.

Design and implement coherent system management approach for a rapidly growing multiplatform network of UNIX servers and workstations. Requires facile knowledge of UNIX, TCP/IP, NFS, NIS, X-Windows, and related protocols. Specific experience with Digital UNIX or Solaris would be helpful, but demonstrated interest and ability in achieving reliable and scalable systems configurations is essential. Experience in a scientific research setting is a plus, as is some familiarity with VMS.

Administer and implement rapidly growing UNIX computing environment. Requires a minimum of 1-2 years' experience with NFS, NIS, TCP/IP, X-windows, and related utilities. Experience with Macintosh and network support is desirable.

Join GTC and enjoy the discovery and developments of progressive science, as well as a comprehensive salary and benefits package. Please send or fax your resume or curriculum vitae to Human Resources, Genome Therapeutics Corporation, 100 Beaver Street, Waltham, MA 02154; Fax: (617) 893-9835; or see http://www.crcc.com. We are an equal opportunity employer M/F/V/H.

DATABASE SOFTWARE ENGINEER BIOINFORMATICS
The Technology Career of Tomorrow!
Genomics is revolutionizing drug development, gene therapy, and our entire approach to healthcare and human medicine. Translating genomics discoveries into practical biomedical results through bioinformatics applications presents the challenge of the decade. Bioinformatics offers the career path of the future for the ambitious data professional.

DIGITAL GENE TECHNOLOGIES, INC.—the La Jolla-based leader in total gene expression technology—seeks highly-motivated and creative professionals to join the company's leading-edge bioinformatics group in developing and expanding the genomics database of tomorrow in a wide range of profitable and significant medical, industrial and academic applications.

Current opportunities include a Database Software Engineer position. This position requires experience with Sybase and Powerbuilder for PC/UNIX applications, a BSCS or equivalent, and a minimum of 3 years database experience. A background in biology and familiarity with genomic databases would be a plus. Other opportunities accommodate different computer professionals. Compensation and benefits are exceptional.

Career-minded professionals with ambition to pioneer the Technology Frontier of Tomorrow should apply by sending or faxing resume, letters of reference and salary history to:

DIGITAL GENE TECHNOLOGIES, INC.
11149 North Torrey Pines Road, Suite 110
La Jolla, California 92037
fax: (619) 552-8625
e-mail tom@dgt.com
EOE

RHdb! The Radiation Hybrid Database at the EBI

RHdb, the radiation hybrid database was established a year ago in response to a need expressed by groups at the Sanger Centre, Cambridge University, The Wellcome Human Genes Centre, Genethon, the Whitehead Institute and the Stanford Human Genome Centre, for a repository for raw radiation data to allow the construction of radiation hybrid maps.

These groups are part of an international collaborative project which will produce a large number of radiation hybrids for the human genome. In understanding the genome, radiation hybrid maps are an indispensable alternative to genetic maps as they can include non-polymorphic markers and are also powerful enough to order involved genetic clusters of polymorphic STSs. They will allow the generation of a very precise STS map that will be indispensable in the study of multifactorial diseases.

RHdb went public in July 1995, with 3 panel entries, 25 experimental conditions entries and 1115 RH entries. Now almost a year later there are 1325 RH entries (a 10 fold increase) and 23 Radiation Hybrid maps. This is already a powerful information resource, and will be made more useful by future submissions.

We invite you to try out the database, and encourage all groups using the Radiation Hybrid techniques to submit their data to this database.

For more information, look at the RHdb home page on the EBI WWW server at URL http://www.embl-ebi.ac.uk/RHdb or send a mail to datalib@embl-ebi.ac.uk with RHdb on the subject line.

Alternatively, contact Patricia Rodriguez-Tomé on +44 (0) 1223 494409.
THE INSTITUTE FOR GENOMIC RESEARCH (TIGR) is a not-for-profit research institute devoted to sequencing, mapping, and functional characterization of human, animal, bacterial, and plant genomes. The goal of TIGR is to identify and characterize novel genes and gene families through the application of DNA sequence analysis, bioinformatics, gene expression and model organism studies. TIGR scientists have developed a new generation of public biological databases to organize the data generated by cDNA and genomic sequencing. TIGR is the recipient of a DOE Small Genome Initiative grant and has completed the first 3 microbial genomes, *Haemophilus influenzae*, *Mycoplasma genitalium*, and the first Archaean, *Methanococcus janasi*chi. Projects are currently underway on the genomes of *Helicobacter pylori*, *Archeoglobus fulgidus*, *Borellia burgdorferi*, *Deinococcus radiodurans*, *Neisseria meningitidis*, and *Treponema pallidum*. TIGR has also received a grant from the NCHGR to sequence the p arm of human chromosome 16. Other projects are underway in *Arabidopsis thaliana*, mapping of human Expressed Sequence Tags, and curation of human cDNA data. Summaries of our research projects can be found on our web site (http://www.tigr.org).

TIGR seeks highly-motivated individuals in the following areas to join a growing team of scientists and engineers:

**Scientific Software Design Manager**

This position will involve working with scientists to design software for DNA and protein sequence analysis in support of large-scale genome sequencing projects. The successful candidate will have experience in UNIX, C, C++, GUI, SQL, and CGI programming. Other minimum requirements include a bachelor’s degree in computer science or equivalent plus 3-5 years professional experience, including management and design experience, a working knowledge of molecular biology, and excellent communications skills. 

Ref. SDM

**Database Specialists**

Positions are available for detail-oriented individuals to join a team of scientists curating DNA and protein sequences. These challenging positions involve analysis and curation of a wealth of data from a variety of large-scale projects, including human, plant and microbial genomes. Duties include working with faculty on sequence similarity searching, motif analysis, etc., as well as keeping annotation up to date in local databases, on WWW site, and in the public databases. Minimum requirements include BA/BS (Masters preferred) in biology/genetics, and strong computer and analytical skills. Ideal candidates will have experience in molecular biology or biochemistry. 

Ref. DS

**Software Engineers - UNIX, C, C++, GUI, Motif, SQL, CGI, Java**

Multiple positions are available for individuals with some or all of the above programming skills to join a growing software development team. The positions involve working with scientists to develop software for DNA sequence analysis in support of large-scale genome sequencing projects. A bachelor’s degree in computer science or equivalent is required; prior work in a molecular biology environment is a plus. 

Ref. USE

**Postdoctoral Fellows**

**Bacterial Genomics:** Postdoctoral fellows will assist in sequencing, assembly, analysis, and annotation of complete microbial genomes, including the current organisms under study. Applicants are eligible to compete for DOE Human Genome Distinguished Postdoctoral Fellowships. Send CV and list of publications. 

Ref. BPD

**Human Gene Discovery:** Postdoctoral fellows will participate in large-scale sequencing and analysis of human genomic regions including development of new methods for closure and quality assurance. Postdocs will also work with members of the Bioinformatics group to take advantage of TIGR’s database of over 400,000 ESTs to facilitate gene identification and annotation. Send CV and list of publications. 

Ref. HPD

Send applications, including a minimum of 3 references, to: 
The Institute for Genomic Research, 9712 Medical Center Drive, Rockville, MD 20850-3319, Attn.: Human Resources/Ref. ___, e-mail jobs@tigr.org, FAX 301-838-0218, URL: http://www.tigr.org

TIGR is an equal opportunity employer and encourages qualified women and minority candidates to apply.

The Institute for Genomic Research is located in its new, permanent campus (left) in Rockville, Maryland, in the greater Washington, D.C. area close to other research and educational institutions. Facilities consist of a 20,000 sq. ft. faculty office building, and a 30,000 sq. ft. laboratory building located on a 12-acre campus. The laboratory building is equipped with large facilities for DNA sequencing, bioinformatics, biochemistry, and molecular biology.
SUITABLE PROFESSOR IN THE AREA OF GENOME INFORMATICS

In addition to developing a vigorous independent research program, the candidate is expected to interact with the BCM Human Genome Sequencing Center in developing support for large scale DNA sequencing, to develop collaborations with the genetics faculty, and to contribute to the overall development of a strong informatics infrastructure within the Department. Interested individuals are invited to send a curriculum vitae and research plan outline to:

A. Gibbs, Ph.D., Associate Professor and Director
BCM Human Genome Sequencing Center
Department of Molecular and Human Genetics
Baylor College of Medicine
One Baylor Plaza
Houston, TX 77030
Phone: 713-798-6539
Fax: 713-798-5741
Email: agibbs@bcm.tmc.edu

Baylor College of Medicine is an Equal Opportunity/Affirmative Action/Equal Access Employer. Minorities and women are encouraged to apply.

BIOMETRICS

Algen Biotechnologies Corporation is based in Montreal, Canada and seeks a SCIENTIST (Ph.D.) with three to five years of practical experience in bioinformatics as applied to the functional discovery in human complex disorders, for a senior position. Available immediately. Salary according to experience and expertise. To work in close collaboration with a team of geneticists and epigeneticists on disorders of the aged.

Applications should include a curriculum vitae, a statement of research experience and interests, and names and addresses/telephone numbers of three references. Direct application materials to:

Dr. David Smith
Department of Plant Pathology
S-305 Agriculture Science Building-North
University of Kentucky
Lexington, KY 40546

E-mail transmittal applications will not be reviewed. Further information may be obtained by: Phone: 606-287-3901; Fax: 606-323-1961; Email: dasmith@ca.uky.edu

Applications will be reviewed until August 21, 1999, or until a suitable qualified candidate is found. The University of Kentucky is an Equal Opportunity Employer. Women and minorities are encouraged to apply.

BIOMETRICS COORDINATOR

Missouri Botanical Garden seeks individual to install equipment, configure networks and operating systems, and maintain system performance relative to the Flora of North America Project. Also will design, implement, and deploy WWW information and communication tools and operation, and training of FNA related information resources, including CD-ROM-based systems and databases. Requires a Bachelors degree in computer science, biology, or related discipline and five to ten years experience and applicable experience with Windows 95, Access, HTML, SGML, Java, and Web site maintenance. To apply, submit resume to:

Human Resources Management
Missouri Botanical Garden
P.O. Box 299
St. Louis, MO 63166-0299
Email: rland@mobot.org
Fax: 314-963-7957

Equal Opportunity Employer

POSITIONS OPEN

ASSOCIATE PROFESSOR

The Department of Veterinary Anatomy and Cell Biology is seeking a cell molecular biologist for a TENURE-TRACK FACULTY position at the Associate Professor level. Applicant should have Ph.D. or equivalent degree in a biological or biomedical science, postdoctoral experience, research background in cell molecular biology, ability to teach a course in the professional curriculum, and extramural funding. Application deadline is July 25, 1999, or until suitable applicant is found. Submit curriculum vitae; names, addresses, and telephone numbers of at least three references; and a summary of current research to: Dr. Gary Wise, Professor and Head, Department of Veterinary Anatomy and Cell Biology, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA 70803.

FACULTY POSITION FUNGUS-PLANT INTERACTIONS

Department of Plant Pathology
University of Kentucky
Applications are invited for a TENURE-TRACK or TENURED position. The appointee will be expected to develop a nationally recognized research program focused on fungus-plant interactions; to develop educational programs; to obtain extramural funding; and to participate expertise to other departmental efforts. Preference will be given to individuals with research experience in one or more of the following areas: fungal molecular biology; fungal metabolism; fungal pathogenesis; and pathogen virulence determinants of fungi. The ideal candidate will have expertise in development of new regulatory and interventional technologies. The department offers a challenging environment for research and teaching.

Applications should include a curriculum vitae, research statement, a list of publications, three letters of recommendation, and evidence of teaching effectiveness. In the United States, send to:

Dr. Don Nauffts
Department of Plant Pathology
Kidwell Biological Research Center
University of Kentucky
Lexington, KY 40546
Fax: 606-257-2757

Inquiries may also be directed by email to dnanafft@uky.edu.

Applications must be received by 15 August 1999.

ASSOCIATE/ASSOCIATE PROFESSOR

Environmental and Occupational Health Policy

A FACULTY POSITION in the Division of Environmental and Occupational Health, School of Public Health, University of Minnesota, is available for a well-qualified professional with training and/or experience in an appropriate discipline such as policy analysis, applied economics, decision analysis, risk assessment, strategic environmental management, or health policy. Preference will be given to candidates with expertise in qualitative approaches to analysis of environmental and/or occupational health policy. This is a 12-month, 100% time non-tenure-track appointment that is annually renewable. Qualifications include: earned doctorate in field relevant to policy analysis, strong substantive knowledge of health regulations and/or policy, willingness to serve as a member of a multidisciplinary team, and excellent communication skills. Starting date is negotiable; salary and rank will be commensurate with qualifications and experience. Submit curriculum vitae, names and addresses of three referees, and a brief statement of interest to:

Dr. Ken Sexton, Search Committee Chair, EOH, School of Public Health, University of Minnesota, Box 807 UMC, 420 Delaware Street SE, Minneapolis, MN 55455. Deadline for applications is September 30, 1999. The University of Minnesota is an Equal Opportunity Educator and Employer.

PHYSICIST—JILA, a joint institute comprising faculty members from both the University of Colorado and the National Institute of Standards and Technology, is conducting a search for outstanding physicists for its experimental laboratory which covers areas of particular interest are precision measurement and standards, quantum optics, and nonlinear optics. Several positions will be filled over the next 18 months, in the Fellows track of JILA. The individuals selected will be expected to develop creative, independent, and broad-based experimental programs in their respective areas of expertise. They will become faculty members of the University, and the Institute will establish active research groups including University graduate students and postdoctoral researchers, acquire outside grants and contracts, and assume some teaching responsibility. The starting salary is $50,000 to $80,000, depending upon experience and qualifications. Interested parties should send a curriculum vitae and a detailed proposal of research (two to three pages), and should indicate the type of recommendation to be sent to the Search Committee, JILA Campus Box 440, University of Colorado, Boulder, CO 80309-0440. Applicants should email a copy of their CV to jila-search@jila.colorado.edu. Applications and nominations should be received by September 1, 1999, and will be reviewed for a possible January 1999 start date, while applications received by January 31, 1999 will be reviewed for a possible September 1999 start date. JILA strongly supports the principle of diversity. We are particularly interested in receiving applications from women, ethnic minorities, disabled persons, veterans, and applicants from the Vietnam era.
HELP US ADVANCE OUR ACUTE CARE PRODUCTS TO TREAT CARDIO-RENAL DISEASE

SCIOS is a biopharmaceutical company engaged in the discovery, development, and commercialization of novel human therapeutics, focused chiefly on cardio-renal disease and inflammation targets. Talented and dedicated Science professionals are invited to consider the following positions to support program expansion at our San Francisco Bay Area offices.

SENIOR SCIENTIST

This senior-level Scientist is sought to lead our new Research Protein Chemistry group, which provides protein chemistry expertise to Research projects. You will work closely with the Recombinant Expression group to design expression systems for production of protein reagents for multiple research project teams. A Ph.D. and 4-8 years’ experience, including postdoctoral work, are required. Extensive protein purification experience is desirable, particularly from recombinant sources. Job Code 96-001.

SCIENTIST

This position requires a Ph.D. in Biochemistry or Molecular Biology with at least 2 years of postdoctoral experience to provide overall leadership for our established DNA sequencing group, with particular emphasis on management of high-throughput DNA sequencing projects. To create core capabilities in bioinformatics as a resource for our Research Department, you must have extensive experience with current software for automated DNA sequencing and sequence data management, database searching, and gene and protein structural prediction. Strong Macintosh/UNIX background preferred. Job Code 96-022.

SENIOR/RESEARCH ASSISTANT

Your primary responsibilities will include assisting in the preparation of small molecule compounds and carrying out synthesis and analysis of combinatorial libraries on solid supports. The required qualifications include a Master’s in Organic Chemistry along with the ability to synthesize and analyze small molecules using state-of-the-art analytical instrumentation. Knowledge of solid support synthesis would be advantageous. Job Code 96-035.

Enjoy the benefits of Scios’ competitive salaries, excellent benefits package, and exciting, interactive research environment set at the center of one of the country’s most dynamic bioscience communities. Please note job code in your response. Scios Inc., Human Resources, 2450 Bayshore Parkway, Mountain View, CA 94043. Or FAX to 415/962-5966. EOE.

SCIOS
Assistant/Associate Professor

The Section of General Surgery at the University of Chicago invites applications for a FACULTY position at the Assistant/Associate Professor level to serve as Director of the Laboratory of Genetic Medicine. We are seeking an independent investigator able to conduct and direct high quality basic science research in molecular oncology of gastrointestinal and pancreatic adenocarcinoma. Qualifications include a Ph.D. degree and completion of a relevant postdoctoral fellowship. The candidate should have evidence of productivity in research with publications in peer-reviewed journals and current independent research funding. Responsibilities include independent basic science research; development of translational research projects with current faculty to complement the Section of General Surgery; and the overall direction of the research programs of the Section. Please send inquiries and curriculum vitae to: Fabrizio Michelassi, M.D., The University of Chicago, Section of General Surgery, 5841 South Maryland Avenue/MC 5094, Chicago, IL 60637. The University of Chicago and its Medical Center are Affirmative Action/Equal Opportunity Employers and applications from women and representatives of minority groups are encouraged.

EvoLutionary Biology Professorship

The Norwegian University of Science and Technology (formerly University of Trondheim) announces a tenure PROFESSORSHIP in Evolutionary Biology (Zoology). The Department of Zoology aims at strengthening its evolutionary competence through the announced position. The interest of the Department is on how selection processes (natural and sexual) and evolutionary environments of how such processes may give rise to the establishment of new species (macoevolution) is also relevant. Applicants should have research experience involving natural and/or sexual selection. Studies of adaptation to the external environment, to intraspecific interactions, and to interspecific interactions (coevolution) are considered relevant. Theoretical as well as empirical approaches will be taken into consideration.

FACULTY POSITION

Department of Bacteriology

College of Agricultural and Life Sciences

University of Wisconsin–Madison

The Department of Bacteriology at the University of Wisconsin–Madison invites applications for a tenure-track faculty position at the ASSISTANT PROFESSOR level. The department is most interested in persons employing molecular approaches to elucidate mechanisms in the use of scientific tools to address the interactions of microbes and their environments. These include the nature of microbial communities, host-microbe interactions, and unique metabolic abilities or their transfer among microorganisms. Candidates should have a Ph.D. degree in microbiology or related discipline and postdoctoral experience. The successful candidate will be expected to establish a dynamic and extramurally funded research program and to participate actively in undergraduate and graduate teaching, training, and advising. The University of Wisconsin–Madison has a diverse and rapidly growing research environment, and maintains a student population of superior caliber. This position represents an outstanding academic research opportunity for a junior investigator. Salary, fringe benefits, and startup packages are nationally competitive and are commensurate with qualifications and experience. Please send a detailed curriculum vitae, including names and addresses of three references; a statement of future plans; a list of publications; representative reprints; a list of potential teaching interests or relevant experience; and three letters of recommendation to: Section Head, Bacteriology, 1200 University Station, Madison, WI 53706-1567. The application deadline is October 1, 1996. The University of Wisconsin–Madison is an Equal Opportunity/Affirmative Action Employer. Women and minorities are strongly encouraged to apply.

Assistant Professor

University of California, Irvine

Applications are invited for a TENURE-TRACK FACULTY position in the Department of Biological Chemistry, College of Biological Sciences, University of California, Irvine. Candidates whose research interests lie primarily within the general fields of molecular biology and biochemistry are encouraged to apply. The successful candidate will have strong, independent research capabilities and experience in research; participate in the interdepartmental graduate program; and contribute to graduate and medical teaching. Interested individuals holding the Ph.D. or M.D. degree are encouraged to send a letter of interest, curriculum vitae, outline of proposed research program, and three letters of reference prior to September 1, 1996 to: Chair, Biological Chemistry Search Committee, Department of Biological Chemistry, College of Medicine, University of California, Irvine, CA 92717-1700. (Please note: After July 1, 1996, use the following zip code: 92697-1700.) To: Dr. Bernt-Erik Sather, Irvine, is an Equal Opportunity/ Affirmative Action Employer.

FACULTY POSITION

Medical Biochemistry

The Division of Basic Medical Sciences at the University of Medicine and Dentistry of New Jersey announces a tenure-track position in the field of biochemistry. The successful candidate will have strong, independent research capabilities and experience in research; participate in the interdepartmental graduate program; and contribute to graduate and medical teaching. Interested individuals holding the Ph.D. or M.D. degree are encouraged to send a letter of interest, curriculum vitae, outline of proposed research program, and three letters of reference prior to September 1, 1996 to: Chair, Biological Chemistry Search Committee, Department of Biological Chemistry, College of Medicine, University of California, Irvine, CA 92717-1700. (Please note: After July 1, 1996, use the following zip code: 92697-1700.) To: Dr. Bernt-Erik Sather, Irvine, is an Equal Opportunity/Affirmative Action Employer.

FACULTY POSITION

Medical Biochemistry

The Division of Basic Medical Sciences at Mercer University School of Medicine invites applications for a Co-ordinator of Medical Biochemistry Education. Medical Biochemistry is a two-semester, interdisciplinary problem-based medical education program in which small groups tutorials replace lectures. The successful applicant will be expected to pursue scholarly activity, serve as a research mentor to faculty, and teach in the medical education. Rank and salary will be commensurate with experience. Applicants must have a Ph.D. in biochemistry or an M.D. degree, and extensive medical biochemistry education experience. Applicants should send a curriculum vitae, names of three references, and a statement of philosophy on the role of teaching and research in medical education. Apply to: Dr. Robert J. Koss, Division of Basic Medical Sciences, School of Medicine, Mercer University, Macon, GA 31207. Equal Opportunity/Affirmative Action Employer. Women and minority candidates are encouraged to apply.

FACULTY POSITION

Ben-Gurion University of the Negev

Faculty of Health Sciences

The Faculty of Health Sciences is recruiting basic laboratory scientists to join its interdisciplinary team engaged in research in the fields of nutrition and international health. Candidates should be researchers who utilize modern approaches in basic research in biochemistry or biophysics, molecular, cellular, or immunologists with expertise and interest in the field of infectious diseases. Ph.D. and/or M.D. degrees with at least two years of research experience in research and teaching and ability to develop independent and interactive research is essential. Curriculum vitae, statement of research plans, and three letters of reference should reach: Dr. Doron Gurevich, Chair, S. Daniel Abraham International Center for Health and Nutrition, Faculty of Health Sciences, Ben-Gurion University of the Negev, P.O.B. 653, Beer Sheva 84105, Israel. FAX: (7) 491763; Email: csalah@bgu.ac.il; USHORT 376, 1996.

Molecular Virologist at rank of ASSISTANT PROFESSOR in the tenure track. Seeking candidate with strong research background in HIV/host cell interactions, drug inhibition of HIV infection, and mechanisms involved in HIV replication (recombination). Must possess Ph.D., postdoctoral experience, strong publication record, and ability to secure external funding. Send curriculum vitae, description of future research plans, and three letters of recommendation to: Dr. Robert Salata, Chief, Division of Infectious Diseases, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106-4984. Case Western Reserve University is an Affirmative Action/Equal Opportunity Employer.

FACULTY POSITION

Department of Microbiology and Immunology of Temple University School of Medicine invites applications for several ASSISTANT PROFESSOR positions. Rank will be appropriate to training and experience. We are particularly interested in individuals studying (1) molecular immunology or cellular immunology employing concepts of epitopes of self and/or foreign (2) molecular microbiology or microbial pathogenesis using molecular approaches. Successful candidates must have significant research accomplishments, ability to establish and maintain a funded research program will attract extramural funds and must have active competitive grants. Start-up funds and newly renovated space are available.

The Department is supported by extensive peer-reviewed funding and has a very strong graduate program providing opportunities for students with advanced training in molecular microbiology and immunology. Interactions are encouraged with other basic and clinical departments of the School. Send a curriculum vitae, bibliography, summary of research achievements and research plans, and the names and addresses of four references to: Chris D. Plattsoucas, Ph.D., Professor and Chairperson, Department of Microbiology and Immunology, Temple University School of Medicine, 3400 North Broad Street, Philadelphia, PA 19140.

Temple University is committed to Affirmative Action and Equal Employment Opportunity and strongly encourages applications from women and minorities.

VISITING ASSISTANT PROFESSOR

BIOLOGY

FS8034

Description: One-year position to start August 1996 with possible renewal. Responsibilities include teaching an undergraduate lecture and lab course in human anatomy and physiology, human anatomy, nutrition, and general biology. Teaching load is 12 credit hours per semester with an option for a one semester lab assistant vacancy and a one semester lab assistant appointment. Review of completed applications to begin June 30, 1996 and continue until a suitable applicant is hired. Affirmative Action/Equal Opportunity Employer.

PRINCIPAL SCIENTIST

Start-up biotechnology company located at University of Georgia seeking SCIENTIST with three or more years of postdoctoral experience in recombinant DNA techniques and molecular, cellular, or developmental biology. Experience in animal transgenesis important. Individual should be capable of directing research into avian transgenesis and willing to participate in the varied tasks contributing to the growth of an emerging commercial enterprise. Incentive stock options available in addition to competitive salary. Email resume plus three references to: gfmurph@agvlab.uga.edu

FACULTY POSITION

Hadasah University Hospital

Jerusalem, Israel

Applications are welcome for MOLECULAR BIOLOGY position, with special emphasis on gene therapy (position available from 1997). Candidates are required to have a Ph.D. and 2-3 years postdoctoral experience with training with proven excellence in research and teaching, and experience in research directly related to gene therapy. The position will be ACADEMIC or CLINICAL, depending on the candidate's qualifications. The Hadasah Medical Organization, Prof. S. Penchas, C/O Dr. M. Roll, Director, Research Department, R&D Division, Hadasah Medical Organization, P.O.B. 12006, Jerusalem, 91120, Israel. Applications should arrive no later than July 1, 1996.
Welcome to the new world of point and click biology.

Incyte Pharmaceuticals is the leader in the design, development and marketing of genomic database products and services. Our LIFESSEQ database integrates high-throughput genomics with bioinformatics technology and software to create an information-based tool used by pharmaceutical companies in drug discovery and development. We offer the following opportunities for skilled and creative individuals to join a market leading company with a significant commitment in developing commercial Intranet tools to support computational biology and biomedical database searching.

Scientific Programmers/Senior Scientific Programmers
You will develop Sybase-based systems for on-line processing and large scale analysis of DNA sequence information, including cross-platform (NT/Mac/UNIX) Intranet tools with components in JAVA and HTML. BS/BA in Science or Engineering required with at least 2 years' professional experience with SQL and C and a background in Object-Oriented programming (pref C++), GUI design, and UNIX scripting languages. Prior experience in developing computer applications for biomedical or chemical research is a plus. REF: 115, 117

Programmer
BS in Science or Engineering and at least 1 year industrial experience with Perl and C in UNIX environment required in addition to UNIX shell programming. HTML CGI and JAVA programming is a plus. REF: PRO

Senior Programmer/Analyst
You will assist in systems design and management of automated sample tracking, QA/QC, and DNA sequence processing systems using relational database and Intranet technologies. BS/BA in Science or Engineering and at least 5 years' experience with SQL and C/C++ and UNIX are required. Professional OO data-modeling experience, excellent communication skills, and project-level team management required. Prior experience in developing computer applications for biomedical or chemical research is a plus. REF: PA

Technology Development Engineers
You will assist in development and commercial deployment of next-generation DNA analysis systems, chemistries, and technologies. Mechanical engineering background with strong machine shop skills required, as is demonstrated prototyping experience with laboratory systems. Real-time/embedded data acquisition and control systems skills a plus. Positions available at both the BA/BS and Ph.D. levels. REF: TDE

Technology Development Programmer
You will assist in development and deployment of next-generation DNA analysis systems, chemistries and technologies. Requires at least 3 years' professional experience with C/C++ on Mac/PC systems, and demonstrated skills in signal and image processing, data acquisition, robotics, and real-time control systems. Experience with LabView, SQL, and GUI development experience desired. REF: TDP

Database Systems Administrator/Senior Information Science Engineer
BS in Computer Science or relevant experience and at least 4 years' experience in UNIX (Solaris/SunOS/SGI/DEC) systems administration primarily in a Sun environment and script level programming, Sybase and Oracle configuration and tuning and cross-platform client server, networking in a TCP/IP environment (PC/Mac/UNIX) required. HTML and Intranet server systems, software development skills (C/C++/SQL) and bioinformatics (GCG, Staden, BioSys and BLAST, etc.) experience a plus. REF: BS

Researchers/Scientific Programmers
Strong scientific thought, creativity and enthusiasm coupled with advanced degrees and experience in bioinformatics or computational biology needed for these positions within our Research Bioinformatics group. Programming skills in databases, algorithms and statistical analysis required, as well as basic knowledge of molecular biology and genetics. Familiarity with the techniques of sequence analysis, data mining, gene discovery and analysis desired. REF: 120

Scientist
Ph.D. Genetics or Molecular Biology with at least 2 years' post-graduate experience required to develop new sequencing chemistries, integrate them into production operations and evaluate new sequencing technologies. Experience with automated sequencing, robotics, and enzymology of sequencing strongly desired. REF: 034

Research Assistant/Associate
Responsibilities include performing extensive word searches against public biology databases using UNIX tools, and editing/analyzing results for future incorporation into our database. You will also use Internet biology databases to add functional annotation to those proteins not classified through word searches. BS/BA or relevant experience and strong knowledge of molecular biology required. Familiarity with biological resources on the Internet, and computer literacy with Macintosh and UNIX systems preferred. UNIX programming ability is a plus. REF: 064

Incyte offers a premier R&D facility in the Palo Alto foothills, along with an outstanding benefit package and significant professional opportunities growth. Please mail/fax your resume to: Incyte Pharmaceuticals, Attn: HR/REF: 3174 Porter Drive, Palo Alto, CA 94304. FAX (415) 555-0572, email: employ@incyte.com. Also look for us on the world wide web at http://www.incyte.com. EOE.
The Department of Pathology of the Vanderbilt University School of Medicine is pleased to announce the appointment of Professor Robert D. Collins as the first John L. Shapiro Chair in Pathology. The Department is seeking nominations for two additional senior faculty to be conferred with Endowed Chairs in the Department. These Chairs honor Professor Ernest W. Goodpasture, and Dorothy B. and Theodore Austin. The Department of Pathology has a distinguished history, a devotion to teaching, and an outstanding record of clinical service, clinical research, and residency and fellowship training. The basic research program is highly focused and excellent, and there is a well-established Ph.D. program within Vanderbilt's Interdisciplinary Graduate Program. Current areas of research strength are cancer, neurototoxicology and neurodegenerative disease, vascular and extracellular matrix biology, AIDS, and renal disease. Environmental pathology, broadly defined, is the recruiting theme for these Chairs. The two Chairs will investigate the contributions of genetics, aging, and environmental toxicants to the pathogenesis of disease. The holder of one Chair will focus on basic cancer research. Candidates must be M.D. or M.D./Ph.D. pathologists with qualifications commensurate with the rank of Professor, and should have a distinguished record in teaching, scholarship, peer-reviewed funding, and the mentoring of academic pathologists. Vanderbilt University is an Equal Opportunity employer, and women and minorities are encouraged to apply.

Letters of interest should be sent with a curriculum vitae and three references to:

Doyle G. Graham, M.D., Ph.D.
Professor and Chair
Department of Pathology
C-3322 Medical Center North
Vanderbilt University Medical Center
Nashville, TN 37232

ENDOWED CHAIRS

DIRECTOR

National Space Biomedical Research Institute

Universities Space Research Association (USRA), a non-profit association of eighty universities, is organizing the efforts of a consortium of life sciences research institutions which seek to operate the National Space Biomedical Research Institute (NSBRI) to be established by the National Aeronautics and Space Administration (NASA) within the next few months. We are seeking a director for the Institute.

The NSBRI is a new and exciting approach to NASA's conduct of space biomedical research. NASA anticipates that the Institute will lead the nation's space biomedical research effort. Accordingly, NASA will give the NSBRI substantial independence and significant funding to enable it to develop an overall space biomedical research plan for the nation, and to carry out a significant portion of the research identified in that plan.

The individual who will fill this challenging position will have the opportunity to shape the Institute from its inception and will play a prominent role in its ultimate success.

The successful candidate will be a U.S. citizen who: (1) possesses an international reputation in a biomedical research field relevant to space biomedicine, and (2) has proven his or her ability to successfully manage a research program. Prior association with NASA is not required.

To investigate this unique opportunity, please fax or mail your resume in confidence to:

USRA, Division of Space Life Sciences
3600 Bay Area Boulevard
Houston, Texas 77058
Fax: (713) 244-2006

RESEARCH & DEVELOPMENT

SENIOR SCIENTIST

Promega Corporation, a world-leading biotechnology company, headquartered in Madison, WI, has an opening for a Senior Research & Development Scientist in Genetic Analysis. Requirements include: Ph.D. in molecular biology or related area and minimum 5 years lab experience. Prefer 2+ years experience in an industrial setting; experience with nucleic acid purification and amplification methods, linkage analysis and/or non-isotopic detection methods; experience handling plant, animal, clinical or forensic materials; and facility with computer-based analyses, especially national genome databases and DNA analysis software.

Promega strives to provide a rewarding work experience for our employees and to provide unparalleled excellence, quality and prosperity in our business. We seek to preserve a balance between work and life activities reflected in our on-site fitness and daycare facilities and comprehensive benefit package. To apply, send a resume with salary requirements to: PROMEGA CORPORATION, Human Resources (11104J), P.O. Box 7879, Madison, WI 53707-7879. Equal Opportunities Employer.

Promega

To hear about current employment opportunities, please call our Career Opportunities Line at (608) 277-5355.
SUPERINTENDENT
CENTER FOR BIO/MOLECULAR SCIENCE AND ENGINEERING
A Senior Executive Service Position
$94,800 to $115,700 (plus locality pay)

The Center for Bio/Molecular Science and Engineering conducts a program of basic research, applied research, development, and evaluation, leading to the creation, adoption, and application of new concepts, principles, methods, and techniques in the various areas of Bio/Molecular Science and Engineering. The Center provides leadership for innovative research and development in the areas of molecular self-assembly, biomaterial science, biophysics, bioorganic chemistry, and related areas of physical characterization. The objective of this research includes the development of novel microstructures, biosensors, and other molecular devices based upon utilization of biomolecules and other complex materials.

Duties and responsibilities: The Superintendent, Center for Bio/Molecular Science and Engineering, is responsible for the conception, planning, and formulation of the scientific program of the Center in pursuit of the needs of the Navy. He/she formulates the general policies and objectives necessary to carry out the program and is responsible for reviewing and evaluating the output and achievements to coordinate efforts to produce the desired goals.

Mandatory Technical Qualifications: (1) Demonstrated competence in conducting research in the field of self-assembled microstructures, liquid crystals, polymeric materials, and lipid based tubules; ability to analyze lipid structure, phase transitions of complex materials, and the effect of molecular structure on microstructure formation; and ability to use experimental techniques for microstructure analysis including picosecond spectroscopy, Raman spectroscopy, and differential analysis. (2) Ability to couple Bio/Molecular Science and Engineering activities to the Navy program planning and acquisition process and to technical program proposals, advanced concept studies and analyses, and then to "market" those proposals to sponsoring activities and executive-level management. This includes the ability to gain acceptance of and to execute highly complex technical programs.

The Mandatory Executive Core and Technical Qualifications must be addressed in detail in order to receive full consideration for this position.

For application details, call Cathy Hamilton on (202) 767-3031.

Refer to announcement number 96-02

In order to be considered, applications must be postmarked by 28 June 1996.

NRL is an Equal Opportunity Employer

U.S. DEPARTMENT OF ENERGY
ASSOCIATE DIRECTOR FOR HIGH ENERGY AND NUCLEAR PHYSICS
OFFICE OF ENERGY RESEARCH
$100,526 to $122,688 per annum

The U.S. Department of Energy (DOE) is seeking applicants for the Senior Executive Service position of Associate Director for High Energy and Nuclear Physics. This person will be the principal official responsible for the development, implementation, and direction of DOE's High Energy and Nuclear Physics research programs. These programs encompass R&D at national laboratories, universities, and private institutions involving about 350 grants, contracts, and interagency agreements, with a budget in excess of $900 million, which funds more than 90 percent of the Federal effort in High Energy Physics and more than 85 percent of Nuclear Physics. The programs study the basic nature of energy and matter seeking an understanding of the ultimate constituents and structure of nuclear and sub-nuclear matter and the fundamental forces. These research activities typically use both domestic and international facilities and are often carried out through multi-institutional and multi-national collaborations. The position reports directly to the Director of Energy Research.

Exceptional difficulty in recruiting highly qualified candidates may be the basis for paying a recruitment or relocation bonus (up to 25% of base pay), and/or requesting approval of a dual compensation waiver for civil and uniformed service retirees.


UNIVERSITY OF ILLINOIS AT CHICAGO
COLLEGE OF MEDICINE
DIRECTOR
Immunobiology Initiative/Program

Applications are invited for the position of Director of a new program in immunobiology within the College of Medicine of the University of Illinois at Chicago. Candidates for this position should possess the Ph.D. and/or M.D. degree, a distinguished record of scholarly activity, and a nationally recognized research program in immunobiology. The candidate should also have the ability to administer and foster interdisciplinary research endeavors with both basic and clinical scientists. The University and College of Medicine will commit considerable resources to this initiative as part of its strategic planning process. The incumbent will have the opportunity to plan and develop the program inclusive of the remodelling of new space, equipment acquisition, and the recruitment of additional faculty and key personnel. The nationally respected Animal Biological Resources Facility as well as a newly constructed 150,000 sq. ft. Molecular Biology Facility will be integral components of the research program. The Director will be appointed at an appropriate faculty rank.

Interested individuals should submit a letter of application and a curriculum vitae which includes a summary of their research program and accomplishments to:
Raymond Pollak, MD, Chair
Immunobiology Program Search Committee
Professor and Chief
Division of Transplantation
University of Illinois at Chicago
801 S. Paulina, Room 411 (MC 960)
Chicago, Illinois 60612

University of Illinois at Chicago is an Affirmative Action/Equal Opportunity Employer. Women and minorities are encouraged to apply.
POSITIONS OPEN

TWO TENURE-TRACK POSITIONS
School of Pharmacy
Medicinal and Natural Products Chemistry
University of Connecticut

The Department of Pharmaceutical Sciences of the School of Pharmacy at the University of Connecticut invites applications for two tenure-track positions as ASSISTANT, ASSOCIATE, or FULL PROFESSOR levels in its Medicinal and Natural Products Chemistry (MNPC) discipline. The successful candidates will be expected to develop and maintain innovative, independent, and externally funded research programs in modern medicinal chemistry or natural products chemistry. A strong commitment to teaching at both the undergraduate and graduate levels is also expected. Areas of research interest may include drug design and synthesis, contemporary natural products chemistry, or mechanisms of action of drug molecules using chemical, biochemical, or biophysical methods. Applications from outstanding candidates with research interests in the chemistry of proteins, genes, receptors, or enzymes are also encouraged. Starting dates and salaries are flexible. One position becomes available after August 1996, the other after August 1997, with applications being considered until the positions are filled. Applicants should send a curriculum vitae and a statement of proposed research interests, and should arrange for three letters of recommendation to be sent directly to: Dr. Karl A. Nieforth, Chairman, MNPC Search Committee, Department of Pharmaceutical Sciences, University of Connecticut, School of Pharmacy, U-92, Storrs, CT 06269. (Search Number 96A310/96A311) We encourage applications from under-represented groups including minorities, women, and people with disabilities.

JUNIOR AND SENIOR FACULTY POSITIONS
UCSF Cancer Center
Cancer Research Institute

The Cancer Research Institute (CRI), a component of the UCSF Cancer Center, invites applications for several new FACULTY POSITIONS. We seek outstanding investigators trained in the areas of cancer biology, cancer genetics, and molecular therapeutics. Successful candidates will receive a dedicated laboratory and a nationally competitive salary to support their work in the School of Medicine and in its graduate programs. New members of the Cancer Research Institute will join an exciting environment that is dedicated to state-of-the-art research facilities and participate in the development and implementation of an innovative graduate program in cancer biology.

Applications should send a curriculum vitae, a short statement of research plans, and the names of at least three references to:

Thea Tlsty, Ph.D., Chair
Cancer Research Institute Search Committee
1245 30th Street, Suite 320
San Francisco, CA 94110

MOLECULAR GENETICIST/BIOLOGIST
Ph.D., nine-month, tenure-track appointment as Assistant Professor starting January 12, 1997. Salary $35,000/nine months. Teaching/research required. Teaching includes freshman biology lecture/lab; graduate genetics/molecular biology lecture/lab; and possibly a molecular genetics/biotechnology course. Applicant must also develop and sustain a funded research program in molecular biology and potentially graduate students. Send resume, letter of application, and three references to: Dr. Marilyn Kilgen, Head, Department of Biology, Nicholls State University, Thibodaux, LA 70301. Deadline: November 1, 1996. Nicholls State University is an Affirmative Action/Equal Opportunity Employer.

POSTDOCTORAL POSITIONS
Cleveland Clinic Foundation

POSTDOCTORAL POSITIONS are available immediately to study signal transduction in response to receptors, G-proteins, and effectors as well as further downstream signaling. Applicants must have a Ph.D. (or equivalent) and be trained in molecular biology and/or medical biol. Send curriculum vitae and three references to: Dr. Mie-Jae Im, Department of Molecular Cardiology (FF8), Research Institute, The Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, OH 44195. FAX: 216-444-8722/9263.

POSTDOCTORAL POSITIONS
The Aaron Diamond AIDS Research Center

POSTDOCTORAL POSITIONS are available immediately in the laboratories of Drs. Cecilia Cheng-Mayer, David Ho, Richard Koup, Nathaniel Landau, and John Moore. Projects include studies of HIV pathogenesis and viral disease, cancer biology, and innate and acquired immunity. Strong background in molecular biology, signal transduction, virology, and pathology is required. Send curriculum vitae and names of three references to: Sidney Ho, The Aaron Diamond AIDS Research Center, 455 First Avenue, New York, NY 10016. The Diamond Center is an equal opportunity employer. The Diamond Center is an Equal Opportunity Employer.

NEUROViroLOGY
A position is available for a POSTDOCTORAL FELLOW (U.S. citizens, permanent resident, or non-U.S. citizen) who has a Ph.D. /M.D. or equivalent degree with expertise in molecular biology, virology, molecular genetics, or neuropathology. Applicant will focus on interface between molecular biology and neuropathology. The position involves working in a small group focusing on JC virus and PML pathogenesis. The appointment will be for two years with a salary between $25,000 and $38,000 per year. Please submit a curriculum vitae, statement of research interests, and three letters of reference by June 30, 1996 to: Dr. Gerald Stoner, Laboratory of Experimental Neuronal Sciences, NIMH, Building 36/Room 4A-29, Bethesda, MD 20892-4126. Telephone: 301-496-6144. NIH is an Equal Opportunity Employer.

POSTDOCTORAL POSITION

POSTDOCTORAL POSITION in the laboratory of Dr. Koup, Cancer Research Center, University of California, San Francisco, CA 94143. The laboratory focuses on developing a new transgenic mouse model of AIDS, development of AIDS vaccines, and immunologic changes in AIDS patients. Opportunities exist for projects in HIV biology and cellular immunity. Applicants must have a Ph.D. and a research background in molecular biology, virology, and immunology. Send curriculum vitae and names of three references to: Dr. Anne Zajacz, Chair, of the Cancer Research Center, University of California, San Francisco, CA 94143. Telephone: 415-476-0216. WWW: http://wwwinces.ucsf.edu/ inmmunologysrccent.html.

POSTDOCTORAL POSITION

POSTDOCTORAL POSITION in the laboratory of Dr. Michael Kostura, Department of Microbiology, University of California, Los Angeles, CA 90024. The laboratory focuses on the molecular biology of Clostridium botulinum. Research includes the expression of the botulinum toxin gene in E. coli, the purification of the toxin, and its biological activity. Applicants must have a Ph.D. and a research background in molecular biology, virology, and/or microbiology. Send curriculum vitae and three letters references to: Dr. Michael Kostura, Department of Microbiology, University of California, Los Angeles, CA 90024. Telephone: 213-825-8586. NIH is an Equal Opportunity Employer.

POSTDOCTORAL POSITION

POSTDOCTORAL POSITION in the laboratory of Dr. Michalis Gogos, Department of Medicine, Stanford University, Stanford, CA 94305. The laboratory focuses on the molecular biology of the heart with emphasis on the role of muscle genes and transcription factors in cardiac development. Applicants must have a Ph.D. and a research background in molecular biology, virology, and/or microbiology. Send curriculum vitae and three letters references to: Dr. Michalis Gogos, Department of Medicine, Stanford University, Stanford, CA 94305. Telephone: 415-725-5221. NIH is an Equal Opportunity Employer.

ENHANCED POSTDOCTORAL POSITION

Opportunity for Ph.D. with proven experience in molecular biology and production of transgenic mice to join extremely well-funded group investigating the molecular basis of cardiomyopathy and treatment of myocardial diseases. Applicants must have a Ph.D. with a minimum of five years of experience in a research laboratory. Send curriculum vitae and three letters of recommendation to: Dr. Stephen B. Liggitt, University of Cincinnati Medical Center, 231 Bethesda Avenue, Room 7511 M5B, Cincinnati, OH 45267-0564.

TWO POSTDOCTORAL positions available to study the nature of interacton proteins between cytochrome P450 and its redox partners. A molecular biologist and an enzymologist/kinetist are required to generate and characterize the structure and function of the proteins. Send resume and three letters of reference to: L. Wallsk, Ph.D., Department of Pharmacology, University of San Francisco Medical Center, San Francisco, CA 94121. Telephone: 415-750-6946. Equal Opportunity Employer.

POSTDOCTORAL POSITION

POSTDOCTORAL POSITION available to study excitotoxicity in the retina. Cell culture, whole animal, and fluorescent imaging techniques will be utilized to study excitotoxic damage to neurons. Interested applicants should forward a curriculum vitae and three letters of recommendation to: Evan Dreyer, M.D., Ph.D., Hoeve Laboratorium, P.O. Box 41, 5200 AE, 's Hertogenbosch, The Netherlands. Email: edreyer@macmail.meei.harvard.edu.

A POSTDOCTORAL POSITION is available to study G protein-mediated signal transduction using molecular biological, cellular biochemical, and transgenic approaches. The work will involve gene transfer and tissue culture techniques, which are highly desirable. Send curriculum vitae and statement of interests to: Dianqiu Wu, Ph.D., Department of Pharmacology and Physiology, University of Rochester Medical Center, P.O. Box 711, Rochester, NY 14642. FAX: 716-244-9283.

ASSISTANT PROFESSOR, Parasitology. The Department of Biomedical Sciences and Pathobiology, Virginia-Maryland Regional College of Veterinary Medicine, invites applications for an Assistant Professor position in Parasitology, available January 1, 1997. The appointee will share in the teaching of parasitology to veterinary and graduate students, contribute to clinical diagnostic parasitology, and work closely with the participates in at least one area of special research emphasis in collaboration with others in the department. Applicants must have the Ph.D.; in addition, the D.V.M. and/or postdoctoral experience is preferred. Send curriculum vitae and three letters of reference to: Dr. Anne Zajacz, Chair of the Parasitology Search Committee, Department of Biomedical Sciences and Pathobiology, College of Veterinary Medicine, Virginia Tech, Blacksburg, VA 24061-0442.

POSTDOCTORAL POSITION

POSTDOCTORAL POSITION in the laboratory of Dr. Michael Kostura, Department of Microbiology, University of California, Los Angeles, CA 90024. The laboratory focuses on the molecular biology of the heart with emphasis on the role of muscle genes and transcription factors in cardiac development. Applicants must have a Ph.D. and a research background in molecular biology, virology, and/or microbiology. Send curriculum vitae and three letters references to: Dr. Michael Kostura, Department of Microbiology, University of California, Los Angeles, CA 94305. Telephone: 213-825-5221. NIH is an Equal Opportunity Employer.

POSTDOCTORAL POSITION

POSTDOCTORAL POSITION in the laboratory of Dr. Michael Kostura, Department of Microbiology, University of California, Los Angeles, CA 94305. The laboratory focuses on the molecular biology of the heart with emphasis on the role of muscle genes and transcription factors in cardiac development. Applicants must have a Ph.D. and a research background in molecular biology, virology, and/or microbiology. Send curriculum vitae and three letters references to: Dr. Michael Kostura, Department of Microbiology, University of California, Los Angeles, CA 94305. Telephone: 213-825-5221. NIH is an Equal Opportunity Employer.
IDUN Pharmaceuticals is an early stage biopharmaceutical company focused on the discovery and development of drugs aimed at the therapeutic modulation of cell death with applications in neurodegenerative diseases, cancer, and inflammation. IDUN invites applications from highly motivated, inventive scientists for the following position:

**Cellular Neurobiologist**

Ph.D. with minimum of 2 years of experience in the biotechnology or pharmaceutical industry and reputation in *in vitro* models of ischemia and neurodegenerative disease, neuronal cell death (apoptosis), or neurotrophic factor biology. Candidate will manage a drug discovery effort using biochemically characterized neuronal model systems. Extensive experience in primary CNS neuronal (cortical, dopaminergic, hippocampal) cultures required. Experience with FACS analysis, immunocytochemistry, and/or *in situ* hybridization a plus. Code: CN-KV

IDUN Pharmaceuticals’ modern laboratory facility is located in La Jolla, CA, close to several outstanding academic centers. IDUN offers the excitement of a start-up company in a rapidly growing scientific field, as well as an attractive compensation package. For confidential consideration, please mail your c.v. (refer to code above) to 11085 N. Torrey Pines Rd., Ste. 300, La Jolla, CA 92037.

*IDUN is an Equal Opportunity Employer*
This tenured position, which will be filled by a mathematical statistician or a medical officer, is located in the Biometry Branch of the Division of Cancer Prevention and Control. The duties of this independent investigator position include the development and supervision of a program of research in statistical methods related to the design, conduct, and analysis of clinical trials, especially trials of cancer prevention, and the direction of a program of consultation and collaboration between the Section and scientists in the Division of Cancer Prevention and Control, other Divisions of the National Cancer Institute, and other research institutions in the US and abroad.

To be placed in the position as a medical officer, candidates must have a medical degree. Candidates must have specific training and expertise in statistics and mathematical statistics, and extensive experience in the design, conduct and analysis of clinical trials. The position demands a high level of skill in the communication of scientific and statistical ideas. Experience in cancer research would be an advantage. Candidates must be United States citizens.

The salary range for this position is $73,486 to $95,531 (including locality pay). Qualified physicians who are employed as medical officers may be paid a salary range of $73,920 to $95,531 and an additional Physician's Comparability Allowance of up to $20,000 per year.

To obtain information on the application procedures and documents required for consideration for this position, candidates may contact the National Cancer Institute, Office of Human Resources and Consulting Branch at (301) 402-2789. To obtain a fax of this information, call 1-800-728-5627 or (301) 594-2953 and enter Fax ID#1886.

Selection for this position will be based solely on merit, with no discrimination for non-merit reasons such as race, color, gender, national origin, age, religion, sexual orientation, or physical or mental disability.

The NIH/NCI is an Equal Opportunity Employer.

WORLD HEALTH ORGANIZATION (WHO)
INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC)
IARC has an opening in its laboratories in Lyon, France, for a post of SCIENTIST

Unit of Carcinogen Identification and Evaluation

The main activity of this Unit is the production of the IARC Monographs on the Identification and Evaluation of Carcinogenic Risks to Humans. Three volumes of Monographs are published annually. They provide critical reviews and evaluations made by international groups of experts on the carcinogenicity to humans of chemicals, complex mixtures, industrial exposures, and biological or physical agents with the aim of primary prevention of cancer.

The incumbent of this post is expected to carry out the planning, preparation, and implementation of at least one of the international working groups held each year. In addition, he/she is responsible for the production and accuracy of sections on epidemiological studies of cancer in humans for all three meetings and assists in the planning of yearly working groups on mechanisms of carcinogenicity. He/she will also be expected to conduct, in cooperation with other Units at IARC, epidemiological research on occupational and environmental cancer risk factors.

Applicants should have a Ph.D. in epidemiology or a related discipline with Master's in Public Health, and preferably postgraduate qualifications in occupational epidemiology, an advanced knowledge of and substantial experience in environmental/occupational cancer epidemiology. Experience in participation at the international level in research networks, and proven ability to analyze critically and summarize published studies, are also required. The initial appointment will be for two years, the first being probationary.

The annual salary level is US$45,413 tax free at single rate and US$48,824 for a staff member with dependents, plus a cost of living element which is currently 57.2% of the above figures.

Those interested should write, enclosing a curriculum vitae to:

Personnel Office
IARC
150, Cours Albert Thomas
F-69372 Lyon Cedex 08 France
Fax: (33) 72 73 85 85

Applications from women are encouraged.
Fixed Term University Lectureship in Experimental Particle Physics

Applications are invited for a University Lectureship in Experimental Particle Physics, tenable for a fixed period of three years from 1 October 1996. Stipend on the scale of £15,154 to £228,215 per annum. Further particulars (containing details of the duties and range of emoluments) can be obtained from the Deputy Administrator, Department of Physics, Nuclear and Astrophysics Laboratory, Keble Road, Oxford OX1 3RH.

The present Experimental Particle Physics research programme includes the DELPHI experiment at LEP (CERN) and ZEUS experiment at HERA (DESY), the SOUDAN 2 and MINOS experiment (USA), the Sudbury Neutrino Observatory (SNO) project (Canada), the development of cryogenic detectors and the CRESST experiment (Gran Sasso) plus the development of the ATLAS and LHC-B experiments in high energy pp physics. The appointee will be expected to participate in one of the above programmes, and preference will be given to candidates wishing to collaborate in the Sudbury experiment. The activities of the Oxford SNO group are concentrated on the development of software for the simulation and analysis of SNO data and on water treatment systems for the purification and assay of heavy and light water to one part in 10^14 of dissolved uranium, thoria, and their decay products.

Letters of application should be sent to the Deputy Administrator at the above address, to arrive no later than 30 June 1996. The letter should be supported by a curriculum vitae, list of publications, a statement of research interests and teaching experience, plus the names of three referees. The referees should be asked to send references directly to Dr. G. Myatt, Acting Head of Particle and Nuclear Physics, at the above address to arrive by the closing date.

It is expected that short-listed candidates will be interviewed in Oxford in July 1996. Applicants are asked to indicate an e-mail address or fax or telephone number where they can be contacted.

The University is an equal opportunities employer.
THIRD ANNUAL REPORT OF MIZUTANI FOUNDATION FOR GLYCOSCIENCE

[Research Grants Awarded in 1996]

Last year, Mizutani Foundation for Glycoscience received 201 research grant applications from twenty-one countries. After careful evaluation for scientific merit, potentiality and feasibility, the foundation approved seventeen projects and awarded a total of ¥100,000,000 to them plus two projects that had been approved for two years in the previous year. The grantees for the 1996 fiscal year are (in alphabetical order):

1) Carson, Daniel D.; University of Texas, M.D. Anderson Cancer Center, USA; “Structure-function studies of a novel heparin/heparan sulfate-binding protein”
2) Davis, Jeffery T.; University of Maryland at College Park, USA; “Studies related to oligosaccharyltransferases”
3) Esko, Jeffrey D.; University of Alabama at Birmingham, USA; “Glycoside modulation of glycosaminoglycan biosynthesis”
4) Fukuda, Michiko N.; The Burnham Institute, La Jolla Cancer Research Center, USA; “Molecular analysis of HEMPAS disease”
5) Halcomb, Randall L.; University of Colorado at Boulder, USA; “Conformationally constrained glycopeptides, tools to study protein glycosylation”
6) Hart, Gerald W.; University of Alabama at Birmingham, USA; “Alzheimer’s disease and cytoplasmic glycosylation”
7) Hindsgaul, Ole; The Burnham Institute, La Jolla Cancer Research Center, USA; “Novel sialylated/sulfated oligosaccharide conjugates as tools for the study of selectins”
8) Ichikawa, Yoshitaka; The Johns Hopkins University School of Medicine, USA; “New inhibitor for glycozymes”
9) Jungahwa, Firoze B., Eunice Kennedy Shriver Center for Mental Retardation, Inc., USA; “Lectins of the sulfoglucuronol glycoconjugates in neural cell interactions”
10) Mourão, Paulo A.S.; Universidade Federal do Rio De Janeiro, Brazil; “Sulfated polysaccharides from invertebrates reveal unique structures and new potential as bioactive polymers”
11) Noda, Masaharu; National Institute for Basic Biology, Japan; “Physiological roles of β64 proteoglycan and protein-tyrosine phosphatase ζ in the brain development”
12) Ohashi, Mamoru; The University of Electro-Communications, Japan; “Tandem mass spectrometric studies on the structures of glycosaminoglycans”
13) Schachter, Harry; Hospital for Sick Children, Canada; “Role of complex N-glycans in the development of Caenorhabditis elegans”
14) Schauer, Roland; Christian-Albrechts-Universität zu Kiel, Germany; “O-acetylation of sialic acids in bovine submandibular gland”
15) Schwartz, Nancy B.; The University of Chicago, USA; “Regulation of sulfate activation, translocation and transfer”
16) Shaper, Joel H.; Johns Hopkins Oncology Center, USA; “Regulation of expression of glycosyltransferases in mouse male germ cells”
17) Spiegel, Sarah; Georgetown University, USA; “Cell growth regulation”
18) Vliegenthart, Johannes F.G.; Utrecht University, The Netherlands; “A NMR-spectroscopic database of complex carbohydrate structures on the Internet”
19) Wang, John L.; Michigan State University, USA; “Carbohydrate recognition in pre-mRNA splicing”

* Invitation for the next grant application may be found in Science, 272: 308, 1996.
* Second year grant.
** Grant approved for two years.

Mizutani Foundation for Glycoscience: Sen-i Kaikan, 3-1-11 Nihonbashihoncho, Chuo-ku, Tokyo 103, Japan (Fax: [81] 3-3246-1265, Phone: [81] 3-3246-0224).
THE SALK INSTITUTE
FOR BIOLOGICAL STUDIES

We invite applications for Assistant Professor positions in the areas of neural and endocrine signaling. We are seeking individuals with strong interests in mechanisms of neuropeptide and growth factor actions and are particularly interested in candidates with experience in neurophysiology, signal transduction or regulation of gene expression.

The Salk Institute offers a very interactive environment between research groups working in the areas of genetics, developmental biology, signal transduction, endocrinology, visceral and cognitive neurobiology.

Qualified candidates should send curriculum vitae, description of research interests, reprints of selected publications, and the names and addresses of three individuals who have been asked to submit letters of recommendation, to: Wylie Vale, Chair, The Clayton Foundation Laboratories for Peptide Biology, The Salk Institute for Biological Studies, 10010 North Torrey Pines Road, La Jolla, CA 92037.

The Salk Institute is an Equal Opportunity Employer.

OUTSTANDING
Research Is Our Primary Objective.

Becton Dickinson and Company has been providing excellence in applied research for nearly 100 years.

Senior Scientist

This position, in our Drug Delivery Department, will contribute to the development of new drug delivery systems by providing expertise in pharmaceutical science. This individual will also design and interpret experiments required for the understanding and the advancement of the underlying technologies.

Qualified candidates must possess a Ph.D. in Pharmaceutical Sciences with experience in developing formulations for parenteral drug delivery systems. Experience in transdermal drug delivery is also a plus. This position requires a minimum of 5 years of experience, with at least 3 years of experience in an industrial setting.

We provide competitive salaries and comprehensive benefits.

Please forward your resume with salary requirements to:
Human Resources, Becton Dickinson Research Center, 21 Davis Drive, Research Triangle Park, NC 27709. AA/EOE Employer.

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TOXICOLOGIST

Amoco's Environment, Health and Safety Department in Chicago, Illinois has an entry level position available in its Product Registration and Toxicology Division.

The position involves the evaluation of toxicological information, communication of toxicological information to business clients and customers, coordination and review of toxicology testing, and representation of Amoco in industry trade association activities.

Applicants must have a minimum of a Masters degree in Toxicology or related field. Some industry experience and knowledge of health risk assessment would be advantageous. Strong oral communication and writing skills are essential.

Amoco offers an excellent compensation and benefits package. For consideration, reply with resume and salary history to:

AMOCO CORPORATION
Mail Code P069M4 130 East Randolph Drive
Chicago, IL 60601
Fax: 312/856-7584

Equal Opportunity Employer
The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), located in Bethesda, MD, is seeking an outstanding physician for the position of Director, Division of Kidney, Urologic, and Hematologic Diseases (DKUHD). This is a Senior Executive Service (SES) permanent full-time position with a salary range of $100,526 to $122,688 per annum commensurate with qualifications. Applicants must demonstrate research experience and knowledge of research programs in one or more areas related to kidney, urologic, and hematologic diseases. May be eligible for Physicians Comparability Allowance of up to $20,000 per year. A recruitment bonus of up to 25% may be available to a non-Federal applicant. The deadline for receipt of application is July 31, 1996.

The Director, DKUHD, is the principal advisor to the Director, NIDDK, on matters and policies pertaining to research grants, contracts, training and specialized programs in kidney, urologic, and hematologic diseases including basic and applied research, training fellowships and institutional training awards, and clinical trials. Additionally, the incumbent may have the opportunity to conduct independent research projects in the area of kidney, urologic and hematologic diseases.

For more information contact Ms. Joanna Voight, NIDDK Personnel Office, Bldg. 31, Room 9A30, 8100 Rockville Pike, Bethesda, Maryland 20892; (301) 496-4231.

U.S. Citizenship Required / NIH is an Equal Opportunity Employer.

Faculty Positions in Developmental Biology
Harvard Medical School
Beth Israel Hospital

The Molecular Medicine Unit of Beth Israel Hospital is seeking applications for tenure track positions at the Assistant Professor level. The successful candidate will hold the Ph.D. and/or M.D. degrees, and will have completed a minimum of two years of postdoctoral training in molecular cell biology, physiology, or genetics. Applicants will be expected to establish a funded independent research program in the broad area of developmental biology. Generous start-up funds and some ongoing support will be provided. The Molecular Medicine Unit faculty currently investigate inductive signaling in early vertebrate development, protein translocation and targeting, signal transduction, and ion homeostasis. Candidates should send CVs and names of three references to:

Robert D. Rosenberg, M.D., Ph.D.
Faculty Search Committee
Molecular Medicine Unit
Beth Israel Hospital, RW663
330 Brookline Avenue
Boston, MA 02215

The Beth Israel Hospital is an Equal Opportunity Employer.

Dean of Graduate School/ Faculty Scientist

New York Medical College, a health sciences university in the Catholic tradition, seeks a distinguished educator and scientist to serve as Dean of the Graduate School of Basic Medical Sciences. The Graduate School comprises six departments: Biochemistry and Molecular Biology, Cell Biology and Anatomy, Microbiology and Immunology, Pathology, Pharmacology and Physiology. The Graduate School offers departmental and interdisciplinary M.S. and Ph.D. degree programs. The Dean of the Graduate School is responsible for all administrative and programmatic activities of the Graduate School and reports to the Provost of the university. A candidate for this position should hold a Ph.D. and/or M.D. degree and have strong scientific credentials appropriate for appointment to faculty rank in one of the basic science departments. Prior academic administrative experience is highly desirable. Since the responsibilities of the Dean do not require full-time professional effort, the person selected will be expected to pursue personal research objectives and contribute to departmental teaching commitments. Please forward an expression of interest and curriculum vitae before July 51, 1996 to:

Mario A. Inchiorsa, Jr., Ph.D.
Chairman, Search Committee for Dean, GSMB
Department of Pharmacology
New York Medical College
Valhalla, NY 10595
FAX: (914) 347-4956

All replies will be kept strictly confidential.
New York Medical College is an Equal Opportunity/Affirmative Action Employer.
The RENAL DIVISION OF BAXTER HEALTHCARE is the worldwide leader in dialysis products and services. We are seeking an individual to be responsible for technology assessment and feasibility studies of new ideas and concepts in the area of chronic percutaneous access devices, with particular emphasis on infection control and tissue integration with peritoneal dialysis catheters. Technology assessment will require review and theoretical evaluation of technologies developed internally as well as those external to Baxter, and subsequent demonstration of feasibility where appropriate by coordinating resources within Baxter divisions and external collaborative R&D centers. This position will require interaction with medical professionals, industry contacts, and research groups around the world in interfacing with people from multiple functions within Baxter. Some travel required.

The qualified candidate will possess a graduate degree with strong emphasis on biomaterial-tissue interactions with at least five years of industry experience. Knowledge and experience in the clinical development of medical devices is desirable. Strong interpersonal skills and ability to organize and coordinate projects are essential. Tissue engineering and foreign body infection experience is a plus.

Baxter offers a competitive salary and benefits package. For immediate and confidential consideration, please send or fax credentials to: Baxter Renal Division, Human Resources Dept., 1620 Waukegan Rd.-MPRA-11, McGaw Park, IL 60085. FAX (847) 473-6711.
Announcing the 4th Annual
BS/MS Careers Issue
August 30, 1996

Get BS/MS students excited about career opportunities at your company or university. SCIENCE Magazine offers you a once-a-year opportunity to reach the best science students and tell them about your employment opportunities in the August 30, 1996 BS/MS special advertising supplement.

Full page advertisements receive bonus distribution to the top biology and chemistry programs in the U.S.
Make sure your message gets the impact you need. Run a full page ad and reach our regular subscriber base of over 160,000. In addition, your ad receives bonus distribution to students in the top biology and chemistry programs around the U.S. in a special reprint of the BS/MS advertising section.

Reach eligible minority students.
Do you need to reach a diverse pool of candidates? When you advertise in the BS/MS Careers issue your advertisement will get special distribution to U.S. colleges and universities with historically high minority enrollment.

Start planning your advertisement now!
It’s never too soon to start planning your full page recruitment message. By advertising in SCIENCE, you’ll increase your chance of reaching the best candidates first. Get scientists excited about your employment opportunities.

Placing your ad is easy!
Call Janis Crowley at (212) 496-7704 or fax (202) 289-6742.
Advertising deadline: August 13, 1996.

List of colleges/universities scheduled to participate in the 1996 bonus distribution of the SCIENCE BS/MS reprint:

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<td>Delaware State University*</td>
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<td>Duke University</td>
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<td>Emory University</td>
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The nation’s top schools for biological sciences, various chemistry disciplines and clinical medicine ranked by the Institute for Scientific Information’s Science Watch, as well as the top 20 schools from U.S. News & World Report’s Annual America’s Best Colleges issue. *Denotes institution with historically high minority enrollment.
NATIONAL CANCER INSTITUTE
NATIONAL INSTITUTES OF HEALTH
DEPARTMENT OF HEALTH AND HUMAN SERVICES
Opening Date: 6/10/96
Closing Date: 7/8/96
Announcement Number: CA-96-2100
MATHEMATICL STATISTICIAN, GS-1529-13

This tenured position is located in the Screening Section of the Biometry Branch in the Division of Cancer Prevention and Control. The duties of this independent investigator position include responsibilities in the areas of applied probability, mathematical statistics, and clinical trials, with particular emphasis on methodological research in applied probability, statistics, and epidemiological techniques applicable to cancer screening trials and related studies. The incumbent will also act as co-investigator for statistica areas of the Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial, with participation in protocol development, data monitoring, data analysis, and publication of findings from the trial. The Screening Section has responsibility for the conduct of screening and related prevention evaluation trials, and for the development of methodology for the design, analysis, and modeling of screening and related prevention programs.

Candidates must have a degree, or equivalent experience, and specific training and expertise in statistics and mathematical statistics with several years of experience in applied probability, mathematical statistics, and biostatistics. Candidates should also have recognized knowledge and experience in at least one of the following areas: martingale theory and Brownian motion, survival analysis, stochastic processes (especially related to mathematical models of cancer screening), and clinical trials. Candidates must be United States citizens.

The salary range for this position is $58,166 to $73,124 (including locality pay).

To obtain information on the application procedures and documents required for consideration for this position, candidates may contact the National Cancer Institute, Office of Human Resources and Consulting Branch at (301) 402-2789. To obtain a fax of this information, call 1-800-728-5627 or (301) 594-2953 and enter Fax ID#1885.

Selection for this position will be based solely on merit, with no discrimination for non-merit reasons such as race, color, gender, national origin, age, religion, sexual orientation, or physical or mental disability.

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SENior RESEARCH SCIENTIST
Stanford University
School of Medicine
Stanford, California

Position immediately available for a Ph.D. with 5-10 years of postdoctoral experience in all of the following areas: flow cytometry (advanced operating ability), molecular biology, tissue culture, and investigation of the molecular pharmacology of immune cells. The applicant must have a strong publication record, excellent speaking and writing skills, successful record of grant and/or contract approvals, and experience managing research teams. The position will entail managing a research team investigating the molecular mechanisms of action of new immunosuppressive molecules.

Salary: $60,000--$65,000 per year, depending on experience

Send curriculum vitae, list of publications, list of grant/contract awards, and six letters of recommendation to:
Search Committee
c/o Randall E. Morris, M.D.
Department of Cardiothoracic Surgery
Stanford University School of Medicine
Stanford, CA 94305-5247
TEL: 415-723-6016
FAX: 415-725-3846

Equal Opportunity/Affirmative Action Employer

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GROUP LEADER

Genetic Therapy, Inc., based in the Washington, D.C. area, is a leader in the development of human gene therapy products for genetic and acquired diseases. We are looking for a Group Leader to establish a new research group with a mission of developing in vivo non-viral vectors.

Applicants must have a Ph.D. and 5 years of experience in gene therapy research or related field; or equivalent. Applicants should have experience in designing and implementing a research program, experience in non-viral gene delivery systems and strong management skills. Strong publication record required. Industry experience is desired.

GTI offers a stimulating and challenging environment with an excellent salary and benefits package. Please specify position when applying. Fax or send resume to:

Genetic Therapy, Inc.
938 Clopper Road
Attn: 71-072-7/5
Gaithersburg, MD 20878
Fax: (301) 948-0503

Genetic Therapy is a subsidiary of

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Equal Opportunity Employer

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SEARLE

Searle, a subsidiary of the Fortune 500 Monsanto Company and one of the world's foremost pharmaceutical companies, takes pride in the accomplishments of their professionals. We're currently seeking a talented individual to impact our future.

RESEARCH SCIENTIST

Utilizing state-of-the-art technologies, you will assume responsibility for the effective development and validation of bioanalytical methods, primarily immunoassays, for macromolecules that may impact future Searle products and services. This position also includes the evaluation of new technologies and systems related to immunoassay development.

The qualified candidates will have a Ph.D. in Immunology, Biochemistry, Pharmacology, Toxicology or Analytical Chemistry, with 2+ years experience in the development of immunoassays, immunohistochemistry or immunobiology, preferably for biological macromolecules. Hands-on experience with bioanalytical chemistry, immunochromatography, methods development and computerized data reduction essential. Experience with immunoassay/PCR methods desirable. Supervisory skills mandatory.

In return for your expertise, Searle offers an excellent salary and benefits package. For consideration, please send your resume to: Searle, Human Resources Dept. JAS-3011, 4901 Searle Parkway, Skokie, IL 60077. An equal opportunity employer.
Distinguished Researcher in Residence

Mountain Research Center (MRC) Montana State University—Bozeman

One- to three-month Fellowship for an internationally recognized scholar to conduct research bearing on any aspect of the MRC’s mission: to develop, synthesize, and disseminate knowledge on the natural and/or interrelated factors influencing the future of montane ecosystems. Responsibilities include field research encompassed within at least one of the MRC Affinity Groups (Biogeosystems, Ecological Processes, Physical Processes, Cultural and Economic Processes, or Geographic Information Analysis) and interacting with students and faculty. Full/Associate Professors on sabbatical encouraged to apply. Stipend up to $5000/month for three months (commensurate with project), plus relocation housing allowance. Accepting applications for Spring 1997, Fall 1997, Spring 1998. Submit curriculum vitae, letter explaining research interests and what you hope to accomplish with the fellowship, and contact information for at least 3 references to: Distinguished Researcher Committee, Mountain Research Center, Box 173490, Montana State University, Bozeman, MT 59717-3490. Screening begins August 1, 1996 and continues until candidates are chosen. http://www.mrc.montana.edu for detailed job listing. ADA/Equal Opportunity/Affirmative Action/Veterans Preference.

Postdoctoral Fellowships in Behavioral Neuroscience

Laboratory focuses on parent behavior and sexual dimorphism, using prairie voles and human tissue. Strong anatomical background needed. Send resume and statement of interests to: Dr. Brian Kirkpatrick, MPRC, P.O. Box 21247, Baltimore, MD 21228 U.S.A. FAX: 410-780-3887. The University of Maryland at Baltimore is an Affirmative Action/Equal Employment Opportunity/ADA Employer. Women and minorities are encouraged to apply.

Postdoctoral Position to study genninivirus/host interactions as they relate to plant cell cycle control and transcripional regulation of plant DNA replication factors. A significant molecular biology background is required and experience investigating gene regulation is preferred. Available July 1, 1996. Interested candidates should submit curriculum vitae and references to: Prof. Linda Hanley-Bowdoin and Dominique Robertson, Department of Biochemistry, North Carolina State University, Raleigh, NC 27698-7622. Equal Opportunity Employer.

Postdoctoral Position

A position is available to study mechanisms of cardiovascular disease in diabetes mellitus. A background in cardiovascular physiology or in pharmacology is preferred. Excellent oral and written communication skills are required. Available July 15, 1996. Please send curriculum vitae and statement of research interests to: Angelina L. Trujillo, M.D., Endocrinology Section, Department of Internal Medicine, University of South Dakota School of Medicine, 1400 West 22nd Street, Sioux Falls, SD 57105. Equal Opportunity Employer.

Postdoctoral Position: Biophysics

A Postdoctoral Position is available to study chaperonins and protein and lipid trafficking in lipoprotein assembly (JBC, 261:8682). Candidates must have a strong background in cell and molecular biology. The scholar will have experience (for applicants) in cell biology or biophysics as well as experience or interest in signal transduction related to growth factor-dependent and stress related responses and/or proliferation of cancer cells. Send curriculum vitae, and letters of recommendation to: Dr. Alan D. Attie, Department of Biochemistry, University of Wisconsin-Madison, Madison, WI 53706-1569.

A position is available at the Wellman Laboratories of Photomedicine, Massachusetts General Hospital (MGH), Harvard Medical School, Boston, Massachusetts 02114. Applicants should have a Ph.D./M.D. in cell biology or biophysics as well as experience or interest in signal transduction as related to growth factor-dependent and stress related responses and/or proliferation of cancer cells. Send curriculum vitae to: T. Hasan, Ph.D. at the above address. Phone: 617-726-6996. MGH is an Equal Opportunity Employer; women and minorities are encouraged to apply.

Postdoctoral Position: Molecular Neurobiology

Harvard Medical School

A Postdoctoral Position is available to study the molecular mechanism of biological clocks in vertebrates and Drosophila. Applicants should be experienced in molecular biology, biochemistry, and/or genetics. Send curriculum vitae and the names of three references to: Charles J. Weitz, M.D., Ph.D., Department of Biology, Harvard Medical School, 220 Longwood Avenue, Boston, MA 02115. Email: weitzwarren.med.harvard.edu.

Postdoctoral Position

A Postdoctoral Position is available in the Department of Radiation Oncology at the University of Florida to study the impact of the tumor microenvironment on conventional anticancer therapies, such as radiation and antineoplastic drugs, on a potential target for gene therapy. Experience in cellular and molecular biology is required.

Send curriculum vitae and names of three references to: Dietmar W. Siemann, Department of Radiation Oncology, Shands Cancer Center, University of Florida, Box 100385, Gainesville, FL 32610. An Equal Employment Opportunity/Affirmative Action Employer.

University of Michigan Postdoctoral/Lecturer Position

Cytochrome P450 Structure/Function/ Mechanism of Action

A Postdoctoral position now available for Ph.D. in chemistry, biochemistry, or related field to study biochemical functions, structures, and mechanistic aspects of P450 isozymes. Desired: strong chemical background, research experience with publications on chemistry of membrane-bound enzymes, familiarity with analytical techniques, and some experience in molecular genetics. Title of Lecturer possible for qualified candidates with previous postdoctoral experience. Send curriculum vitae and reference names, addresses, and telephone numbers to: Dr. M. J. Coon, Department of Biological Chemistry, Medical School, University of Michigan, Ann Arbor, MI 48109-0866, FAX: 313-763-4581; Telephone: 313-764-9132; Email: mcoon@umich.edu.

Postdoctoral Fellowship: Rheumatology/Immunology

University of Connecticut School of Medicine

A funded position will be available in fall 1996 through an NIH training fellowship. Persons with a Ph.D. or M.D. who are U.S. citizens or have permanent residency status are eligible. Available areas of research include cellular and molecular immunology, connective tissue biology, and mechanisms of cellular adhesion. Please send curriculum vitae, statement of research experience and interest, and three letters of reference by August 1, 1996 to: Dr. Naomi Rothfeld Division of Rheumatic Diseases Department of Medicine University of Connecticut Health Center 263 Farmington Avenue Farmington, CT 06030-1310

Postdoctoral Positions, Penn State: Two postdoctoral positions available. Cytokine signalizing, type 1 receptor function, associated kinases/phosphatases, mitogenesis and apoptosis, nuclear effectors of cytokropoeisis. Participation in Penn State University’s Centers for Gene Regulation and Cell and Developmental Biology. Curriculum vitae, references, and interests to: D. M. Wolniewicsz, Penn State University, 126 ASI, University Park, PA 16802. Telephone: 814-865-0657; Email: DMW1@psu.edu. An Affirmative Action/Equal Opportunity Employer; women and minorities encouraged to apply.

Postdoctoral Research Training Program in Psychoneuroimmunology, The Ohio State University College of Medicine. Supported by an NIH training grant, this two-year interdisciplinary program includes 12 faculty who provide training in behavioral immunology/endocrinology research involving human subjects and animal models. U.S. citizens or permanent residents with a Ph.D. or M.D. should send a curriculum vitae, statement of interest, and three letters of recommendation to: Ronald Glass, Department of Medical Microbiology and Immunology, 2187 Graves Hall, Columbus, OH 43210.
POSTDOCTORAL POSITION: NIH-funded studies on the characterization and molecular etiology of membrane estrogen receptors. Techniques to be employed include immunocytochemistry, protein modification characteristics, PCR amplification/sequencing, RIA, Xenopus oocyte RNA injection, and cell culture. Available July 1996; salary depends on qualifications. Send curriculum vitae and names and addresses of three references to: Dr. Cheryl S. Watson, Human Biological Chemistry and Genetics Department, University of Texas Medical Branch, Galveston, TX 77555-0645. Email: cszwatson@utmb.edu. Affirmative Action/Equal Opportunity Employer.

COURSES AND TRAINING

Hands-on TRAINING in MOLECULAR BIOLOGY LAB TECHNIQUES. Differential display, quantitative RNA/PCR (two days each); nonradioactive DNA/RNA detection (one day); offered summer 1996 in: Philadelphia: June 11 through 18; Boston: July 9 through 16; Seattle: August 5 through 13. Tuition is $200 for one-day and $400 for two-day workshops. Courses are 75% hands-on; lectures on applications and troubleshooting also included. For exact dates contact: KT Biotechnology, Telephone: 800-473-0113; Email: duncanta@ncea.com.

ANNOUNCEMENT

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ASSOCIATE position is available for a scientist interested in studying signal transduction mechanisms for integrin gene regulation and the role of specific integrins in tumor metastasis at the Guthrie Research Institute. Approximately 25% effort can be directed toward isolating novel genes associated with breast metastasis. The Institute offers outstanding facilities and opportunities for both collaborative and independent work in a supportive environment. Experience in molecular biology, biochemistry, or cell biology is required. Candidates should send curriculum vitae and the names of two references to: Dr. John D. Nott, Guthrie Research Institute, Sayre, PA 18840. Telephone: 717-882-4653; FAX: 717-882-5151. An Equal Opportunity Employer.

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Applications are invited for the POSTDOCTORAL POSITION of Junior Fellow in Experimental Neurobiology to study biological mechanisms underlying formation, release, and disposal of adrenomedullin, an endogenous arachidonic acid derivative that activates brain cannabinoid receptors. Applicants should have experience with molecular biology techniques and a background in molecular pharmacology. Fellows will receive stipends appropriate to their qualifications and experience. Submit a curriculum vitae, statement of research interests, and the names of three references to: Dr. Daniela Piomelli, The Neurosciences Institute, 10640 John Jay Hopkins Drive, San Diego, CA 92121. FAX: 619-626-2099.

POSTDOCTORAL FELLOW position available October 1, 1996 to study programmed cell death, regulation of lymphocyte activation and memory, and autoimmunity. Research will focus on studying existing mouse models of autoimmune bowel disease as well as generating new knock-out mice. Applicants must have M.D. or Ph.D. and prior experience in cellular and/or molecular immunologic techniques. Please send curriculum vitae and letter of reference to: Averil Ma, M.D., The University of Chicago, Department of Medicine, MC 4076, 5841 South Maryland Avenue, Chicago, IL 60637. Affirmative Action/Equal Opportunity Employer.

POSTDOCTORAL POSITION to investigate the hormonal regulation of transcription in the liver by steroid hormones and cAMP. Please send curriculum vitae and names of three references to: Edwards A. Park, Department of Pharmacology, University of Tennessee, 874 Union Avenue, Memphis, TN 38163. Email: eparks@utmem.utmem.edu. The University of Tennessee Memphis is an Equal Employment Opportunity/Affirmative Action/TITLE VII/TITLE IX/Sex/S/ADA Employer.

POSTDOCTORAL POSITION in molecular endocrinology. Regulation of estrogen responsive genes. Experience with nuclear matrix, run-on transcription, and in vivo footprinting desirable. NIH-funded position. Send curriculum vitae and three letters of reference to: Dr. Marilyn Evans, Department of Biochemistry, P.O. Box 9142, Robert C. Byrd Health Sciences Center, Morgantown, WV 26506-9142.
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