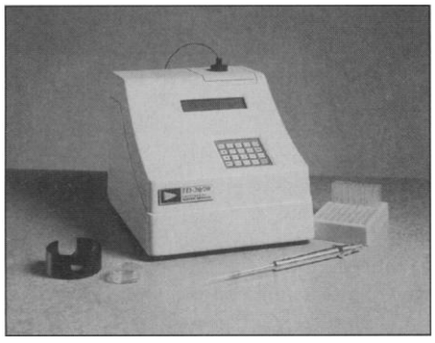
PRODUCTS & MATERIALS

Luminometer

The TD-20/20 Luminometer detects down to 0.1 fg of luciferase and has a dynamic range of 10^7 or better using a range-extending filter. The TD-20/20 calculates sample average and variance for up to 20 replicate samples. ASCII data output is transmitted through an



RS-232 serial port to a printer or computer. Optional internal autoinjectors provide user-programmable single or dual injection of reagents. The unique sample compartment accommodates culture dishes, test tubes, microfuge tubes, scintillation vials, and solids of various shapes and sizes. **Turner Designs. Circle 137.**

■

Karyotyping Software

Oncor Karyotype is a software package for Macintosh or IBM-compatible computers to augment or replace manual karyotyping methods or to work in conjunction with fluorescence in situ hybridization analysis. It can also be configured as a complete system with a high-resolution digital camera or a less expensive video camera. **Oncor. Circle 138.**

■

Statistical Software

Unistat is statistical software for life sciences and biomedical research. Version 4.0 integrates seamlessly with the Microsoft Office suite of programs via OLE2 automation. A stand-alone statistical package, it also functions as a Microsoft Excel add-in. It is possible to start Excel with Unistat menus and toolbar, process data in Excel, and run Unistat just like an Excel Wizard. **Unistat. Circle 139.**

■

DNA Ligation and Screening Kit

The Ligator Rapid DNA Ligation and Screening Kit reduces the time needed to clone DNA fragments and identify recombinants. The ligation of inserts containing cohesive overhangs or blunt ends can be performed with high efficiency in just 5 min at room temperature. Ligation of polymerase chain reaction products with A-overhangs into T-vectors can be performed in 1 hour at 16°C. Following ligation and transformation, the Ligator in-well lysis screening technique allows screening of colonies for insert-containing plasmids in less than 1 day without having to isolate DNA and perform restriction digests. **Epicentre Technologies. Circle 140.**

■

Sequencing Primers

A new line of sequencing primers is designed for polymerase chain reaction or cycle sequencing reactions. The line includes several newly optimized longer oligonucleotides. The lyophilized primers are available in two sizes (30.0 or 6.6 μg). **CyberSyn. Circle 141.**

■

Automated Immunostaining System

Leica's ST5050 Immunostainer and Zymed's HistoST5050 reagents form a flexible and reproducible immunostaining system for general immunohistochemistry applications. Leica's ST5050 is a second-generation automated immunostaining instrument based on the proven Jung Histostainer Ig technology. Up to 10 programs can be run simultaneously

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

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 cul-

ture 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.**

1996 Immuno-products Catalog features monoclonal antibodies for human and mouse adhesion markers, human cytokines, CD markers, and viral antigens. **Antigenix America. Circle 145.**

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.**

CALL FOR PRESENTATIONS
Conference on Examining and Preventing Errors in Health Care
October 13-15, 1996

Proposals are invited for presenting papers at plenary sessions and for organizing and leading breakout sessions at a multidisciplinary conference on *Examining Errors in Health Care: Developing a Prevention, Education, and Research Agenda* to be held at the Annenberg Center for Health Sciences, Rancho Mirage, California, October 13-15, 1996. Joining the Annenberg Center as conveners of the conference are the American Association for the Advancement of Science, the American Medical Association, and the Joint Commission on Accreditation of Healthcare Organizations, with the co-sponsorship of the American Hospital Association.

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.

Proposals or other inquiries should be directed to Deborah Runkle, AAAS, 1200 New York Ave., NW, Washington, DC 20005;

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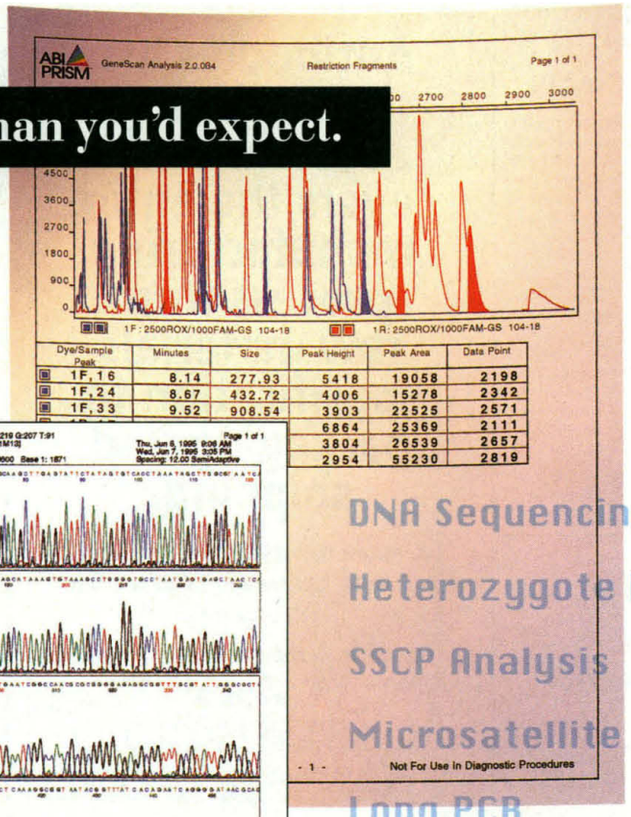

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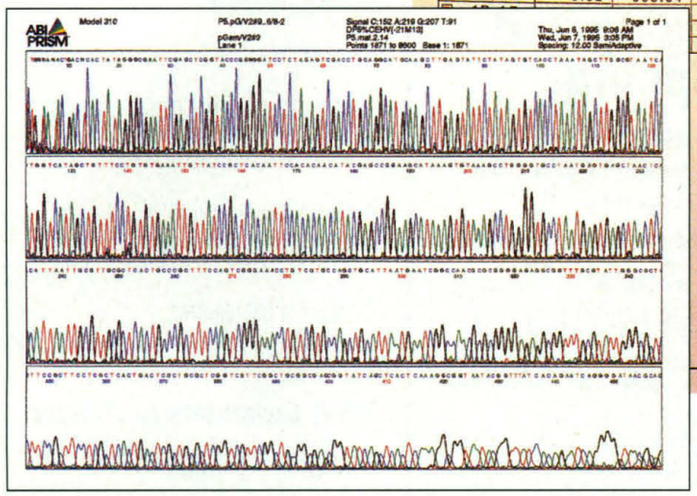
			2954	55230	2819



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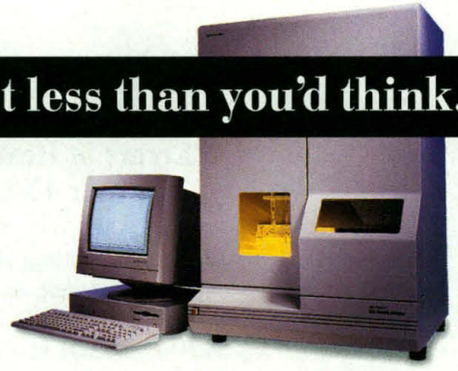

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DNA Sequencing Software:

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.

Look for future articles on computers and software in the 6 September and 13 December issues of SCIENCE.

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."

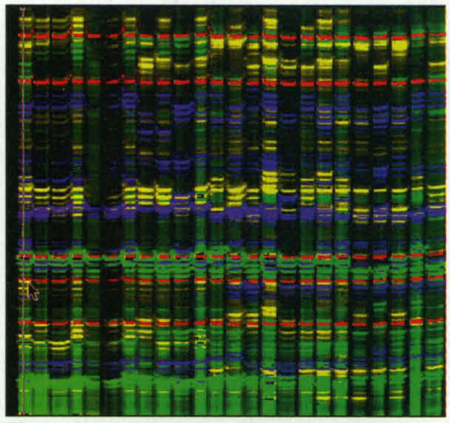
Bio Image's high resolution graphical output facilitates interpretation of the data, adds Luton. Using the Sequence Assembly Manager, an operator searching for ambiguities in a consensus sequence can click on a base and see that portion of the film image displayed on screen. The software runs on UNIX-based 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



Electropherograms, such as this one generated from an ABI PRISM™ Genetic Analyzer, are the industry standard representation of a DNA sequence.

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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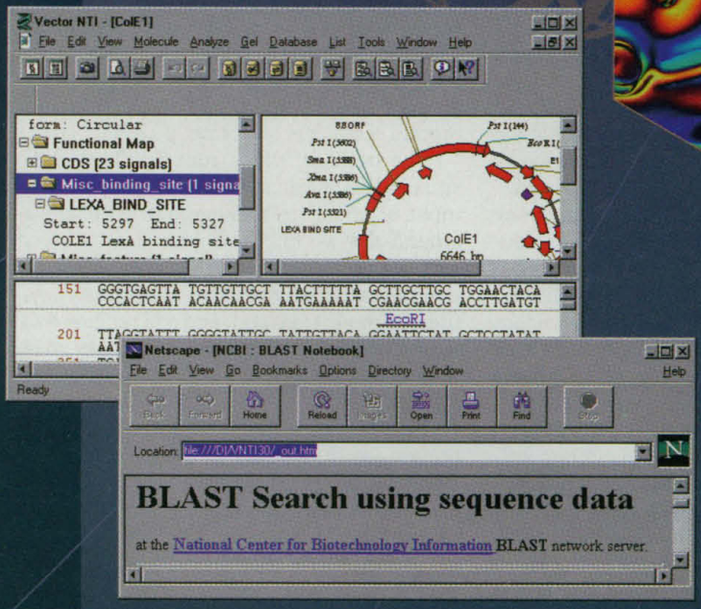

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Like Bob Gross, Philip Taylor, a reproductive biologist who is the author of BIOSOFT's DNA Sequencing software package Gene Jockey II, designs software that "works in the way biologists work and incorporates the same assumptions that they make."

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 – the human interface. 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.

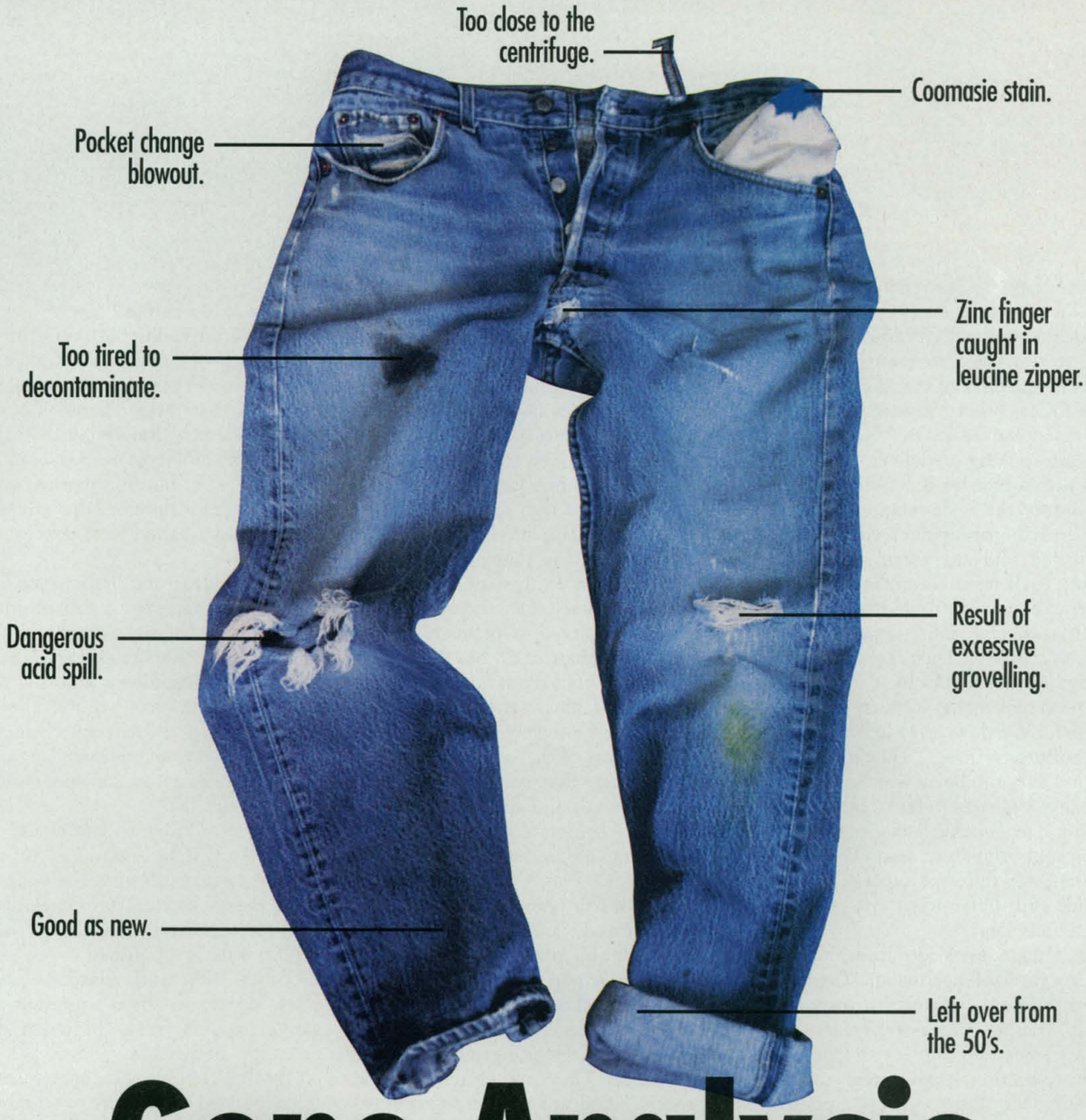
Last August, GCG released Version 8.1 – Version 9 is due out this fall – of the "Wisconsin Package." It's a comprehensive DNA sequence analysis package comprising over 140 programs that handle sequence entry and mapping, fragment assembly, database searching, pair-wise comparison, multiple sequence analysis,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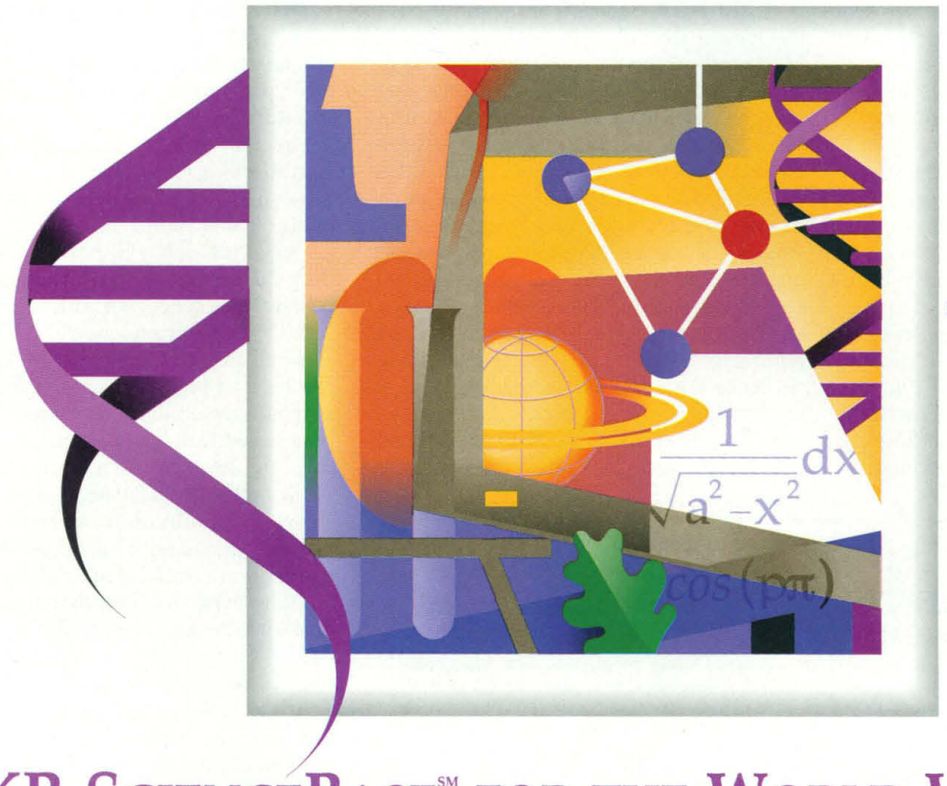

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"In the pharmaceutical industry in particular, there's a real shift in thinking," explains Lombardi, a nucleic acid chemist. "Where companies were investing in biotechnology more as a defensive measure because proteins were a threat to them, now with 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 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

TAGCTAGCTAGC

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 is 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

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 still 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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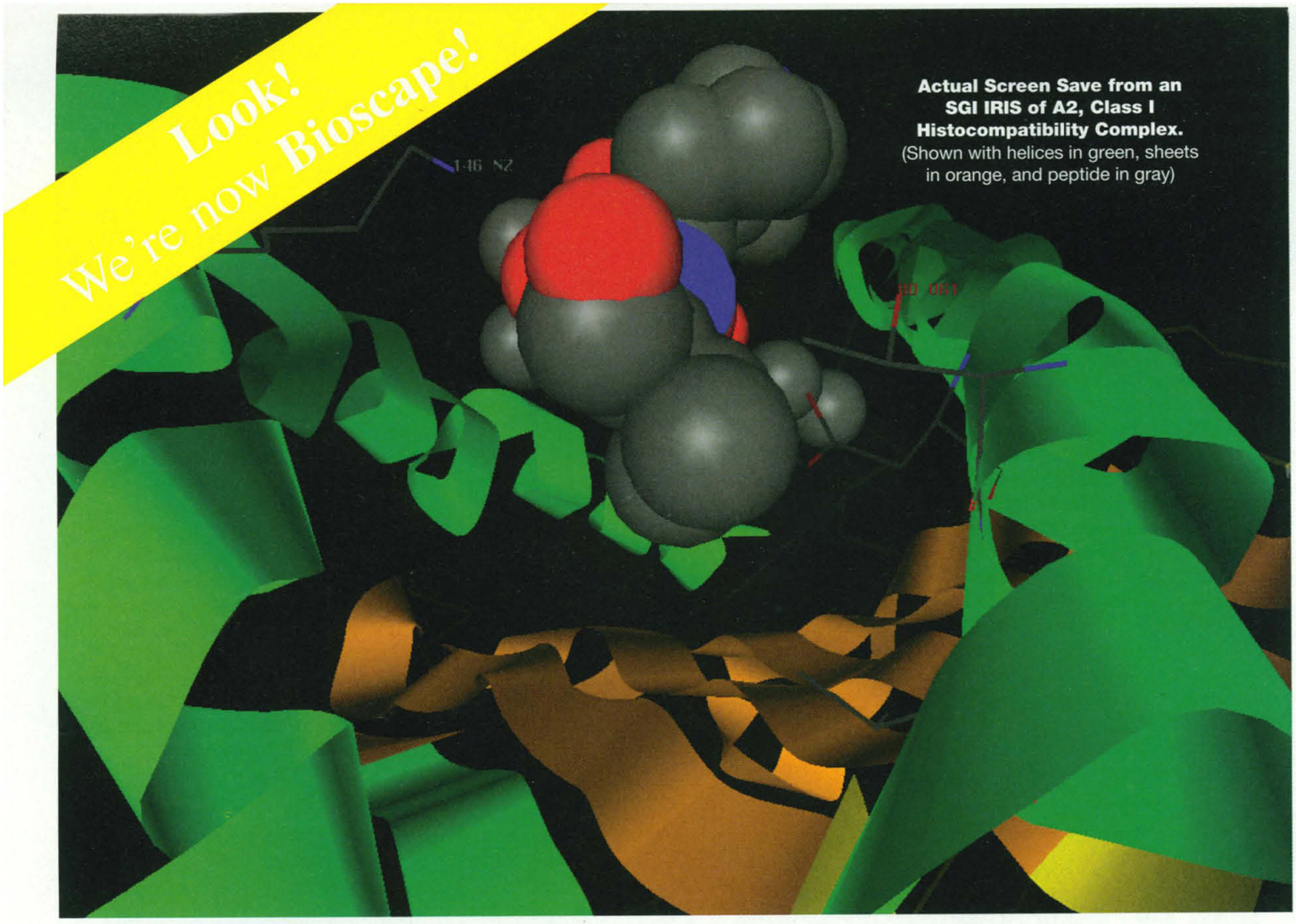

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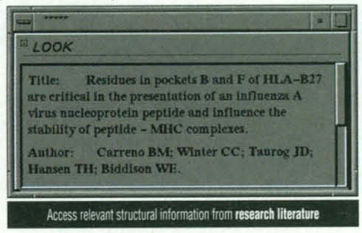

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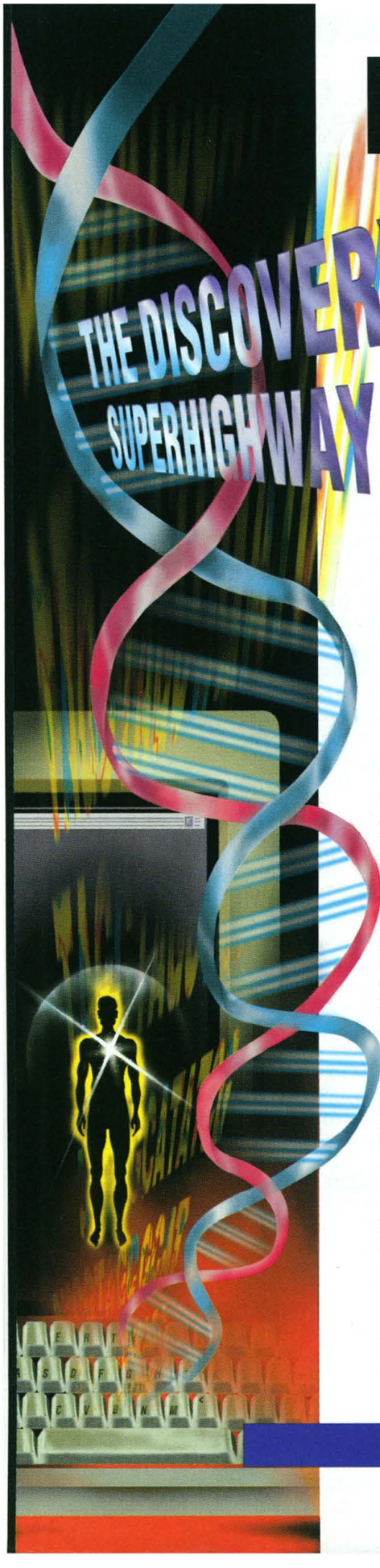

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Possessing skills in laboratory automation, laboratory information management, molecular biology, and computational science, you will be responsible for establishing, supervising and troubleshooting the flow of genomic data from both internal and external sources. Requirements include a doctorate degree in computer science or biology, with a strong understanding of genetics and molecular biology. Candidates should have 3-5 years of experience with the UNIX operating system, laboratory automation or information management (LIMs) and database management. Perl programming and UNIX shell scripting skills are a must. ***Position # OPSCI-1960***

Genomics Sybase Database Administrator

You will provide technical expertise for large Sybase databases to ensure that genomic databases are efficiently maintained. This includes developing integrated database models for large scale initiatives; formulating policies and procedures to maintain database security, integrity and performance; and providing leadership in database related technology assessment. Requirements include a minimum of 10-12 years of in-depth experience using relational database management systems in a large scale computing environment, with at least 6-8 years experience with Sybase database administration in a UNIX operating system environment. Significant experience with bioinformatics software and public genomics databases is desired. A Bachelor's degree in computer science, statistics or a related quantitative science is required; a Master's or Ph.D. degree is preferred. ***Position # OPSCI-1988***

UNIX Systems Administrator

You will manage a large scale, computer intensive UNIX environment focusing on genomic data warehousing. Extensive use of Internet facilities will also be required. This position presents an opportunity to construct a state-of-the-art computing environment from the ground up while simultaneously influencing the automation efforts for our Bioinformatics research staff. Specific duties include performance monitoring, software installations, capacity planning, and the development of operational procedures. This multi-site client/server application will require the highest level of system performance and reliability. Requirements include a Bachelor's degree in a quantitative or life science; a Master's degree is preferred; and 9 or more years experience; and extensive hands-on knowledge of the UNIX operating system, TCP/IP network protocol and Internet operating environments.
You should possess a working knowledge of and relevant experience with Novell NetWare and/or Windows NTS/NTAS (NOS) in a large LAN setting. Prior experience is preferred with the application and use of public and private genomic databases.
Position # OPSCI-1965

Wyeth-Ayerst offers an excellent compensation and benefits package in a highly professional environment. Please send your resume with salary requirements including Position #, to: **Wyeth-Ayerst Research, Human Resources Dept., P.O. Box 7886, Philadelphia, PA 19101-7886. Fax: (610) 989-4854 (fine mode), e-mail: jobs@RAMAIL1.wyeth.com** (ASCII format, no attachments, subject: resume)

Principals Only. Equal Opportunity Employer, M/F/D/V.

SCIENTIFIC APPLICATIONS SPECIALIST

Amgen the world's largest biotechnology company, seeks the analytical talents of an experienced applications specialist to support our Research Staff.

In collaboration with the scientific staff, the incumbent will develop strategies for data analysis using available software, which may include performing the analysis. In addition, the incumbent will be responsible for recommending appropriate scientific software and demonstrating its use.

This position requires a BS degree in the Life Sciences or the equivalent and 3 years' experience in the laboratory, Sequence Analysis (GCG preferred), as well as experience with Macintosh, and UNIX/VMS is required. Familiarity with a broad range of scientific software such as data base, scientific graphing, statistics and image analysis as well as familiarity with chromatography and laboratory instrumentation is preferred.

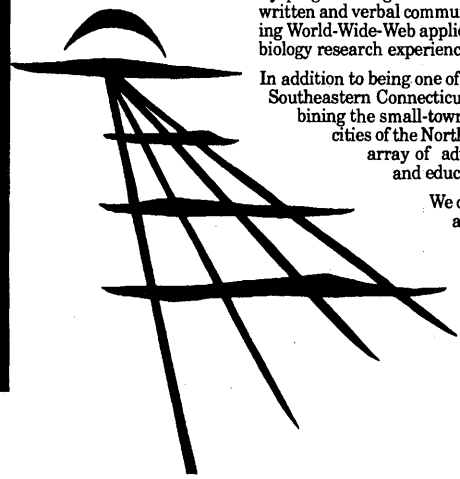
We value and encourage the diverse perspectives essential to the process of discovery.

At Amgen, your accomplishments will be rewarded. Our generous compensation and benefits package includes a retirement and savings plan, an on-site fitness center and three weeks' vacation. For immediate consideration, mail your resume to: **Amgen, Staffing Job Code: TPSC, P.O. Box 2569, Thousand Oaks, CA 91319-2569. E-mail: jobs@amgen.com** Please consult our on line Job Bulletin Board at http://amgen.bio.com for information on other career opportunities available at Amgen. Principals only, please.

EEO/AA Employer M/F/D/V

AMGEN®

At Pfizer, we're taking medicine to new frontiers.



Pfizer believes that the greatest breakthrough drugs and life-enhancing treatments are yet to be discovered and are seeking individuals to help accomplish this. We are a leading developer of novel drug therapies and life-enhancing health care products. Our state-of-the art research facilities and continuing investments in R&D make it a place to support individuals who are working hard to make a real difference. If you are that individual, please read on.

BIOINFORMATICS

The Department of Molecular Sciences is seeking a Ph.D. scientist in the area of bioinformatics to join our Genetic Technologies group. This group is engaged in challenging research to discover new drug targets in major therapeutic areas. You will lead a growing team of scientists to develop and apply computational tools for molecular biology, working in close collaboration with drug discovery project teams. Expertise in current computational sequence analysis methods for database searching, gene and protein structure prediction, and pattern discrimination is essential. A strong background in database and utility programming in a Unix/Macintosh environment coupled with excellent written and verbal communications skills are required. Experience in developing World-Wide-Web applications is also desirable. Candidates with molecular biology research experience are preferred.

In addition to being one of the world's finest corporate scientific communities. Southeastern Connecticut is a highly desirable place to live and work, combining the small-town life of New England with easy access to the major cities of the Northeast. The Groton-New London area provides a wide array of advantages in addition to many cultural, recreational and educational amenities.

We offer a competitive salary/benefits program, as well as a generous relocation package. For confidential consideration, please forward your resume suitablefor electronic scanning (i.e., eliminate italics, bullets, bolds, underlines and staples) to: Employee Resources, Ad#1121, Pfizer Inc, Central Research Division, Eastern Point Road, Groton, CT 06340. We are an equal opportunity employer M/F/D/V.

Pfizer
Central Research

CREATING TOMORROW'S SOFTWARE TODAY

MDL Information Systems, Inc. is the leading provider of integrated chemical information management systems, databases and services used in chemical, agrochemical and pharmaceutical research and development worldwide. MDL solutions help individuals, research teams and corporations make the most of a company's intellectual assets to speed new product discovery and development. We have an immediate opening for:

SENIOR SOFTWARE TEST ENGINEER

You must have broad knowledge of desktop applications and Oracle or other relational systems to design and execute test plans that will ensure a high-performance product. You will develop and maintain comprehensive tests to fully exercise and characterize software releases, as well as write programs to enhance the product's functionality, assist customers in implementation and troubleshoot customer problems. We require a BS degree in Computer Science, Software Engineering, or related field, plus two years' software testing experience, including one year testing commercial applications. Test automation experience is a plus.

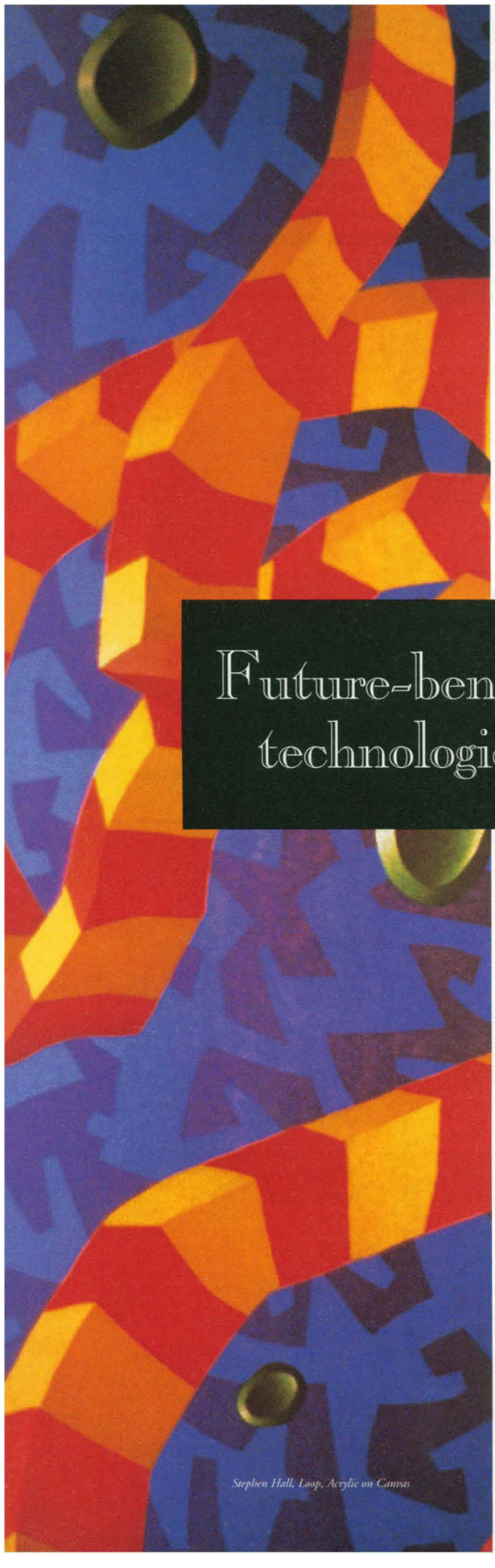
SENIOR SOFTWARE ENGINEER

You will be responsible for Oracle 7.1 or higher, cross-platform client-server application development using Oracle Power Objects; cross-platform client software implementation; and oracle server schema and stored procedure. Duties include transforming specification documents for key components into efficient software and working with QA and documentation as a part of a team. You must possess experience in Oracle 7 Schema analysis & development; Oracle 7 PL/SQL & stored procedure development; client building (DelPhi, Visual Basic)1 and experience with large production databases. Experience in UNIX and Open/VMS OS; C/C++ programming; and Oracle DBA required. Familiarity with scientific programming and biology a plus.

Both positions require the ability to function effectively in a highly matrixed, cross-functional team environment, communicate clearly with customers and coworkers, work under pressure and complete tasks on time.

Become a part of MDL and help us create the scientific tools of tomorrow, today! Please send your resume, indicating position of interest, to: MDL Information Systems, Inc., Attn: Employment Department, 14600 Catalina Street, San Leandro, CA 94577. FAX: (510) 614-3679. EOE

MDL
Information Systems, Inc.



Stephen Hall, Loop, Acrylic on Canvas

The leader in Bioinformatics continues to set the pace.

At SmithKline Beecham, genomics is increasingly at the forefront of discovery. Along with this commitment has come the clear understanding that bioinformatics is the linchpin of the new brand of data-intensive molecular biology that will take us into the 21st century.

Excellence in bioinformatics, and thus genomics, does not come without a tangible investment to assemble a critical mass of the best and brightest in this emerging field. We at SmithKline Beecham have already proven our commitment. The group of 30 scientists and engineers now in place is slated to double within a year, while the range and extent of unique data resources available to them is unprecedented.

In addition to providing tools, data, and services to bench scientists and strategic alliance partners, Bioinformatics is greatly expanding its role. The recently established Research group will be expected to make fundamental new contributions to the field, developing the algorithms and technology to keep SmithKline Beecham at the leading edge. A computational Discovery group will be charged with finding and characterizing new genes and gene families in all manner of sequence resources on a grand scale, using state-of-the-art tools. Another group will support a new initiative to sequence the genomes of a large number of bacterial pathogens, an effort that will provide exciting and utterly novel opportunities for comparative genomics and functional analyses. All this is in addition to continuing the groundbreaking work that has already been done with nearly a million expressed sequence tags, providing a fascinating window on the human genome.

Career opportunities in Bioinformatics at SmithKline Beecham span the broad range from support roles to basic research resulting in novel patents and publications. We are currently seeking computational biologists at the Master's and Ph.D. levels, at every level of experience, including senior managers and researchers with proven records in academic or industrial research. Positions are available in both our Philadelphia and London locations. Areas of particular interest include support of high-throughput sequencing, database search, sequence analysis, automated annotation, knowledge management, sequence/structure/function, genetics, and mapping.

Besides giving you the chance to make drug discovery history, SmithKline Beecham also offers a competitive compensation/benefits/relocation package and an environment in which to grow and excel. For confidential consideration, please send resume and salary requirements to: SmithKline Beecham Pharmaceuticals, Department S6/7, P.O. Box 2645, Bala Cynwyd, PA 19004. We are an Equal Opportunity Employer, M/F/D/V.

SB
SmithKline Beecham
Pharmaceuticals
Challenging the natural limits.

IN IT FOR LIFE

Improving life by 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

GENE EXPRESSION MONITORING

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) 876-8847. Genetics Institute is dedicated to building strength through diversity.

GENETICS INSTITUTE®

Harnessing the Body's Power to Heal™

WHEN SCIENCE
AND TECHNOLOGY COME TOGETHER,
ANYTHING IS POSSIBLE.

AND EVERYTHING IS ACHIEVED.

By merging pharmaceutical science with genomics technology, Eli 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 genetic information for the development of new therapeutics to improve health care and manage diseases. Genomics research thus joins 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 arenas keep our $6+ billion company on the cutting edge. So bring your 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 apply** 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 postdoctoral experience are required. Qualified candidates will 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: **Eli Lilly and Company, Scientific Recruitment, Dept. ADSCMPH06, 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.

Lilly
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 its unique proprietary screening technologies and has openings at all levels for motivated scientists.

Scientific Information Systems Manager

Cadus seeks an experienced information system 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 total scientific information system compatibility. Expertise with C++, Perl, UNIX, Mac and PC necessary. Background in scientific database development/ORACLE and statistical analysis highly desirable. Familiarity with informatic needs of pharmaceutical/biotech an advantage. Knowledge of Novell Netware 4.1 a plus. Excellent organizational and communications skills are essential. **CODE S-SISM**

Biological/Chemical Database Administrator

Responsible for planning, coordinating, administering and integrating Cadus's 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 biomathematics 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

BIOINFORMATICS AND INFORMATION TECHNOLOGY PROFESSIONALS

THE R W JOHNSON
PHARMACEUTICAL RESEARCH INSTITUTE
a Johnson & Johnson company

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 softwares (GCG, 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 softwares 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 LaJolla 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 systems 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, suitable for scanning into our database (i.e., clean/clear, no graphics, and preferably unfolded) 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.

Genomics: Breakthrough Discoveries

Genome Therapeutics Corp. is a proven leader in the field of genomics and a major contributor in the Human Genome Project. Our focus is to identify and characterize genes involved in common diseases and to translate our discoveries into therapeutic breakthroughs. GTC is a fast-growing and financially successful biotechnology company—in the past your we have initiated a $22 million and a $43 million alliance to develop genome-based drugs and vaccines. Challenging and rewarding opportunities exist for:

Microbial and Human Disease Gene Discovery

Microbial Genome Analysts

Scientists with broad knowledge of microbial physiology and significant experience with computational sequence analysis methods to do sequence analysis/annotation. Work at the interface between computing and molecular biology in the search for useful gene targets for developing novel anti-microbials. Junior and senior positions are available.

Human Genome Analyst/Programmer

Develop software tools for cDNA Sequence Analysis, Differential Gene Expression Studies, and Sequence Annotation projects. Requires experience in C/C++, Perl, web interfaces, and programs to access sequence databases. Experience with molecular biology or genomics and broad knowledge of protein function is desirable.

Statistical Geneticist

Scientist with expertise in mapping genes for complex disorders to contribute to identification of genes for important human diseases. Requires experience in developing appropriate study designs for analysis of complex traits and experience with non-parametric methods, linkage analyses, and related analytical techniques. The ideal candidate will be actively involved in developing new strategies for mapping complex disorders. The individual will be expected to assume a leadership position in the human genetics group. Ph.D. with 1-2 years' post doctoral experience required.

Linkage Analysis Programmer/Analyst

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 with data management, UNIX, C, and Perl. Experience with Linkage Analysis, Macintosh, Pascal, or Fortran is desirable.

Scientific Computing

Software Engineers

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+ 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.

Database Programmers and Administrator

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.

Macintosh Programmer

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.

Senior Systems Software Specialist

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 scaleable systems configurations is essential. Experience in a scientific research setting a plus, as is some familiarity with VMS.

UNIX Specialist

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) 893-9535; or see http://www.cric.com.** We are an equal opportunity employer M/F/V/H.

Genome Therapeutics Corporation

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.

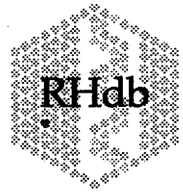
DIGITAL GENE TECHNOLOGIES, INC. —the La Jolla-based leader in ***total gene expression technology***—seeks highly-motivated and creative professionals to join the company's leading-edge ***bioinformatics*** group in developing and expanding the genomics database of tomorrow in a wide range of profitable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

DIGITAL GENE TECHNOLOGIES, INC. Total Gene Expression



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 Genetics Centre, Généthon, 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 unresolved 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 12905 RH entries (a 12 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.

TIGR
THE INSTITUTE FOR GENOMIC RESEARCH

Careers in Bioinformatics at TIGR

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 Archaeon, *Methanococcus janaschii*. Projects are currently underway on the genomes of *Helicobacter pylori*, *Archaeoglobus 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

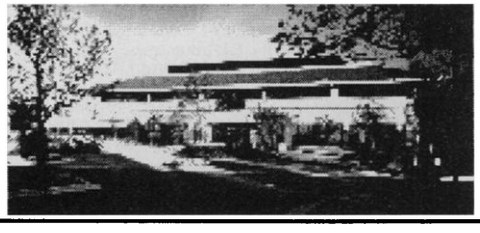
Bacterial Genomics: Postdoctoral fellows will assist in sequencing, assembly, analysis, and annotation of complete microbial genomes, including the current organisms under study. Applicants are eligible to compete for DOE Human Genome Distinguished Postdoctoral Fellowships. Send CV and list of publications.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

BIOINFORMATICS

DIRECTOR OF INFORMATICS

Department of Molecular and Human Genetics
Baylor College of Medicine

The Department of Molecular and Human Genetics at the Baylor College of Medicine (BCM) is seeking an outstanding individual at the level of **ASSISTANT/ASSOCIATE PROFESSOR** in the area of genome informatics. In addition to developing a vigorous independent research program, the individual 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:

Richard 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
Telephone: 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.

BIOINFORMATICS

Canadian Genomic Biotech

Algène 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 field of gene 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 epidemiologists on different complex 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 referees. Direct application material to: **GENET002, Algène Biotechnologies Inc., 4565 Queen Mary Road, Montréal, Québec H1W 3W5 Canada. FAX: 514-340-3545.**

BIOINFORMATICS 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 coordinate licensing, operation, and training of FNA related information resources, including CD-ROM-based systems and databases. Requires a Bachelor's degree in computer science, biology, or related discipline and five to ten years' relevant experience and applicable experience with Windows 95, Access, HTML, SGML, Java, and Web site maintenance. To apply, submit résumé to:

Human Resource Management
Missouri Botanical Garden
P.O. Box 299
St. Louis, MO 63166-0299
Email: rland@admin.mobot.org
FAX: 314-577-9597
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, 1996, 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.**

POSITIONS OPEN

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 a) develop/direct a nationally recognized, fundamental research program focused on fungus-plant interactions; b) contribute to the instructional program; and c) provide 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 population genetics; pathogenicity/virulence determinants of fungi; biochemistry/genetics/molecular biology of plant responses to fungi; mapping and cloning disease resistance genes. The incumbent's program will be expected to complement and enhance existing endeavors in the department. A Ph.D. in plant pathology or a related discipline is required, with postdoctoral experience desirable. Appointment at a senior level will require demonstration of appropriate professional accomplishments. Applicants should send curriculum vitae; transcripts; sample publications; outline of proposed research program; any other evidence of relevant expertise; and the names, addresses, and telephone numbers of at least three professional references to: **Dr. David A. Smith, Department of Plant Pathology, S-305 Agricultural Science Building–North, University of Kentucky, Lexington, KY 40546-0091**. Electronically transmitted applications will not be reviewed. Further information may be obtained by: **Telephone: 606-257-3901; FAX: 606-323-1961; Email: dasmith@ca.uky.edu**. Applications will be accepted until August 2, 1996, or until a suitably qualified candidate is found. *The University of Kentucky is an Equal Opportunity Employer. Women and minorities are encouraged to apply.*

FACULTY POSITION in Microbiology. The Department of Microbiology at North Carolina State University (NCSU) welcomes applications for a nine-month, tenure-track faculty position at the Assistant Professor level. The successful candidate is expected to develop an independent research program in microbial biotechnology funded by extramural support, participate in the department's teaching programs, and serve as an advisor to undergraduate/graduate students. Preference will be given to a microbiologist with interests that complement existing research programs in the department. We are particularly interested in host-microbe interactions, pathogenesis, or environmental/industrial microbiology. Applicants must have a Ph.D. with at least two years of relevant postdoctoral experience. To apply, send curriculum vitae; reprints; statements of research and teaching interests; and names, addresses, telephone, fax numbers and Email addresses of three persons who may be contacted as references to: **Dr. G. Luginbuhl, Chair, Faculty Search Committee, Department of Microbiology, Box 7615, North Carolina State University, Raleigh, NC 27695-7615**. Closing date for receipt of all materials is September 1, 1996, or until a suitable candidate is found. *North Carolina State University is an Equal Opportunity Employer and operates under Affirmative Action Policy. The University strongly encourages all qualified applicants.*

FOUR TENURE-TRACK POSITIONS

New York University Medical Center
Department of Physiology and Neuroscience

Applications are invited for positions at **ASSISTANT** or **ASSOCIATE PROFESSOR** levels depending on experience. Areas of research in physiology or neuroscience are open. Applicants can expect start-up funding and renovated laboraotry space. Although new faculty will be expected to participate in a team-taught physiology and/or neuroscience course and graduate training programs, the majority of their effort will be devoted to vigorous, independent research. Applicants should send curriculum vitae and summary of current research and goals, together with the names of three references, to:

Rodolfo Llinás, M.D., Ph.D.
Chairman
Department of Physiology and Neuroscience
New York University Medical Center
550 First Avenue
New York, NY 10016

New York University encourages applications from women and members of minority groups.

POSITIONS OPEN

DIRECTOR OF TECHNOLOGY TRANSFER

The University of Utah seeks a new **DIRECTOR** for its Office of Technology Transfer. The position reports to the Vice President for Research with primary responsibilities to: 1) identify, market, and manage the intellectual property of the University of Utah; 2) administer the University's Technology Transfer Office and personnel; and 3) interact with State and local community officials on economic development issues.

The University of Utah is aggressively committed to the commercialization of technology, and is among the highest ranking U.S. institutions in patenting and licensing of technology. The University is also a national leader in related corporate start-up activities.

The candidate should have an earned advanced degree in a relevant field. Experience in technology evaluation, commercialization, patentability analysis, business plan review, and technology license negotiations is required.

Please submit a letter of application with a résumé and names, addresses, and telephone numbers of three potential references to: **Dr. Edward M. Eyring, Chair, Search Committee for Director of Technology Transfer, University of Utah, 210 Park Building, Salt Lake City, UT 84112.**

The University of Utah is an Equal Opportunity/Affirmative Action Employer. Applications from women and minorities are encouraged.

ASSISTANT/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; grant writing ability; capacity to function 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 UMHC, 420 Delaware Street SE, Minneapolis, MN 55455**. Deadline for applications is September 30, 1996. *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 programs. 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 adjoint faculty of the University of Colorado, establish active research groups including University graduate students and postdoctoral research associates, acquire outside grants and contracts, and assume some teaching responsibilities. The salary range 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 also arrange for three letters of recommendation to be sent to the **Search Committee, JILA Campus Box 440, University of Colorado, Boulder, CO 80309-0440**. See the JILA homepage at **http:\\www.boulder.nist.gov/jila/jilahome.html**. Candidates whose applications are received by September 1, 1996, will be reviewed for a possible January 1997 start date, while applications received by January 1, 1997, will be reviewed for a possible September 1997 start date. *JILA strongly supports the principle of diversity. We are particularly interested in receiving applications from women, ethnic minorities, disabled persons, veterans, and veterans of the Vietnam era.*

genzyme

Moving forward. With a new manufacturing facility, expanding global markets, and constant scientific innovation, Genzyme has become a major, diversified healthcare products company. **Making progress.** Our people are enthusiastic and focused, achieving success in the areas of therapeutics, diagnostic products and services, as well as pharmaceuticals and fine chemicals. **Looking ahead.** Many words can describe a goal, an achievement, or even an opportunity. But only one word can describe an opportunity like this. **Genzyme.**

ENZYMOLOGIST

Cambridge, Massachusetts

You will conduct independent research to determine kinetics and mechanisms of enzymatic relations as well as characterize novel enzyme substrates and inhibitors. Additionally, you'll analyze products and intermediates of enzymatic reactions, develop new enzyme assays, carry out chemical and structural characterization of proteins and contribute to recombinant protein expression. Requires an MS or Ph.D. in Biochemistry or Chemistry with a strong background in enzymology. A working knowledge of analytical and protein chemistry is required. Molecular or cell biology experience is desirable. **(Job Code BB-E)**

Qualified candidates should forward their resume indicating job code to: Genzyme Corporation, Human Resources Dept., One Kendall Square, Cambridge, MA 02139 or fax directly to our scanner (without a fax cover sheet): (617) 374-7427.

Genzyme uses optical scanning technology for its resume tracking system. Please use a 12 point font with minimal use of bullets, italics, underlining and bolding.

Genzyme rewards success with an excellent compensation and benefits package, including 3 weeks' paid vacation, a 401(k) plan with a company match, extensive insurance benefits and an Employee Stock Purchase Plan. An equal opportunity employer committed to a culturally diverse workforce.

ADVANCING HEALTHCARE PRODUCTS AND SERVICES WORLDWIDE

Senior Scientist
Antibacterial Drug Discovery

Isis Pharmaceuticals, a dynamic biopharmaceutical company, has developed a novel combinatorial drug discovery strategy to inhibit specific RNA/protein binding. Interactions between RNA and protein are fundamental to biology and are largely unexplored as drug targets. Isis exploits unique chemical and biological strategies to identify specific inhibitors of RNA/protein interactions from small molecule chemical libraries.

The successful candidate will join an interdisciplinary team to discover novel antimicrobial agents. The group focuses on targeting RNA metabolism and RNA/protein interactions that are specific to bacteria. A background in prokaryotic molecular biology or physiology is required. Experience working with small animal models of antimicrobial infection would be valuable. A Ph.D or M.D. and at least 2 years postgraduate experience are also needed.

Isis offers excellent salaries and benefits including equity participation, and an ideal work environment in north coastal San Diego County. Please submit resume with salary history to: Isis Pharmaceuticals, Code 212, 2292 Faraday Ave., Carlsbad, CA 92008. Principles only. No phone calls please. EOE.

ISIS PHARMACEUTICALS

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 Laboratories of the Section of General Surgery. 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 clinical programs of 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–Trondheim (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 (microevolution) modify different traits, but the question of how such processes may give rise to the establishment of new species (macroevolution) 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.

For information regarding the position, please contact: **Prof. Bernt-Erik Sather, Telephone: +47 7359 9584; Email: bernts@alfa.avh.unit.no** or **Ass. Prof. Trond Amundsen, Telephone: +47 7359 6293; Email: tamu@alfa.avh.unit.no; FAX: +47 7359 1309.** Application deadline: October 15, 1996.

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 modern molecular, computational, or genomic science 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 provides an excellent 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 start-up packages are nationally competitive and are commensurate with qualifications and experience. Please send a detailed curriculum vitae, including research accomplishments and interests; 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: **Search Committee Chair, Department of Bacteriology, University of Wisconsin–Madison, 1550 Linden Drive, 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.*

POSITIONS OPEN

ASSISTANT PROFESSOR

University of California, Irvine

Applications are invited for a **TENURE-TRACK FACULTY** position in the Department of Biological Chemistry, College of Medicine, 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 is expected to develop a strong, independent research program; participate in the interdepartmental graduate program; and contribute to graduate and medical teaching. Interested individuals holding the Ph.D. or M.D./Ph.D. degree may apply by sending 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.)

The University of California, 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 Coordinator of Medical Biochemistry Education. Medical Biochemistry is presented over a two-year period in an interdisciplinary problem-based medical education program in which small group tutorials replace lectures. The successful applicant will be expected to pursue scholarly activity in either bench research or 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. Moon, 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 help form a multidisciplinary 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 working in the field of lipid or lipoprotein research 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 experience are required. Excellence 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. Drora Fraser, Director, 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: 972 (7) 491763.** Closing date is July 7, 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 reverse transcription/replication. 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 reference 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 Emplyer.*

SCIENTISTS IN MOLECULAR BIOLOGY

Origen Technologies Inc. is a newly founded biotech company located in close proximity to NIH. We are seeking outstanding molecular biologists at various experience levels with expertise in cDNA and genomic library construction, yeast two-hybrid system, recombinant protein expression, and monoclonal and polyclonal antibody production. We offer an attractive salary and benefits package. Please send curriculum vitae and three references to: **James A. Riley, Origen Technologies Inc., 13 Taft Court, Suite 100, Rockville, MD 20850.**

POSITIONS OPEN

FACULTY POSITIONS

The Department of Microbiology and Immunology of Temple University School of Medicine invites applications for two **TENURE-TRACK** faculty positions. Rank will be appropriate to training and experience. We are particularly interested in individuals studying (1) molecular immunology or cellular immunology employing contemporary molecular biology approaches; (2) molecular microbiology or microbial pathogenesis using molecular approaches. Successful candidates must have significant research accomplishments, ability to establish and maintain a vigorous research program that will attract peer-reviewed funding, and a commitment to excellence in educating graduate and medical students. Applicants at the Associate Professor or Professor level must demonstrate a considerable record of independent peer-reviewed funding 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 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. Platsoucas, 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
FS8024

Description: One-year position to start August 1996 with possible renewal. Responsibilities include teaching undergraduate lecture and laboratory courses in human anatomy and physiology, human anatomy, nutrition, and general biology. Teaching load is 12 credit hours per semester with opportunity for some research involving undergraduate students. Qualifications: Ph.D. in biology with evidence of a broad background in human biology, outstanding teaching ability, and experience in advising undergraduates. Salary: $28,000 to $30,000; excellent benefits package. Applications: Applicants must provide letter of application describing interest and qualifications for position; curriculum vitae with transcripts of all college work; and three current letters of recommendation to: **Dr. Brent Ybarrondo, Chair, Department of Biology, Adams State College, Alamosa, CO 81102.** Call **719-587-7256** for a copy of complete vacancy announcement. 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 résumé plus three references to: **gfmurph@aol.com.**

FACULTY POSITION

Hadassah University Hospital
Jerusalem, Israel

Applications are welcomed for **MOLECULAR BIOLOGY** position, with special emphasis on gene therapy (position available from 1997). Candidates are required to have Ph.D. and/or M.D. degree and postdoctoral training with proven excellence in research and teaching, and experience in research directly related to gene therapy. The recipient is expected to develop collaborative basic and clinical research in gene therapy.

Curriculum vitae, list of publications, three to five selected reprints, research plans, and three letters of recommendation should be addressed to: **Director General of the Hadassah Medical Organization, Prof. S. Penchas, c/o Dr. M. Roll, Director, Research Department, R&D Division, Hadassah Medical Organization, P.O.B. 12000, 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 LIFESEQ 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: IS

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) 855-0572, email: employ@incyte.com. Also look for us on the world wide web at http://www.incyte.com.** EOE.

INCYTE

PHARMACEUTICALS, INC.

ENDOWED CHAIRS

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, neurotoxicology 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

genzyme

Moving forward. With a new manufacturing facility, expanding global markets, and constant scientific innovation, Genzyme has become a major, diversified healthcare products company.
Making progress. Our people are enthusiastic and focused, achieving success in the areas of therapeutics, diagnostic products and services, as well as pharmaceuticals and fine chemicals.
Looking ahead. Many words can describe a goal, an achievement, or even an opportunity. But only one word can describe an opportunity like this. **Genzyme.**

CONTINUOUS ACHIEVEMENT for The Decade Ahead

Framingham, Massachusetts

STAFF SCIENTIST

Immunobiology Group

Manage a group of 4 individuals whose responsibilities include producing and characterizing monoclonal antibodies, studying the immunobiologic effects of TGF-ß and prolactin, as well as the interaction of these two molecules with each other and other cytokines. Requires a Ph.D. with a minimum of 6 years' experience in cellular immunology, molecular biology, and hybridoma production. Previous management experience is essential.

Qualified candidates should forward their resume to: Genzyme Corporation, Human Resources Dept.- Code PK, One Kendall Square, Cambridge, MA 02139 or fax directly to our scanner (without a fax cover sheet): (617) 374-7427.

Genzyme uses optical scanning technology for its resume tracking system. Please use a 12 point font with minimal use of bullets, italics, underlining and bolding.

Genzyme rewards success with an excellent compensation and benefits package, including 3 weeks' paid vacation, a 401(k) plan with a company match, extensive insurance benefits and an Employee Stock Purchase Plan. An equal opportunity employer committed to a culturally diverse workforce.

ADVANCING HEALTHCARE PRODUCTS AND SERVICES WORLDWIDE

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

Genetic Analysis

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 Opportunity Employer.

Promega

To hear about current employment opportunities, please call our Career Opportunities Line at (608) 277-2539.

EXELIXIS
pharmaceuticals, inc.

Group Leader/Director of Bioinformatics

Exelixis is recruiting a Group Leader or Director of Bioinformatics to design, build and support a bioinformatics infrastructure. The position requires 5+ years of hands-on experience with relational dbases, UNIX, etc., and sufficient background in genetics to support bioinformatics analysis.

Candidate should be a self-starter with a demonstrated ability to work independently in an entrepreneurial and progressive team environment. Position reports directly to CEO or COO.

Located in Cambridge, MA, Exelixis is a venture capital backed, fast growing company focused on gene function. We offer generous compensation and benefits, including stock ownership.

Please fax your resume to:
Human Resources
Exelixis Pharmaceuticals, Inc.
Fax: 617-494-0005

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 pursuance 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.

Applications must be postmarked no later than July 22, 1996. Direct inquiries to: **Office of Executive and Technical Resources, 4E-060, DOE, Washington, DC 20858, Attn: ERD-96-10.** The vacancy announcement is available from the above address or through Energy Research's internet Home Page (**http://www.er.doe.gov**). *DOE is an equal opportunity employer.*

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 (M/C 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 at the **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 appointments in academic departments in the School of Medicine and in its graduate programs. New members of the Cancer Research Institute will join an exciting interactive research environment in state-of-the-art research facilities and participate in the development and implementation of an innovative graduate program in Cancer Biology.

Applicants 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
c/o Tracey Lee
UCSF Cancer Center
3333 California Street, Box 1297
San Francisco, CA 94143-1297

The University of California is an Equal Opportunity/Affirmative Action Employer. Minority candidates and women are encouraged to apply.

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; téam teaching molecular biology lecture/lab; and possibly a molecular genetics/biotechnology course. Applicant must also develop and sustain a funded research program that integrates undergraduate and potentially graduate students. Send résumé, letter of application, and three references to: **Dr. Marilyn Kilgen, Head, Department of Biology, Nicholls State University, Thibodaux, LA 70310.** Deadline: September 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 involving receptors, G-proteins, and effectors as well as further downstream signaling. Applicants must have a Ph.D. (or equivalent) and training in biochemistry and molecular biology. Send curriculum vitae and three reference letters to: **Dr. Mie-Jae Im, Department of Molecular Cardiology (FFb), Research Institute, The Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, OH 44195. FAX: 216-444-8372/9263.**

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 dynamics, HIV regulatory genes and the cell cycle, humoral and cellular immunology, and chemokine receptors for viral entry. Virology/immunology/molecular biology experience will be 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 affiliate of The Rockefeller University. *The Diamond Center is an Equal Opportunity Employer.*

NEUROVIROLOGY

A position is available for a **POSTDOCTORAL FELLOW** (*U.S. citizen, 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 virology and neuropathology. The position includes working in a small group focusing on JC virus and PML pathogenesis. The appointment will be for two years with a salary range 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 Neuropathology, NINDS, NIH, Building 36/Room 4A-29, Bethesda, MD 20892-4126. Telephone: 301-496-6144.** *NIH is an Equal Opportunity Employer.*

POSTDOCTORAL POSITION

Position available to study the genetics, biochemistry, and regulation of protein secretion in bacteria using an interdisciplinary approach. Background in protein or membrane biochemistry is desirable. Send curriculum vitae, reprints, and three letters of reference to: **Donald Oliver, Chairman, Department of Molecular Biology and Biochemistry, Wesleyan University, Middletown, CT 06457. Telephone: 860-685-3556; FAX: 860-685-2141; Email: doliver@wesleyan.edu.**

Equal Opportunity/Affirmative Action Employer.

POSTDOCTORAL SCIENTIST

POSTDOCTORAL/ASSISTANT SCIENTIST position in gene therapy of insulin dependent diabetes. Candidates must have a Ph.D. or M.D. and a strong background in molecular biology. Experience in recombinant virus vector production is desirable. Send curriculum vitae to: **Dr. Michael J. MacDonald, University of Wisconsin Medical School, 1300 University Avenue, Madison, WI 53706. FAX: 608-262-9300.**

NIH POSTDOCTORAL POSITIONS
MOLECULAR BIOLOGIST/VIROLOGIST
Available fall 1996

Laboratory of Immunopathology
National Institute of Allergy
and Infectious Disease
National Institutes of Health

TWO POSITIONS available for fellows (less than five years out of degree) to work on retrovirus induced immunodeficiency, basic retroviral biology, and basic immunology. Current activities center on mechanisms of anergy and abnormal cell signaling in MAIDS, development of B cell lymphomas with an emphasis on proviral insertional mutagenesis, and interactions of Gag with cellular proteins. Background in molecular biology, cell biology, protein-protein interactions, or signal transduction and strong background in immunology would be beneficial. Salary range begins with $28,000 and will be commensurate with experience. Qualified and interested candidates should send curriculum vitae and names and addresses of three references to:

Herbert C. Morse III
Chief, Laboratory of Immunopathology
NIAID
Building 7, Room 304
7 Center Drive, MSC 0760
Bethesda, MD 20892-0760
Telephone: 301-496-6379
FAX: 301-4022-0077
Email: hmorse@atlas.niaid.nih.gov

NIH is an Equal Opportunity Employer

ASSISTANT PROFESSOR, Parasitology. The Department of Biomedical Sciences and Pathobiology, Virginia–Maryland Regional College of Veterinary Medicine, invites applications for a calendar-year tenure-track 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 extension work, and develop an 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 a letter of application, curriculum vitae, and names of three references to: **Dr. Anne Zajac, Chair of Parasitology Search, Department of Biomedical Sciences and Pathobiology, College of Veterinary Medicine, Virginia Tech, Blacksburg, VA 24061-0442.** Individuals with disabilities desiring accommodations in the application process should notify Dr. Zajac at the address above, or by calling **540-231-7017.** Review of applications will begin on September 15, 1996, but applications will be accepted until a suitable candidate is identified. *Virginia Tech has a strong commitment to the principle of diversity and, in that spirit, seeks a broad spectrum of candidates including women, people of color, and people with disabilities.*

POSTDOCTORAL POSITION

POSTDOCTORAL POSITION is available immediately to a qualified Ph.D. for immunology research focused on human adenoviruses and human papillomaviruses. *U.S. citizens or permanent residents only.* Candidates should have a strong background in molecular biology with immunology experience desirable. Email or FAX a curriculum vitae, research interests, and three references to: **Dr. Jack Routes, National Jewish Center for Immunology and Respiratory Medicine, Department of Medicine, 1400 Jackson Street, Denver, CO 80206. FAX: 303-398-1806; Email: routesj@njc.org.**

POSTDOCTORAL POSITIONS available at Lawrence Berkeley National Laboratory, UC Berkeley, to study function of cell-type specific proteins in breast carcinoma and T cells that bind the matrix attachment region (MAR), DNA segments that anchor chromatin onto the nuclear matrix. Strong molecular biology background required. Send curriculum vitae and list of three references to: **Dr. Terumi Kohwi-Shigematsu, The Burnham Institute, 10901 North Torrey Pines Road, La Jolla, CA 92037. Telephone: 619-646-3146; FAX: 619-646-3195.** The lab will move to Berkeley shortly. *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 cardiopulmonary signal transduction using transgenesis. Position provides a dedicated full-time technician and an excellent transgenic/knockout facility that carries out injections, clips, animal care, etc. Excellent salary and benefits. Potential for advancement to faculty status. Send curriculum vitae and three letters of recommendation to: **Dr. Stephen B. Liggett, University of Cincinnati Medical Center, 231 Bethesda Avenue, Room 7511 MSB, Cincinnati, OH 45267-0564.**

TWO POSTDOCTORAL positions available to study the nature of interprotein interactions between cytochrome P450 and its redox partners. A molecular biologist and an enzymologist/kineticist are required to generate and characterize the structure and function of the proteins. Send résumé and three letters of reference to: **L. Waskell, Ph.D., Department of Anesthesia, UC San Francisco, VA Medical Center, San Francisco, CA 94121. FAX: 415-750-6946.** *Equal Opportunity Employer.*

POSTDOCTORAL POSITION available to study excitotoxicity in the retina. Cell culture, whole animal, and fluorescent imaging techniques will be used to study excitotoxic damage to central neurons. Interested applicants should forward a curriculum vitae and three letters of recommendation to: **Evan Dreyer, M.D., Ph.D., Howe Laboratory, Massachusetts Eye and Ear Infirmary, Harvard University, 243 Charles Street, Boston, MA 02114. Email: edreyer@macmail.meei.harvard.edu.**

A **POSTDOCTORAL POSITION** is available to study G protein-mediated signal transduction using molecular biological, cell biological, biochemical, and transgenic approaches. Experience in molecular biology and tissue culture is essential. Send curriculum vitae and statement of interests to: **Dianqing Wu, Ph.D., Department of Pharmacology and Physiology, University of Rochester Medical Center, Box 711, Rochester, NY 14642. FAX: 716-244-9283.**

NATIONAL CANCER INSTITUTE

NATIONAL INSTITUTES OF HEALTH
DEPARTMENT OF HEALTH AND HUMAN SERVICES
Opening Date: 6/10/96
Closing Date: 7/1/96
Announcement Number: CA-96-2101

CHIEF, CLINICAL AND DIAGNOSTIC TRIALS SECTION
(MEDICAL OFFICER, GS-602-15 OR MATHEMATICAL STATISTICIAN, GS-1529-15)

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

GLOBAL CAREER OPPORTUNITIES

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 three 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 collaboration 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 Lyons Cédex 08 France
Fax no: (33) 72 73 83 85

Applications from women are encouraged.

THE CLEVELAND CLINIC FOUNDATION

ASSOCIATE DIRECTOR/MANAGER MOLECULAR BIOTECHNOLOGY CORE FACILITY

The Cleveland Clinic Foundation Research Institute is a rapidly expanding basic research facility currently ranked 9th in the nation in NIH funding at "Research Institutes." The Institute comprises seven highly interactive departments with over 90 principal investigators, 30 junior scientists, 200 research fellows, and 350 support personnel. It has a highly developed network of core service departments supporting the basic research.

We are currently seeking an Associate Director/Manager of the Molecular Biotechnology Core Facility to lead the service that participates collaboratively in a wide range of research programs. The current services include protein sequencing, peptide mapping, peptide synthesis, purification and chemical modification, DNA sequencing, and oligonucleotide synthesis. In the near future we will introduce mass spectrometry for protein structural/functional analysis.

Qualified candidates should have an M.S./Ph.D. with significant experience in protein analysis and peptide synthesis. A working knowledge of mass spectrometry would also be an advantage.

The Molecular Biotechnology Core is expanding to meet an increasing demand and the post offers an excellent career opportunity for an individual with first class technical and interpersonal skills, and organizational experience. The appointment will be at the level equivalent to Instructor or Senior Research Associate. Candidates should send their CV and the names and fax numbers of 3 references to **Dr. Derek I. Duke, Director, Scientific Support Services, Cleveland Clinic Foundation Research Institute Administration/NC11, 9500 Euclid Avenue, Cleveland, Ohio 44195.** *The Cleveland Clinic is an Equal Opportunity/ Affirmative Action Employer.*

Global Career Opportunities

University of Oxford

Department of Physics

Fixed Term University Lecturership in Experimental Particle Physics

Applications are invited for a University Lecturership in Experimental Particle Physics, tenable for a fixed period of three years from 1 October 1996. Stipend on the scale of £15,154 to £28,215 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^{15} of dissolved uranium, thorium, 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.

The University Of Queensland

Equal opportunity in employment is University policy.

Call for Expressions of Interest – Senior Staff

AUSTRALIAN GENOME RESEARCH FACILITY

The Australian Government has allocated substantial funds to establish the infrastructure for a major national research facility, the Australian Genome Research Facility (AGRF), which will be based at the University of Queensland in Brisbane and the Walter and Eliza Hall Institute for Medical Research in Melbourne. The AGRF will undertake the large-scale analysis of genes and genetic variation across the phylogenetic spectrum.

The Facility will be unique in its generic structure and will provide research groups and industry with access to large scale facilities for high throughput DNA sequencing, genotyping and mutation detection, using state-of-the-art analytical equipment with associated robotics and information technology.

Over 70 Australian organisations, both public and private, have indicated their intention to use the AGRF. The Facility will also be made available to international users. The AGRF is currently in its planning phase which is expected to be completed by mid-1996 with operations commencing from the beginning of 1997.

It is anticipated that the Facility will appoint a **Scientific Director**, a **Business Manager** and three **Operational Managers**. The terms and conditions of employment may be negotiable.

Expressions of Interest are invited from suitably qualified and experienced individuals. Please send a covering letter, quoting **Reference No. 27896**, together with curriculum vitae and the names of three professional referees by 30 June 1996, to Professor John Mattick, Australian Genome Research Facility, Centre for Molecular and Cellular Biology, The University of Queensland, Brisbane Qld 4072 Australia (telephone +61-7-3365-4446, facsimile +61-7-3365-4388 or email j.mattick@cmcb.uq.edu.au).

Course

FUNDACION GENERAL DE LA UNIVERSIDAD COMPLUTENSE

COMPLUTENSE UNIVERSITY SUMMER SCHOOL

Rector: Prof. Rafael Puyol
School Director: Prof. Miguel Ángel Alario y Franco
Science Coordinator: Prof. Antonio Fernández-Rañada

SCIENCE COURSES 1996

San Lorenzo de El Escorial (Madrid) SPAIN

July 8-12	**OZONE CHEMISTRY AND THE ATMOSPHERE** Director: J. Santamaría (U. Complutense)
	ETHICS AND INFORMATICS Directors: L. Joyanes (U. Pontificia de Salamanca en Madrid) y P. Barroso (U. Complutense)
	NEUROSCIENCE, COMPUTATION AND ROBOTS Director: R. Moreno-Díaz (U. Las Palmas)
	FUNDAMENTAL ISSUES OF CELL INJURY AND THE INFLAMATORY RESPONSE Director: A. Martín-Municio (Pte. Real Academia de Ciencias)
July 15-19	**BIOMATERIALS** Director: M. Vallet (U. Complutense)
	STRONGLY CORRELATED MAGNETIC AND SUPERCONDUCTING SYSTEMS Director: G. Sierra (CSIC)
July 22-26	**AIDS. LAST ISSUES** Director: L. Valenciano (Pte. Fundación Wellcome España)
	PEACE STUDIES AND PEACE RESEARCH AT THE END OF THE CENTURY Director V. Martínez (European Peace Univ. Castellón)
July 29-August 2	**RECYCLING MATERIALS** Directors: J. L. Sotelo (U. Complutense) y J. Aguado (U. Complutense)
	ADVANCED TOPICS IN NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS Director: J. Carrillo (U. Complutense)
August 5-9	**SPATIAL ASTROPHYSICS: FROM STARS TO QUASARS** Director: B. Montesinos (LAEFF-INTA)
SHORT COURSE: **July 1-2**	**HEALTH AND BIOTECNOLOGY: ETHICS AND HEREDITY** Director: E. Muñoz (Pte. Gabinete Biotecnología)

SCIENTIFIC DEBATES

July 4. C. Belmonte (U. Alicante); J. Mª Segovia (U. Autónoma Madrid); A. García-Bellido (CSIC, Madrid); F. Rubia (U. Complutense). **July 11.** M. De Guzmán (U. Complutense); R. Margalef (U. Barcelona); E. Carmona (U. Sevilla). **July 18.** J. Sanz Serna (U. Valladolid); C. Pajares (U. Santiago); A. Martín-Municio (Pte. Real Academia de Ciencias); J. Rojo (U. Complutense). **August 1.** E. Aguirre (Museo Ciencias Naturales, Madrid); A. Hernando (U. Complutense); J. Elguero (CSIC, Madrid).

Lectures will be in Spanish or English depending on the Course. In some cases, simultaneous translation may be available. Normal Registration including full board accommodation 65.000 pesetas. A number of grants covering full board accommodation will be atributed to postgraduate and postdoctoral students from Universities or Research Centers. A registration of 18.000 pesetas is not included in the grant. Interested participants should send a letter of intention including C. V. and the names of two referees to: The registrat. Cursos de Verano de la Universidad Complutense, calle Donoso Cortés, 63. 28015 MADRID (SPAIN). Tel.: 34.1.544.81.06; 543.10.70 y 544.64.64. FAX: 34.1.394.64.33.

Financial support. Banco Central Hispano. Iberia. Teneo.

ANNOUNCEMENT

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) Jungalwala, Firoze B., Eunice Kennedy Shriver Center for Mental Retardation, Inc., USA; "Lectins of the sulfoglucuronyl 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 6B4 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"

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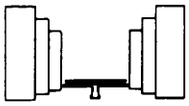
† Invitation for the next grant application may be found in *Science*, **272:** 308, 1996.
* Second year grant.
** Grant approved for two years.

Mizutani Foundation for Glycoscience: Sen-i Kaikan, 3-1-11 Nihonbashi-honcho, Chuo-ku, Tokyo 103, Japan (Fax: [81] 3-3246-1265, Phone: [81] 3-3246-0224).



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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.

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WE DEPEND ON THE

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Candidates must have a Ph.D. in Computational Sciences with practical experience in Bioinformatics and Genomic Biology as well as be skilled in the integration of the tools of bioinformatics and genomics with the drug discovery process. Applicants should have extensive experience in the development, adaptation and integration of computational sequence analysis methods for genomic database searching.

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Fax: 312/856-7584

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DIRECTOR, DIVISION OF KIDNEY, UROLOGIC, AND HEMATOLOGIC DISEASES (DKUHD)

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, 9000 ROCKVILLE PIKE, BETHESDA, MARYLAND 20892; (301) 496-4231.

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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

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NRC-CNRC

NRC is a dynamic, nationwide R&D organization committed to helping Canada realize its potential as an innovative and competitive nation. Combining our strengths — outstanding people, core science expertise and information, research programs focused on key technologies and technology diffusion — with those of industrial and academic partners, we foster Canada's emerging national system of innovation.

Research Officer

Biotechnology Research Institute (BRI)
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You will develop applications of electrospray mass spectrometry for biotechnology research and lead your own projects to characterize peptide-protein interaction in collaboration with other institute members.

With a PhD in Analytical Chemistry, Organic Chemistry, Biochemistry or a related discipline, you have in-depth knowledge of electrospray mass spectrometry, peptide chemistry or protein chemistry, as well as of the structure-function relationship of biologically active molecules and of molecular recognition.

Salary range: Commensurate with qualifications.

To explore this opportunity, send your application by August 16, 1996, indicating reference number RB-95-167-SC, to the: **Recruitment and Staffing Group, National Research Council Canada, Montreal Road, Building M-58, Ottawa, Ontario K1A 0R6.**

NRC is an equal opportunity employer. We thank all those who apply and advise that only those selected for further consideration will be contacted.

Vous pouvez obtenir ces renseignements en français.

National Research Council Canada / Conseil national de recherches Canada — Canada

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 senior 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 31, 1996 to:

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

All replies will be kept strictly confidential.
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NATIONAL CANCER INSTITUTE
NATIONAL INSTITUTES OF HEALTH, PUBLIC HEALTH SERVICE

CANCER PREVENTION FELLOWSHIP PROGRAM

The **Division of Cancer Prevention and Control (DCPC), NCI,** is accepting applications for the Cancer Prevention Fellowship Program (CPFP). The purpose of this program is to train individuals from a multiplicity of health science disciplines in the field of cancer prevention and control. The program provides for: *Master of Public Health training* (at accredited university programs); participation in the *DCPC Cancer Prevention and Control Academic Summer Course* (open to physicians and scientists interested in specialized instruction on the principles and practice of cancer prevention and control); *working directly with individual preceptors at DCPC* on cancer prevention and control projects; *brief field assignments* in cancer prevention and control programs at other institutions. Funding permitting, Fellows will be accepted for up to three years of training, beginning July 1, 1997. Benefits include selected relocation and travel expenses, paid federal holidays, and participatory health insurance.

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M.D., D.D.S., or D.O. from a U.S., territorial, or Canadian Medical School. Foreign medical graduates must have current USMLE or ECFMG certification and appropriate experience, e.g., one year residency in a training program approved by the Accreditation Council for Graduate Medical Education.

OR

Ph.D. or other doctoral degree in a related discipline (epidemiology, biostatistics, and the biomedical, nutritional, public health or behavioral sciences). Foreign education must be comparable to that received in accredited U.S., territorial, or Canadian institutions.

PLUS

The applicant must be a U.S. citizen or resident alien eligible for citizenship within four years.

For details and an application catalog either call, fax, email, or send a postcard or letter with your name, home address, and where you heard about the program to:

Douglas L. Weed, M.D., M.P.H., Ph.D.
Director
Cancer Prevention Fellowship Program
Division of Cancer Prevention and Control
National Cancer Institute
Executive Plaza South, Suite T-41
6130 Executive Blvd MSC 7105
Bethesda MD 20892-7105

Further inquiries: Mrs. Barbara Redding, Telephone: (301) 496-8640; Fax: (301) 402-4863; email: reddingb@dcpceps.nci.nih.gov

DEADLINE FOR RECEIPT OF APPLICATIONS: SEPTEMBER 1, 1996

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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 developedinternally 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-CH, Human Resources Dept.,1620 Waukegan Rd.-MPR-A1, McGaw Park, IL 60085. FAX (847) 473-6711.**

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- Principal consultant to the Navy, other agencies and nations on developing applications for the R&D programs under his/her cognizance.
- Applicants should be recognized as national/international authorities and should have planned and executed difficult programs of national significance or specialized programs that show outstanding attainments in their field of research.

NOTE: **The Mandatory Executive Core and Technical Qualifications must be discussed in detail in order to receive full consideration for the position.**

Resumes, SF-171s (Application for Federal Employment) or **OF-612s** (Optional Application for Federal Employment) must be **Postmarked by 28 June 1996.**

Please Contact: **Cathy Hamilton on (202) 767-3031 for application details**

Apply to:
Naval Research Laboratory
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Washington, DC 20375-5320

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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.

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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

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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
MATHEMATICAL 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 statistical aspects 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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Fax: (301) 948-0503

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POSTDOCTORAL FELLOWSHIP in Behavioral Neuroscience. Laboratory focuses on parental behavior and sexual dimorphism, using prairie voles and human tissue. Strong anatomical background needed. Send résumé and statement of interests to: **Dr. Brian Kirkpatrick, MPRC, P.O. Box 21247, Baltimore, MD 21228 U.S.A. FAX: 410-788-3837.** *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 geminivirus/host interactions as they realte to plant cell cycle control and transcriptional 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 their curriculum vitae and references to: **Profs. Linda Hanley-Bowdoin and Dominique Robertson, Department of Biochemistry, North Carolina State University, Raleigh, NC 27695-7622.** *Equal Opportunity Employer.*

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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 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
BIOCHEMISTRY

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 shall have the option (for additional income) to participate in teaching using classroom techniques involving cooperative learning—great preparation for a faculty position. Send curriculum vitae and three 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 with a Ph.D./M.D. in cell biology or biochemistry as well as experience or interest in signal transduction as related to growth factor-dependent and stress related responses are favored. The project is focused on cellular molecular responses to photosensitization of cancers. Send curriculum vitae to: **T. Hasan, Ph.D.** at the above address. **Telephone: 617-726-6996.** *MGH is an Equal Opportunity Employer; women and minorities are encouraged to apply.*

POSITIONS OPEN

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 Neurobiology, Harvard Medical School, 220 Longwood Avenue, Boston, MA 02115. Email: cweitz@warren.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 anticancer drugs, or as 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, Ph.D., 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

POSTDOCTORAL position now available for Ph.D. in chemistry, biochemistry, or related field to study biological 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 48109-0606. FAX: 313-763-4581; Telephone: 313-764-9132; Email: mjcoon@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, plus three letters of reference by August 1, 1996 to:

Dr. Naomi Rothfield
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University of Connecticut Health Center
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POSTDOCTORAL POSITIONS, Penn State: Two postdoctoral positions available. Cytokine signaling, type 1 receptor function, associated kinases/phosphatases, mitogenesis and apoptosis, nuclear effectors of erythropoiesis. Participation in Penn State University's Centers for Gene Regulation and Cell and Developmental Biology. Curriculum vitae, references, and interests to: **D. M. Wojchowski, 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 College of Medicine. Supported by an NIMH 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 Glaser, Department of Medical Microbiology and Immunology, 2187 Graves Hall, Columbus, OH 43210.**

POSITIONS OPEN

WAYNE STATE UNIVERSITY
PROSTATE CANCER INITIATIVE
POSTDOCTORAL FELLOW

FACULTY position available July 1996 for a recent graduate (Ph.D. or M.D./Ph.D.) in cellular molecular biology with interest in signal transduction mechanisms as they relate to angiogenesis. Project involves the role of bioactive lipids generated by lipoxygenase enzymes in triggering endothelial cell proliferation and migration. Project involves state-of-the-art molecular and cellular biological techniques. Candidates should have experience in one or more of the following areas: molecular biology, signal transduction, endothelial cell biology, or eicosanoids. Preference will be given to candidates with demonstrated research ability. Minimum salary: $27,000 dependent upon experience. Please send: 1) brief statement of research interest, capabilities, and goals; 2) curriculum vitae; 3) addresses, FAX/telephone number(s); and 4) three references to: **Dr. Kenneth V. Honn, Professor, 431 Chemistry, Wayne State University, Detroit, MI 48202. Email: KHONN@CMS.CC.WAYNE.EDU.** *Wayne State University is an Equal Opportunity/Affirmative Action Employer. All buildings, structures, and vehicles at Wayne State University are smokefree. Wayne State University—People working together to provide quality service.*

POSTDOCTORAL FELLOW/RESEARCH ASSOCIATE. A 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 their curriculum vitae and the names of two references to: **Dr. John D. Noti, Guthrie Research Institute, Sayre, PA 18840. Telephone: 717-882-4653; FAX: 717-882-5151.** *An Equal Opportunity Employer.*

THE NEUROSCIENCES INSTITUTE
LA JOLLA
Molecular Neurobiology

Applications are invited for the **POSTDOCTORAL POSITION** of Junior Fellow in Experimental Neurobiology to study biological mechanisms underlying formation, release, and disposition of anandamide, 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. Daniele 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: EPARK@UTMEM1.UTMEM.EDU.** *The University of Tennessee Memphis is an Equal Employment Opportunity/Affirmative Action/Title VII/Title IX/Section 504/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.**

POSITIONS OPEN

POSTDOCTORAL POSITION: NIH-funded studies on the characterization and molecular etiology of membrane estrogen receptors. Techniques to be employed include immunocytochemistry, protein modification characterizations, 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: cswatson@utmb.edu.** *Affirmative Action/Equal Opportunity Employer.*

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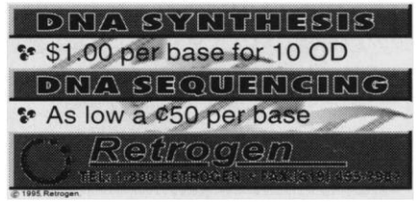

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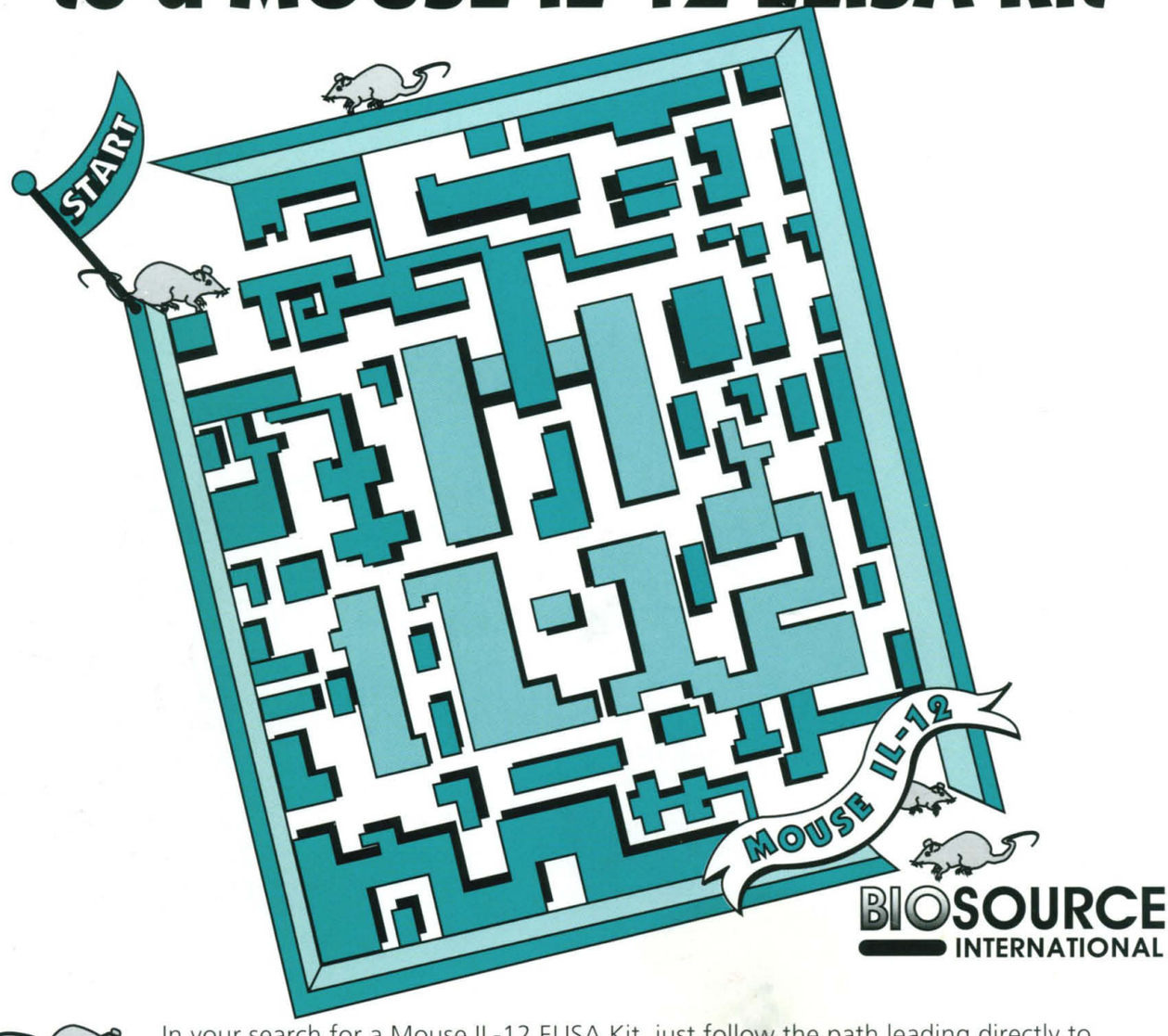

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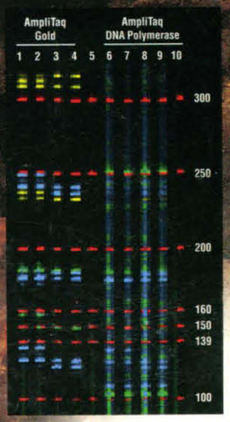

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