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SCIENCE

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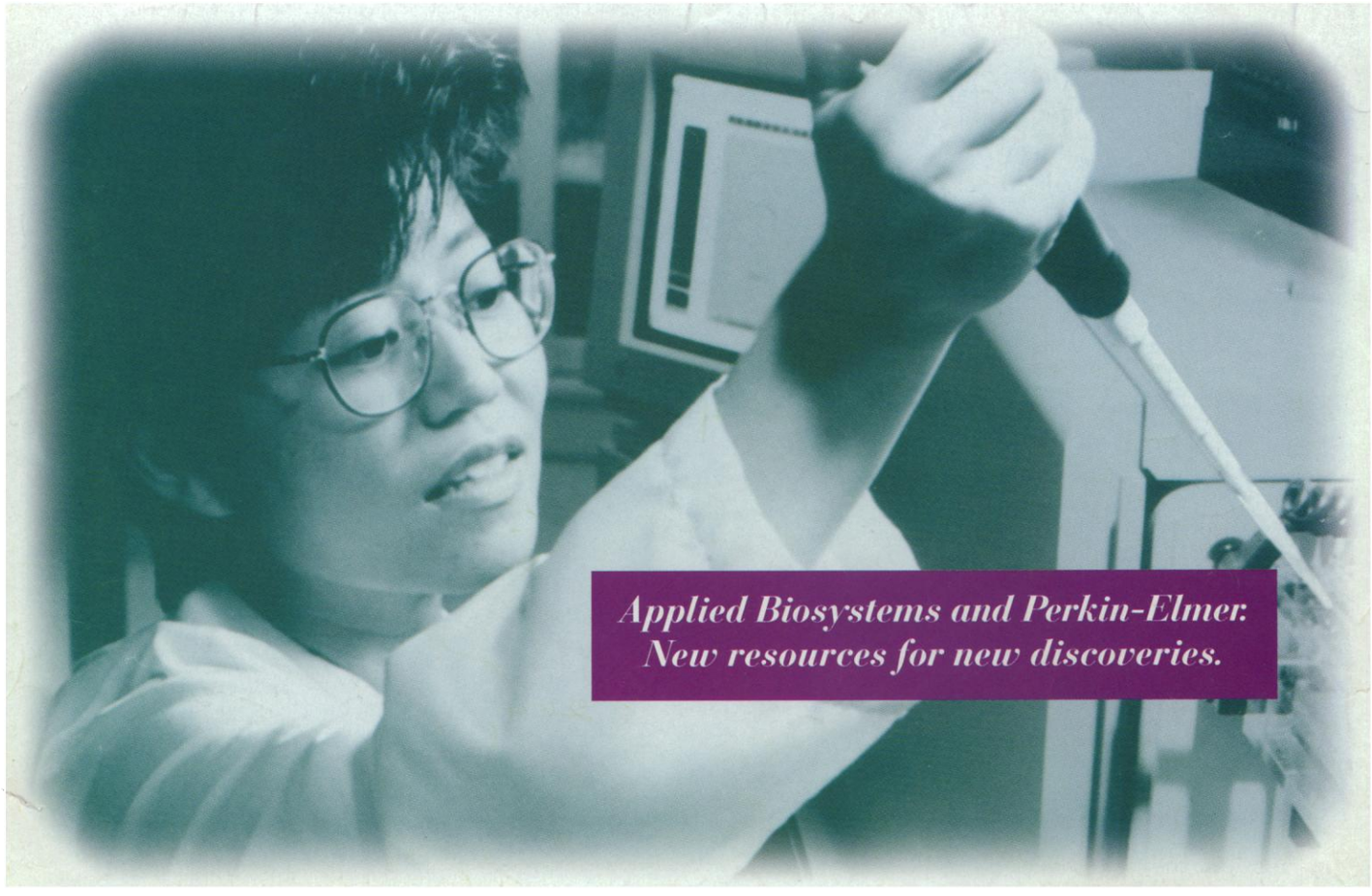
Careers '94

Playing to Win



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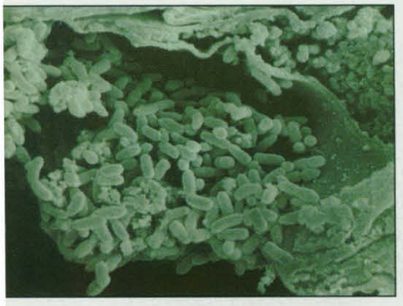
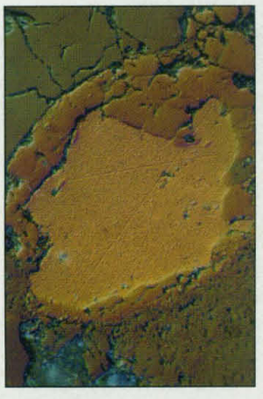


1804 & 1856

How plants fight disease



1846

Meteoritic metals in cooled chondrites

NEWS

PERSPECTIVES

ARTICLES

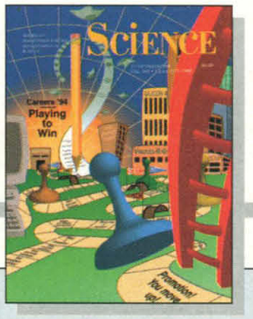
RESEARCH ARTICLE

REPORTS

DEPARTMENTS

COVER

This issue of *Science* examines how researchers overcome the challenges they meet along their career paths. Though presented in this image as a game, meeting those challenges—going from a postdoctoral to a permanent position, for instance, or running a productive laboratory—is a serious measure of success in the scientific life. See the News section, "Science Careers: Playing to Win," beginning on page 1905. [Illustration: Linda C. Owens]



TECHNICAL COMMENTS

SPECIAL SECTION

SCIENCE CAREERS: PLAYING TO WIN

1905

Early Career

The Modern Postdoc: Prepping for the Job Market • Doing a Postdoc the Industry Way • Climbing the Industry Career Ladder • Taking Roads Less Traveled by Researchers • Signing Up for Contract Research and Development • Grant Limits Irk Young Scientists

Midcareer

Grantsmanship: What Makes Proposals Work? • Writing It Wrong • Tenure, Under Fire Once Again, Still Holds Strong • Job-Hopping to Greater Career Heights • Venturing Off: The World of the Entrepreneur • Unemployment Blues: A Report From the Field • A Quick Guide to Job-Hunting

Late Career

Making the Grade as a Scientific Manager • Retirement: When to Go and What to Do

1819 & 1872

Encoding of olfactory information

Indicates accompanying feature

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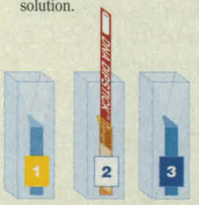
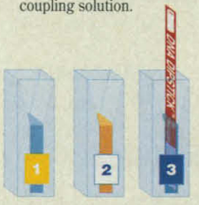


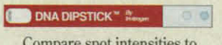
6 Min.

Transfer the DipStick to coupling solution.



10 Min.

Wash the DipStick, then transfer to the developing solution.



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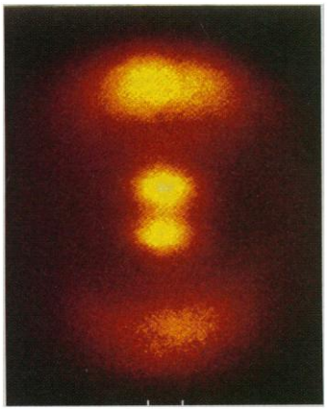
edited by PHIL SZUROMI

Revising the budget

Kinetic models of stratospheric chemistry show a net deficit in ozone production, which suggests that there are chemical reactions that produce ozone that have yet to be identified. Miller *et al.* (p. 1831) present evidence for a new pathway to ozone. Photodissociation of



ozone by 226-nanometer radiation produces highly vibrationally excited O_2; reaction of these molecules with O_2 would then form ozone and a free oxygen atom. The two free oxygen atoms thus produced would react with O_2 for a net gain of two ozone molecules. In a Perspective, Slanger (p. 1817) discusses this and other attempts to balance the ozone budget, as well as the challenges that remain.

■

Zeolite layers

Molecular sieves could have numerous applications as templates and membranes at the surfaces of devices and sensors, but the growth and crystallization of these materials is often difficult to control. Feng and Bein (p. 1839) grew well-oriented, stable films of the aluminum phosphate zeolite $AlPO_4$-5 on a gold substrate. Growth was nucleated by a zirconium organophosphonate layer. The film morphology could be varied from spherical agglomerates to thin tilted needles by varying the water content during the hydrothermal synthesis of the zeolite layer.

■

Traces of lead

Mining and smelting of lead first peaked during the Greek and Roman civilizations before rising again in more recent times. Hong *et al.* (p. 1841) analyzed lead levels in the GRIP Greenland ice core and show that this ancient lead production led to extensive and widespread pollution of the Northern Hemisphere atmosphere. Fallout of lead from A.D. 300 to 500 B.C. over Greenland was about 15 percent of that during the past 60 years caused by the widespread use of leaded gasoline.

■

Plasticity origins

Learning of a task involving touch can lead to remodeling of the somatosensory cortex. Diamond *et al.* (p. 1885) used a rat learning model to show that plasticity changes originate in the cortex and then are relayed to subcortical levels. Each whisker on the rat projects neurons through the thalamus to cortical barrel structure in layer IV, which connects to a column of neurons in layers II through VI. Clipping all but two whiskers on one side of a rat's nose led to changes initially in the whiskers' receptive fields in the cortical layers above and below layer IV, the primary target. This result shows that plasticity originates in layers of the cortex other than layer IV, and at later times layer IV and subcortical levels are affected.

■

Can live without

Both small ribonucleoproteins (snRNP) and non-snRNP proteins such as the SR proteins are found in the spliceosome and participate in pre-mRNA splicing. Crispino *et al.* (p. 1866) investigated the role of the U1, U2 and U4/U6 snRNPs in splicing by depleting them. SR proteins can compensate for the loss of U1 and restore splicing to U1-depleted reactions. Thus, U1 is dispensable for catalysis and probably functions in substrate recognition.

■

Odor codes

Fast oscillations in the local field potentials of large populations of neurons were initially observed in the olfactory centers of both vertebrates and invertebrates after exposure to odors. Laurent and Davidowitz (p. 1872) found that, in the olfactory bulb of the locust, different but overlapping populations of neurons oscillated in response to different odors. The population of participating neurons in response to exposure to a single odor can also change on a temporal scale that is much slower than the 20-hertz oscillation frequency. In a Perspective, Tank *et al.* (p. 1819) discuss how these and other results are adding to our understanding of the role that these oscillations play in perceiving odors.

■

Mad mouse

People who have deficiencies in the neurotransmitter serotonin (5-hydroxytryptamine, or 5-HT) may be subject to mood disorders and behaviors such alcoholism and suicide. Serotonin has numerous receptors, and a number of antiagression drugs target these receptors. Sandou *et al.* (p. 1875) used homologous recombination to generate mice that lacked one particular serotonin receptor, 5-HT_{1B}, which is the rodent homolog of the human $5\text{-HT}_{1D\beta}$ receptor. Mice lacking this receptor were more aggressive than wild-type mice and more likely to attack an intruder.

■

Working in tandem

Many transcription factors in both eukaryotes and prokaryotes activate transcription synergistically by mechanisms that are not well understood. In studies by Joung *et al.* (p. 1863), two prokaryotic activators are shown to activate transcription from an artificial promoter synergistically. These studies suggest that synergy is mediated by direct contact by each of these transcription factors with a separate surface of RNA polymerase.

Extrathymic T cells and neuroendocrines

In the mouse, intestinal intraepithelial lymphocytes (IELs) form the largest group of T cells that mature outside of the thymus. However, the role the thymus plays in their development has been controversial; mice made athymic as adults have a normal set of IEL T cell receptor (TCR) subtypes, whereas mice made athymic at birth have a limited number of TCR subtypes as adults. Wang and Klein (p. 1860) found that mice made athymic at birth that were given a neuropeptide, thyrotropin-releasing hormone, developed a complete set of IEL T cells. This neuroendocrine signal released by the thymus is needed for maturation of gut $\alpha\beta$ T cells.

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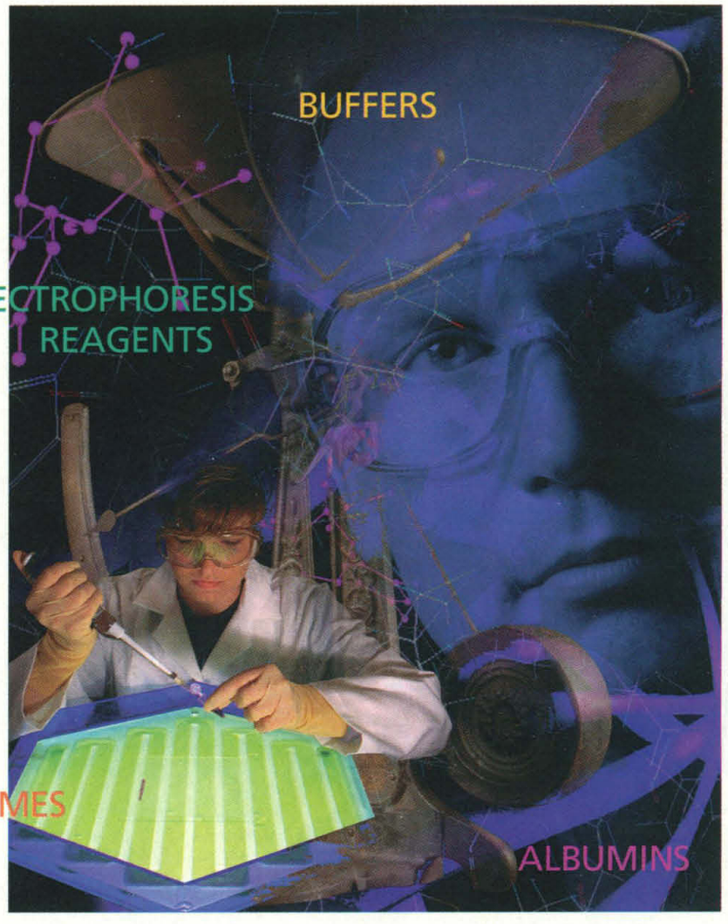

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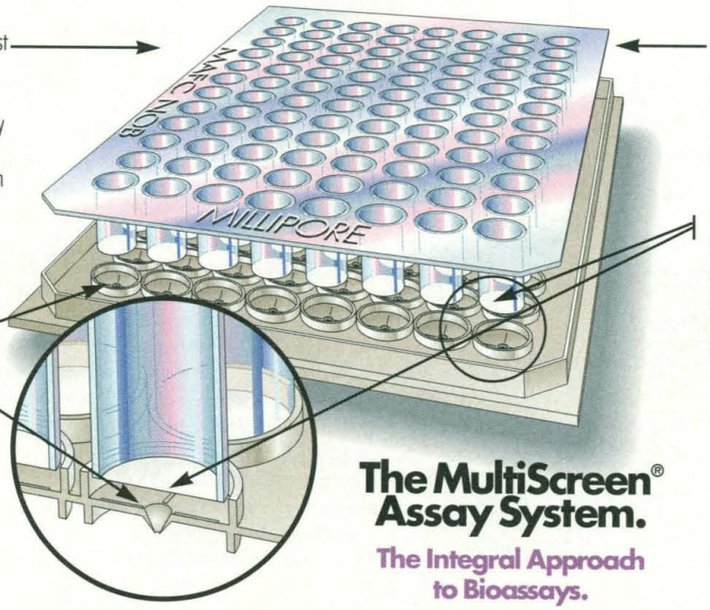

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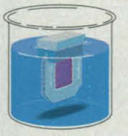

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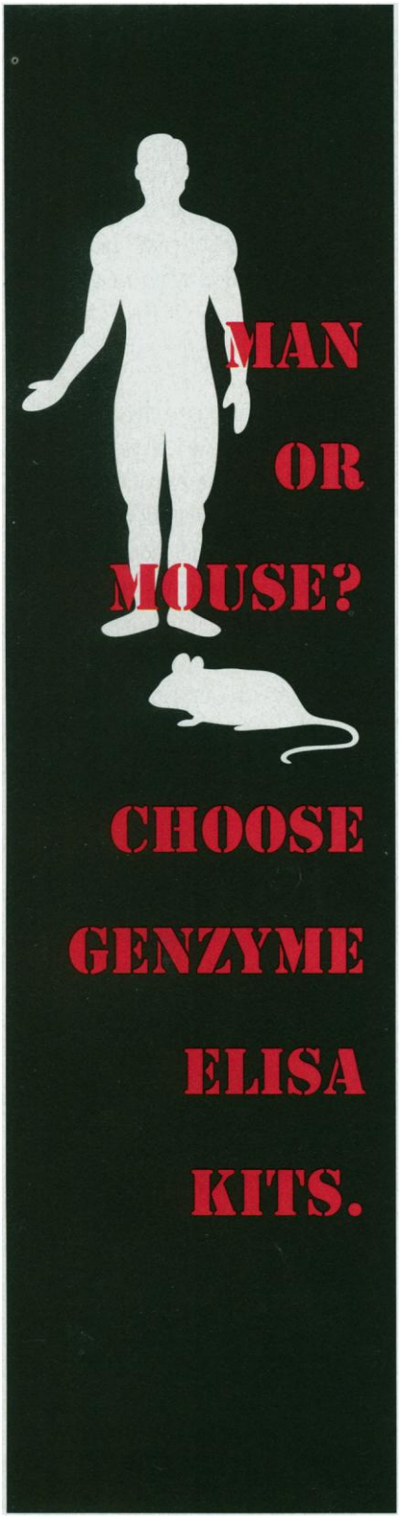

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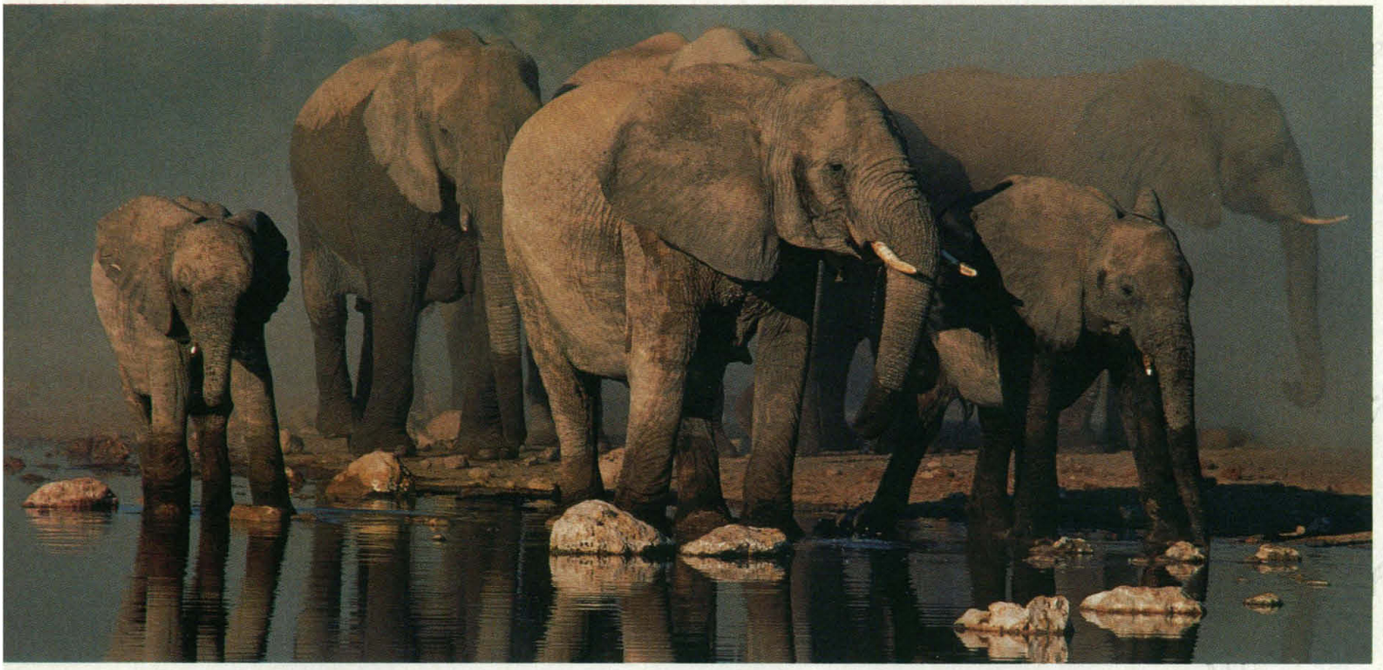

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Achieve peace of mind by relying on Boehringer Mannheim for all your PCR needs. Contact your representative for more information, or call us at 1-800-428-5433 (514-686-7141 in Canada).

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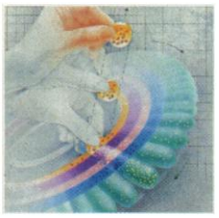

CENTRIFUGATION

The new J2-HC stretches the limits of high-speed centrifugation

In today's environment of shrinking budgets and lab space, the new J2-HC centrifuge is an ideal fit. It generates up to 18,000 rpm and 47,900 × *g* for high-speed separations, but it also has a full three-liter capacity for large-volume and multiple-sample processing. Plus, the J2-HC can even perform the functions of a refrigerated microcentrifuge and a microplate centrifuge. This versatile instrument, currently unlike any other instrument on the market, performs like four centrifuges, in one.

FOUR CENTRIFUGES IN ONE

HIGH SPEED: The new J2-HC accommodates Beckman's complete line of high-speed rotors including the new unique JA-12 fixed angle, which runs 12 common 50 mL conical tubes without adapters.

HIGH CAPACITY: The new JS-4.3 swinging bucket rotor adds a new dimension to floor model capabilities. Run a range of labware, from 1.5 mL tubes to 750 mL bottles, with incredible versatility...you can choose to run 148 3 or 5 mL tubes, or three liters.

MICROCENTRIFUGE: The J2-HC is ideal for efficient processing of plasmid mini-preps. With the JA-18.1 rotor, it can spin 1.5 mL tubes at 33,260 × *g*.

MICROPLATE: From cytotoxicity studies to cloning, the J2-HC can handle your microplate applications, accommodating up to 12 microplates or four Deep-Well plates per run.

YOUR MOST EFFICIENT CHOICE

The J2-HC produces less heat and noise, while consuming less energy, than any other manufacturer's floor model centrifuge due to its unique Friction Reduction System (FRS), which is built into all Beckman J2 Series centrifuges.

Dr. R. Rott, from the Institute of Virology at the University of Giessen, Germany, comments on the benefits of FRS: *"Beckman's FRS...considerably decreases energy requirements, positively affecting ambient temperature and supporting a concern for all of us, efficient use of energy."*

The high-speed, high-capacity J2-HC centrifuge is one more example of how The Beckman Plus adds speed, efficiency, and versatility to your research applications. For more information about applications of high-speed centrifugation or about the J2-HC, contact one of our local sales and service offices worldwide.

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POWER PCR

TaKaRa LA PCR Kit:

Proven Powerful to Any Length

Using *TaKaRa Ex Taq* in conjunction with a special reaction buffer, the new TaKaRa LA PCR Kit generates **Longer and More Accurate PCR** Products in Higher Amplifications.

Extension to **20 kb** with Ease. The Kit contains 20 kb Control to assure you premium PCR Performance.

With up to **40 kb** extension capability, the kit meets all your PCR requirements for further studies, such as genome mapping and sequencing.

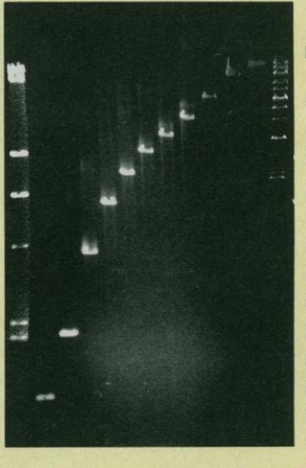
Code No. RR011

TaKaRa LA PCR Kit

Designed and developed for Long and Accurate PCR Amplification of the target in any span length up to 40 kb, employing a proprietary LA technology.

Typical Performance of TaKaRa LA PCR

M1 1 2 3 4 5 6 7 8 9 10 11 M2 **Template: 2.5 ng λDNA**



Lane M1: λ-*Hind* III digest markers
Lane 1: 1.0 kb
Lane 2: 2.0 kb
Lane 3: 4.0 kb
Lane 4: 6.0 kb
Lane 5: 8.0 kb
Lane 6: 10.0 kb
Lane 7: 12.0 kb
Lane 8: 15.0 kb
Lane 9: 20.7 kb
Lane 10: 27.9 kb
Lane 11: 34.8 kb
Lane M2: High MW DNA markers

TaKaRa BIOMEDICALS

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Fax: +81 775-43-9254

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What's the least you can expect from Pharmacia Biotech automated DNA sequencing?

choice

R1709

The last thing you want automation to do is restrict your choices. So when we designed ALF™, our automated DNA sequencer, we made sure that it gave you maximum choice – in chemistry, in methodology, in data presentation. One important example of the choice it offers is the ability to use labelled or unlabelled primers, an economical way of dealing with the need for a variety of primers.

With its ease of use, speed of operation, choice of chemistries and the ability to present raw as well as processed data, ALF ensures that you get the choices you need for the results you want.

Which means that when it comes to choosing a DNA sequencer, go for the one that gives you choice.

Pharmacia Biotech puts time on your side.

Pharmacia Biotech

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The American Association for the Advancement of Science is pleased to present a special introductory 9.9% APR on cash advances.* As a part of your welcome package you will receive two Premium Access Checks that you can use to pay off or pay down other credit cards and installment loans.

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- A 15.15% variable APR on purchases
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Call Now!

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Please use this priority code when calling: **MXUM.**

†The Annual Percentage Rate (APR) for purchases is 15.15%, which may vary. The APR is 9.9% on cash advances through your first six statement closing dates commencing on the month after your account is opened and may vary thereafter (applies to both new and outstanding cash advance balances). The current indexed rate for cash advances is 15.15%, which may vary. Transaction fee for two specifically designated Premium Access Checks® or Preferred Access Checks® will be waived. The information about the cost of the card described in this application is accurate as of 8/94. The information may have changed after that date. To find out what may have changed, call 1-800-847-7378.

*Cash advances cannot be used to pay off or pay down another MBNA® account.

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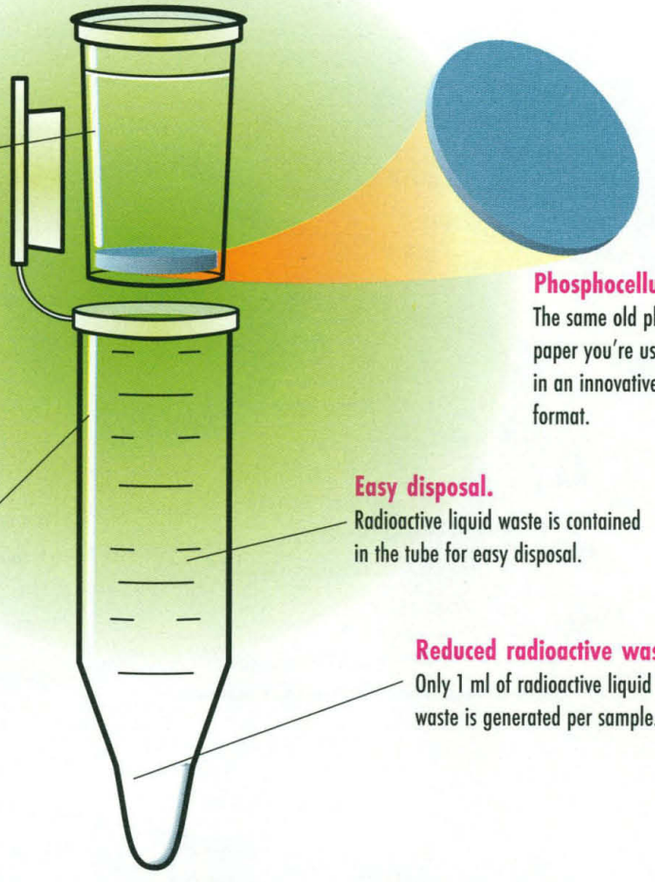
Speed.
In less than five minutes, Pierce Phosphocellulose Units will separate excess [γ-^{32}P]ATP from phosphorylated peptide. The innovative bucket design features a phosphocellulose membrane in a spin-column format, eliminating the tedious wash steps of the traditional paper disc procedure.



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Easy disposal.
Radioactive liquid waste is contained in the tube for easy disposal.

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Only 1 ml of radioactive liquid waste is generated per sample.

Try the new Pierce Phosphocellulose Units for radioactive kinase assays—they're a scientist's best friend.

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Ask us about the new Pierce PKC and PKA Colorimetric Assay Kits.

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IF IT ISN'T ONE REASON, IT'S ANOTHER.

"Pro 100 film is super! I'm very happy with its color saturation and grain for my aerial and industrial work. Large-size prints are grainless. I have happy clients and this film will help me keep them."

— PAT McKENRICK, CINCINNATI, OHIO

"Pro 400 MC gives you fine grain, excellent color saturation, and the sensitivity that a true 400 speed color film should have. Thanks, Kodak. Again you have been sensitive to the needs of the professional."

MERLE T. HOWARD, ATLANTA, GEORGIA —

"I'm in construction photography so I need a reliable film for both good and foul weather days. New Pro 400 MC gives me excellent color rendition even with heavy overcast skies. And the 'grainless grain structure' is beautiful for a high-speed film. I have used KODAK Films now for 40 years and the new Pro 400 MC is definitely a winner."

— HOWARD D. KELLY, SAN GABRIEL, CALIFORNIA

Everyone has their own reasons for being impressed with new KODAK Pro 100 and Pro 400 MC Professional Color Negative Films. What will yours be?

Kodak

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If these are your questions:

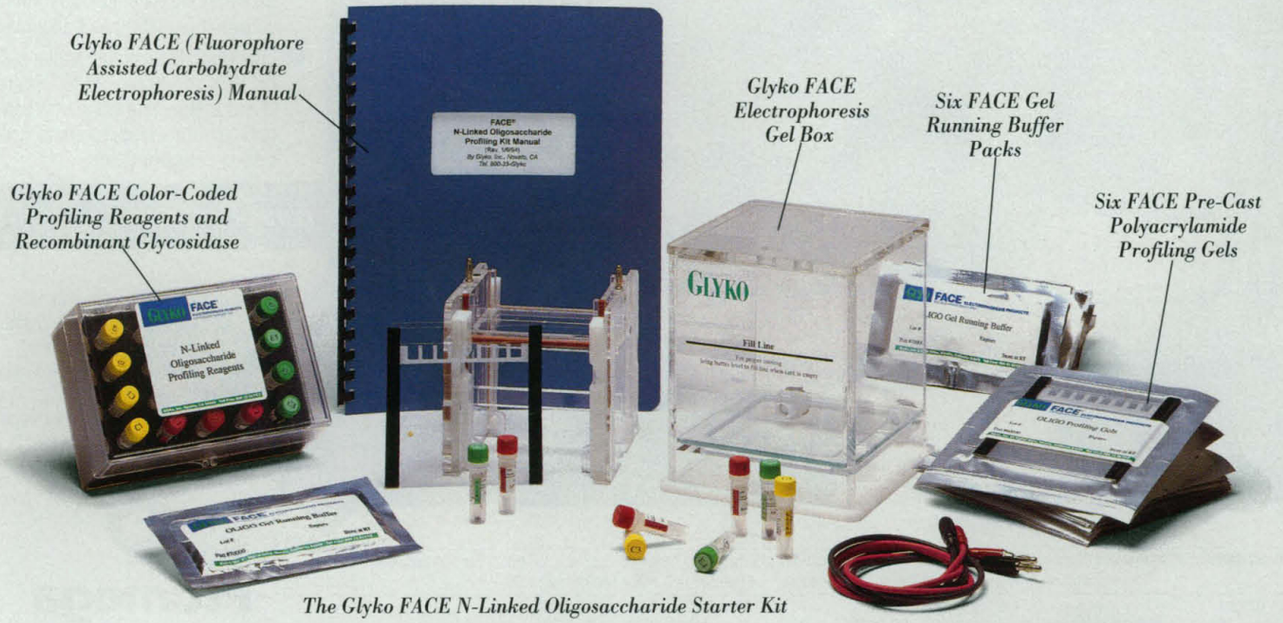
- Is my protein glycosylated?
- Are the carbohydrates N-linked or O-linked?
- What types of monosaccharides are present on my glycoprotein?
- How consistent is the glycosylation between my production lots?
- How do various culture conditions affect my protein glycosylation?

This is your $795 answer:

INTRODUCING THREE GLYKO FACE® CARBOHYDRATE ANALYSIS STARTER KITS

■ **N-Linked Oligosaccharide Profiling** ■ **O-Linked Oligosaccharide Profiling** ■ **Monosaccharide Analysis**

Now you can choose one of these easy-to-use Starter Kits for only $795. Each is guaranteed, and everything you'll need to start getting answers to your carbohydrate questions is included.* Additional supplies are as close as your telephone. Just ask for details.



The Glyko FACE N-Linked Oligosaccharide Starter Kit

To order your Starter Kit for $795, phone 1 415 382-6653 or fax 1 415 382 7889. In U.S. only, phone 1 800 33 GLYKO (334 5956). Sorry, one kit per customer only at this special price.

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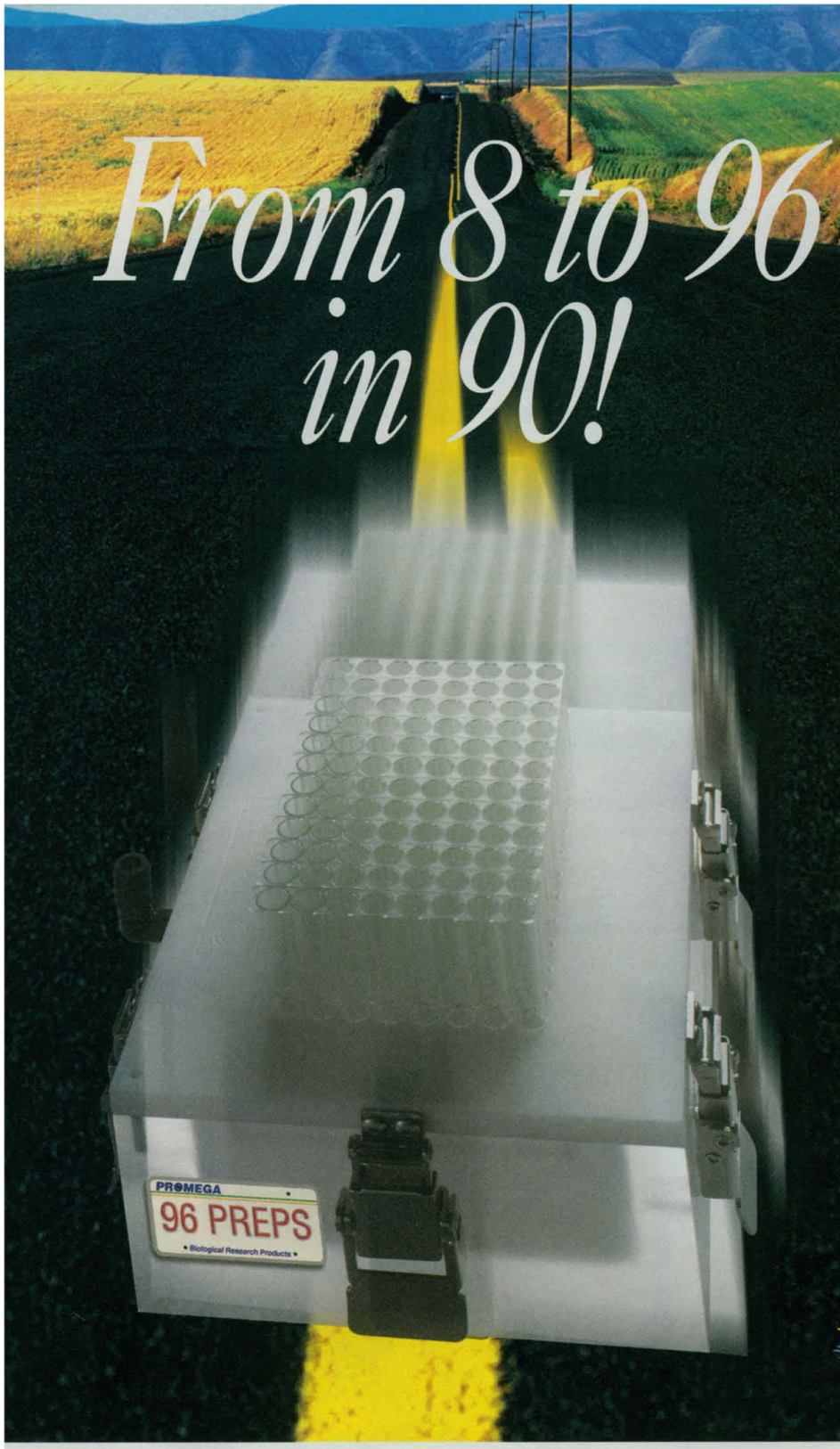

DNA PURIFICATION

From 8 to 96 in 90!

Wizard™ Series 9600™ DNA Purification System

A Revolution in Plasmid Miniprep Technology.

Whether you're doing 8 minipreps or 800, the Wizard™ Series 9600™ System delivers the performance and value you need:

- **Speed:** Wizard™ Series 9600™ Minipreps are performed with a unique vacuum manifold that allows purification of plasmid DNA from up to 96 bacterial cultures in as little as 90 minutes.
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- **Convenience:** The Wizard™ Series 9600™ System minimizes manipulations required to prepare plasmid DNA. The standard 96-well plate format allows easy handling and storage of large numbers of DNA samples. Optional Quick Culture™ bacterial media plates streamline culture inoculation and alkaline lysis.
- **Low Cost:** Unlike alternative systems, the Wizard™ Series 9600™ System offers quality at a price that can reduce your miniprep costs while saving valuable time.

. . . only from Promega.

For more information about the Wizard™ Series 9600™ System and the complete line of Wizard™ DNA purification products, contact Promega or your local Promega branch or distributor.

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MEMBER BENEFITS BULLETIN

145th YEAR 1994 NO.EE05

SCIENTIFIC CAREER OPPORTUNITIES

The American Association for the Advancement of Science (AAAS) conducts a year-round Employment Exchange which includes on-site operations during the weeks of the AAAS national and divisional meetings. The Employment Exchange is a career opportunities/career development service for job candidates and employers. Interview scheduling, position posting, a message center, job and resume referrals, career development seminars and private interview booths are provided during the week of the national meeting. A job and resume referral service and career development seminars are provided at the divisional meetings.

The Employment Exchange recently expanded its services to include year-round candidate referrals. Now in addition to the services provided at the AAAS-sponsored meetings, candidates also receive the benefit of continuous year-round exposure to scientific employers by advertising in the Employment Exchange Quarterly Bulletin. As an added benefit, recruiters may now request a search of the candidate qualifications database.

Annual enrollment in the Employment Exchange is FREE to AAAS member candidates and AAAS Corporate Members. Nonmember employers and nonmember candidates are charged a fee.

If you are presently in the job market, a graduate student, a postdoctoral or experienced scientist, or an employer with positions to be filled, and would like to take advantage of our efforts on your behalf, contact: **Kevin M. Bullock, Project Coordinator, AAAS Employment Exchange, 1333 H Street, NW, Suite 1159, Washington, DC 20005. Phone: 202-326-7049; Internet: KBULLOCK@AAAS.ORG.**

EMPLOYMENT EXCHANGE SCHEDULE

AAAS Annual Meeting and Science Innovation Expo
16-21 February 1995, Atlanta, GA

AAAS SWARM Division Annual Meeting
21-26 May 1995, Norman, OK

AAAS Pacific Division Annual Meeting
18-23 June 1995, Vancouver, BC

NEW CAR RENTAL MEMBER BENEFIT

AAAS members can now save on car rental rates with **Hertz** and **Dollar Rent A Car**! Both companies offer AAAS members special discounted rates, unlimited mileage, frequent flyer mileage with airline partners, 24 hour toll-free roadside assistance, and international rental programs.

The **Hertz** program offers AAAS members the following discounts on U.S. rentals: 15% off the Daily Member Benefit Rates; 10% off **Hertz** Standard Daily, Weekend, Weekly, and Monthly Rates; 5% or greater discount on **Hertz** Leisure Daily, Weekend, Weekly, and Monthly Rates. The **Hertz** reservation computer will automatically search for the best discount rate. In order to receive the AAAS discounted rates, members should call **Hertz** at 800-654-2200 and reference AAAS program **CDP#343457**.

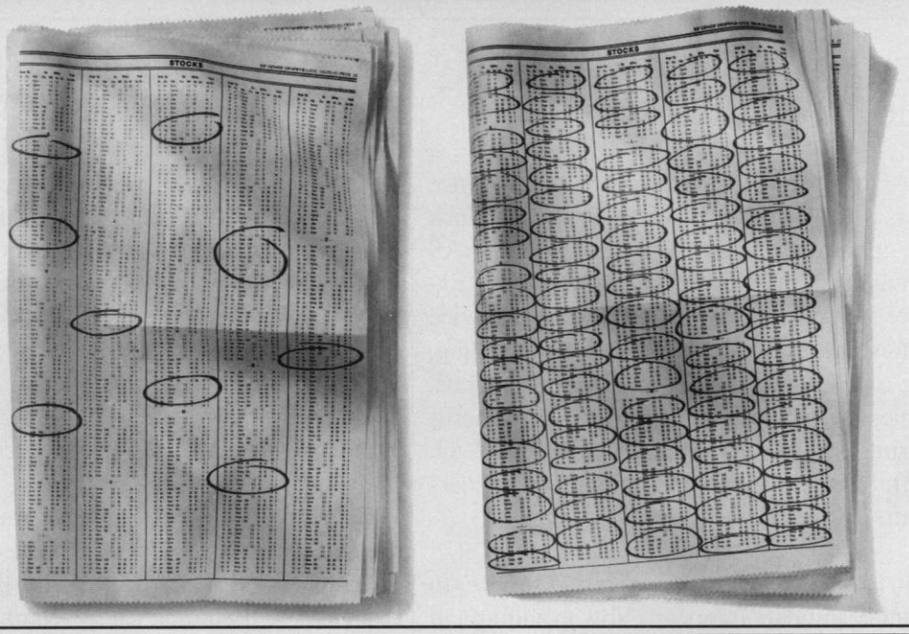
The **Dollar Rent A Car** discount program offers AAAS members the following discounted fixed rates on domestic rentals:

	Daily	Weekly
Economy:	$33.00	$165.00
Compact:	$35.00	$175.00
Intermediate:	$36.00	$180.00
Standard:	$37.00	$185.00
Premium:	$42.00	$210.00
Luxury:	$46.00	$230.00
Mini Van:	$47.00	$235.00

Rates are even lower in California, Florida, and Hawaii. When members rent from **Dollar** using the special AAAS program rates printed above they are eligible for a special insurance benefit. (Please call the AAAS membership office at 202-326-6417 for further details.) In order to receive the special AAAS rates, contact **Dollar Rent A Car** at 800-800-4000 and reference the AAAS program **#AA1115**.

For complete information on the car rental discount programs available to AAAS members and a free upgrade coupon from **Hertz** and **Dollar Rent A Car**, please contact the **AAAS Membership Office at 202-326-6417, fax 202-842-1065, Internet: MEMBERSHIP@AAAS.ORG.**

ANNOUNCING TWO NEW CREF ACCOUNTS



YOU'RE LOOKING AT TWO COMPLETELY OPPOSITE, FUNDAMENTALLY DIFFERENT WAYS TO INVEST IN STOCKS. WE RECOMMEND BOTH.

Introducing the CREF Growth Account and the CREF Equity Index Account.

Whether you want a fund that selects specific stocks or one that covers the market, we're on the same page. Our new CREF Growth and CREF Equity Index Accounts use two distinct strategies for investing in the stock market, but both aim to provide what every smart investor looks for: long-term growth that outpaces inflation.*

The CREF Growth Account searches for individual companies that are poised for superior growth. In contrast, the Equity Index Account looks for more diversification, with a portfolio encompassing almost the entire range of U.S. stock investments. It will invest in stocks in the Russell 3000®,** a broad index of U.S. stocks.

Like our CREF Stock Account, which combines active, indexed and foreign investing, and our Global Equities Account, which actively seeks opportunities worldwide, the new funds are managed by experienced investment professionals. They're the same experts who have helped make TIAA-CREF the largest pension system in the U.S., managing over $130 billion in assets.

To find out more about our new stock funds, and building your portfolio with TIAA-CREF, just call **1 800-842-2776.**

And take your pick.

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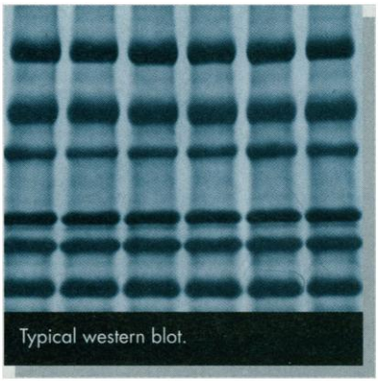
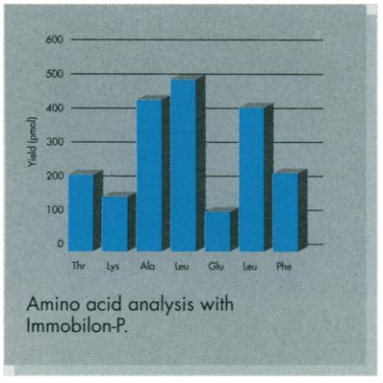
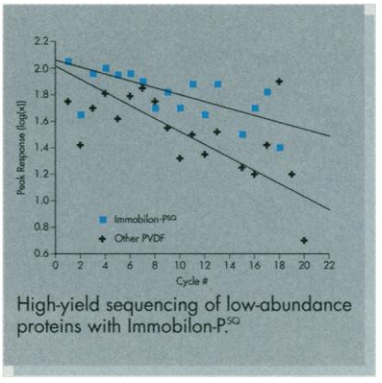


Typical western blot.

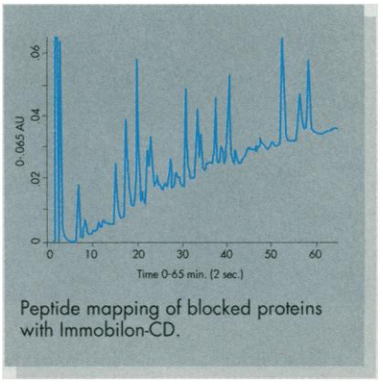
Information.



Amino acid analysis with Immobilon-P.



High-yield sequencing of low-abundance proteins with Immobilon-P^{SQ}.



Peptide mapping of blocked proteins with Immobilon-CD.

Information Superhighway.

To elucidate the properties of your protein, let one of the Immobilon™ transfer membranes pull out the maximum information possible.

Millipore has developed unique Immobilon matrices—each optimized for different biomolecule studies.

Immobilon-P is the ideal PVDF matrix for general western blotting and immunodetection, delivering stronger bands and better signal-to-noise than traditional nitrocellulose. The broad compatibility of PVDF makes it particularly well suited for amino acid analysis.

Immobilon-P^{SQ} is a specialized PVDF membrane that binds three-to-five times more protein than conventional PVDF. The capture of peptides or low-abundance proteins with nearly 100% efficiency makes this the membrane of choice for high-yield sequencing.

For peptide mapping of N-terminally blocked proteins, there's no better choice than Immobilon-CD. Its cationically-charged PVDF surface permits reversible sample immobilization, allowing protein bands to be eluted from the membrane after transfer for sequencing.

Don't let vital information slip through your fingers. Take the high road—and find out what you've been missing. For a free sample of the Immobilon membrane of your choice and key references, in the US and Canada call 1-800-MILLIPORE ext. 8202. Japan, fax to (03) 3474-9141. Europe (fax to our Paris headquarters), +33.1.30.12.71.83.

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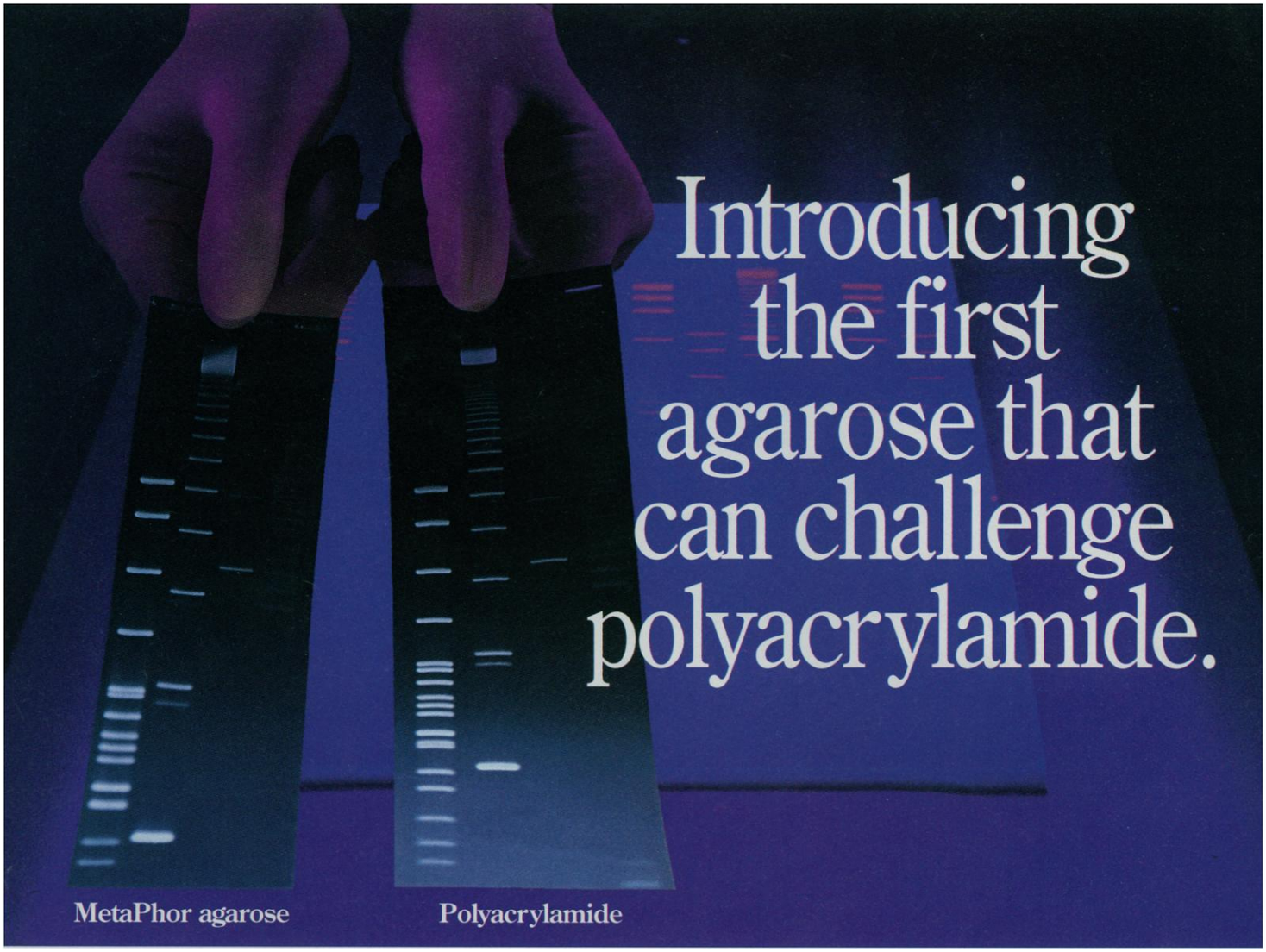

Until now, when you wanted the finest resolution of PCR* products and small DNA fragments (less than 800 bp), you probably made a polyacrylamide gel. Preparing that gel, however, was tedious and time-consuming.

MetaPhor™

But now there's something better. It's a new kind of agarose that not only offers speed and convenience, but also has twice the resolution capabilities of any other agarose. It's new MetaPhor™ agarose from FMC.

In fact, as you can see from the above results, MetaPhor agarose gives you resolution so fine (down to a 4 bp difference) that it rivals polyacrylamide. And we think that makes it a clear winner.

Just dissolve MetaPhor agarose in 1X TBE buffer, cast and chill the gel in your submarine chamber, load your samples, and go. It's as easy as that.

So take the MetaPhor challenge, and see how our new MetaPhor agarose performs. When you do, you'll understand why scientists who want the best go straight to the source. To learn more, or to place your order, call us today at **800-341-1574.**

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FMC BioProducts Europe, Risingevej 1, DK-2665 Vallensbaek Strand, Denmark. Tel.: 45-43-73-11-22 FAX: 45-43-73-56-92

*The PCR process is covered by U.S. patents owned by Hoffmann-LaRoche, Inc.

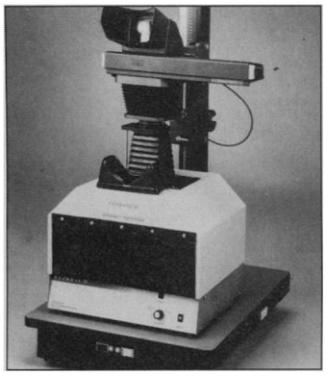
Circle No. 34 on Readers' Service Card

Image Acquisition and Analysis

VISTA is a system for fully automated time lapse digital image acquisition and quantitative image processing for the life sciences. It enables acquisition of high resolution digital images from monochrome or color cameras, at resolutions up to 768 by 576 pixels, with image operation up to 1024 by 1024 pixels using advanced monochrome camera technology. It is supplied as a complete integrated system with image acquisition hardware and software, low light level camera, advanced graphics interface and display technology, and computer. It offers an interface to all conventional light and fluorescence microscopes, acquisition of brightfield and ultra–low light level fluorescence images from living cells, image capture rates compatible with most biological applications, on-chip camera integration to optimize images acquired at low light levels, and more. **Life Science Resources. Circle 140.**

Benchtop Darkroom

The UV-70 Benchtop Darkroom is designed to be used as a convenient compact laboratory darkroom. The cabinet permits gel



viewing right at the laboratory bench by simply placing the unit over any standard transilluminator. An optional bellows attachment connects directly to a camera for photography, eliminating the need to take gels to a separate darkroom. The cabinet makes use of a special viewing filter that absorbs ultraviolet energy and eliminates blue haze for safe, fatigue-free viewing. A large magnetically held access curtain allows easy access. **Ultra-Lum. Circle 141.**

Electrophoresis System

The Cool Gel Electrophoresis System allows the user to control, measure, and report temperature as a routine part of mini-gel experiments. By controlling temperature the system improves separation times while providing resolution normally available only on sequencing size gels. The system is especially applicable to DNA analyses and to protein recoveries from gels where the temperature history of the sample can be crucial. **BioTherm. Circle 142.**

Subtracted cDNA Production

The Subtractor Kit is a simple method for the enrichment of differentially expressed genes. The three-day procedure makes use of the technique of subtractive hybridization to remove common messages from a differentially expressed pool of complementary DNA (cDNA). The subtracted cDNA produced with this kit can be used as a probe to screen a cDNA library or can be amplified and cloned to produce "hard copies" of enriched genes. **Invitrogen. Circle 143.**

Protein Sequencer

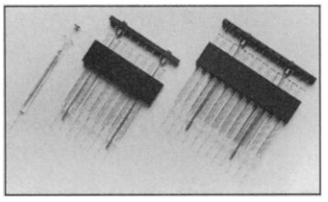
State-of-the-art automation, sophisticated programmability and control by the Macintosh Quadra, and an open architecture that allows for future upgrades are all available in the Procise Protein Sequencing System. This system offers the versatility of either gas or pulsed-liquid chemistries, multiple cartridge configurations, and extra bottles to accommodate future chemistry advances. The system offers sequential sequencing with up to four reaction cartridges, each of which can be independently programmed to run gas phase while another cartridge can be programmed for pulsed-liquid chemistry. Multiple samples can be loaded for overnight and weekend runs. **Perkin-Elmer. Circle 144.**

Purification System

The eggs of immunized chickens are an economical and abundant source of polyclonal antibody that offers advantages over traditional methods of producing antibodies in mammals. The EGGstract IgY Purification System provides a rapid and easy method for the isolation of immunglobulin (Ig) Y, the chicken IgG homolog, from egg yolks. The protocol and reagents supplied allow recovery of 55 to 80 mg of 75 to 90% pure IgY per egg yolk in about 1 hour. The purified IgY can be used in standard immunological assays. **Promega. Circle 145.**

Multi-Channel Syringe Pipette

The Multi-Channel Syringe Pipette is a multiple loading device that incorporates a syringe and needle design for maximum accuracy and optimization when loading sequencing samples. It simultaneously transfers 1, 8, or 12 samples from a 96-microwell plate directly to either a polyacrylamide sequencing gel, to another microwell plate for duplicate analysis, or to a nylon membrane



for visualization. The novel design provides the narrow diameter and tip length needed to fit between gel plates. Each syringe dispenses between 0.2 and 10 ml per well with better than 99% volume accuracy. **Owl Scientific. Circle 146.**

Literature

Gilson Automated Systems for HPLC and LC is a 12-page publication on a line of systems for a wide range of high-pressure liquid chromatography (HPLC) applications. System capabilities include pump-control or computer-control, isocratic or gradient elution, manual or automatic injection, biocompatibility, and automated sample preparation options. **Gilson Medical Electronics. Circle 147.**

Software for Science is a 96-page listing of more than 1200 scientific and technical software tools for DOS, Windows, Macintosh, and UNIX workstations, including more than 200 new products. **SciTech International. Circle 148.**

Filtron Facts is an eight-page newsletter containing technical and applications information for ultrafiltration membrane users. A recent issue focuses on the integrity testing of tangential flow devices and cassettes. Integrity testing is a trouble-shooting tool for determining the cause of leakage in tangential flow systems, and the newsletter includes an easy-to-follow procedure. **Filtron Technology. Circle 149.**

Capillary Electrophoresis (HPCE) Columns describes a line of columns for this technique for the separation of a wide variety of biomolecules and pharmaceuticals. **Phenomenex. Circle 150.**

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.

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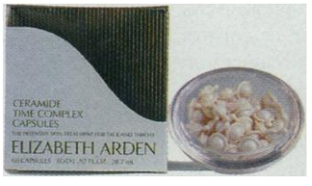
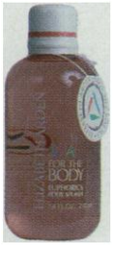


a part of everyday life, in every



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Naturally, Unilever offers the salaries, comprehensive benefits and advancement opportunities you'd expect from a global leader. If you can see yourself having an impact on the way the world lives, we'd like to see you. Send your resume to: James R. Conti, Unilever Research U.S., 45 River Road, Edgewater, NJ 07020. Equal Opportunity Employer.

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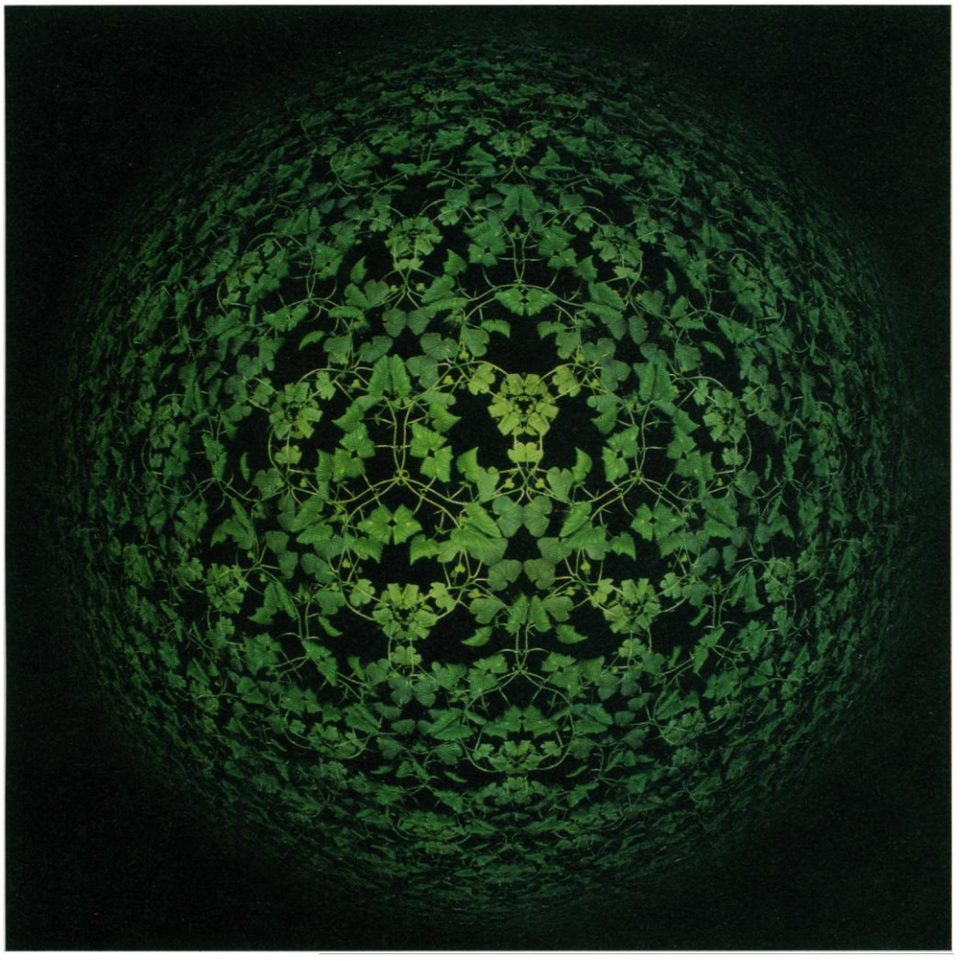
Nature's seemingly bewildering diversity, once examined, reveals an exquisite economy of design and mechanism. Exploring this systematic maze of intrigue and decoding the underlying order requires the focused attention of highly intelligent and motivated scientists in an environment rich in the sophisticated technologies of a global corporation. An environment where a passionate spirit of challenge thrives on mutual support and professional integrity.



Shigeru Tanaka, kaleidoscope photography 1990.

This is the environment of SmithKline Beecham Pharmaceuticals Research and Development. Our history has been marked by pioneer discoveries including the phenothiazine tranquilizers, the H_2-receptor antagonists for gastrointestinal diseases, the identification of the 6-APA nucleus for beta-lactam antibiotics, the creation of the semi-synthetic penicillins, the first successful development of the ß-lactamase inhibitors to circumvent bacterial resistance and the development of the world's first commercially available, genetically-engineered human vaccine against hepatitis B. These accomplishments have been recognized by the award of a Nobel Prize and fourteen Queen's Awards in the U.K. since 1966.

We look to the future with great optimism and the opportunity to explore the yet unrevealed panorama of nature's challenge and the quest for superior therapeutics. If you feel strongly about pursuing your career in a progressive environment, please send your resume to: SmithKline Beecham Pharmaceuticals, Research & Development, Dept. S9/23, P.O. Box 401, Conshohocken, PA 19428. An Equal Opportunity Employer, M/F/D/V.

SB

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do learn get MORE

out of their careers

If you're ready to do more with your BS or MS in the sciences, you'll want to look into Johnson & Johnson. Our goal has always been to provide our employees with the opportunities they need to achieve their personal career objectives. This commitment is evidenced today through a variety of programs — including in-house training, tuition assistance and job posting — that help our people continually learn more and get more out of their careers.

Opportunities are often available at locations throughout the country for individuals with BS/MS degrees, and typically include:

Assistant Scientists

Requires 0-2 years' experience in a microbiology setting, pharmaceutical QA experience and a BA/BS in Microbiology.

Research Assistants

Requires a BS/MS in Biology and 0-5 years of experience with a background in pharmacology, cell biology and protein biochemistry. Also requires experience conducting *in vivo* and *in vitro* experiments and the ability to prepare enzymes, and develop and maintain biochemical assays.

Associate Scientists

Positions require 0-3 years of lab experience and a BS/BA in Chemistry with the ability to analyze pharmaceutical products and raw materials, assist in developing and improving assay methods, and perform stability studies.

Regulatory Affairs

These positions require 2-5 years of regulatory affairs experience. A background in IDE/PMA or IND/NDA/ANDA is preferred. Experience in cardiovascular interventional or diagnostic divices is desired

QA Associates

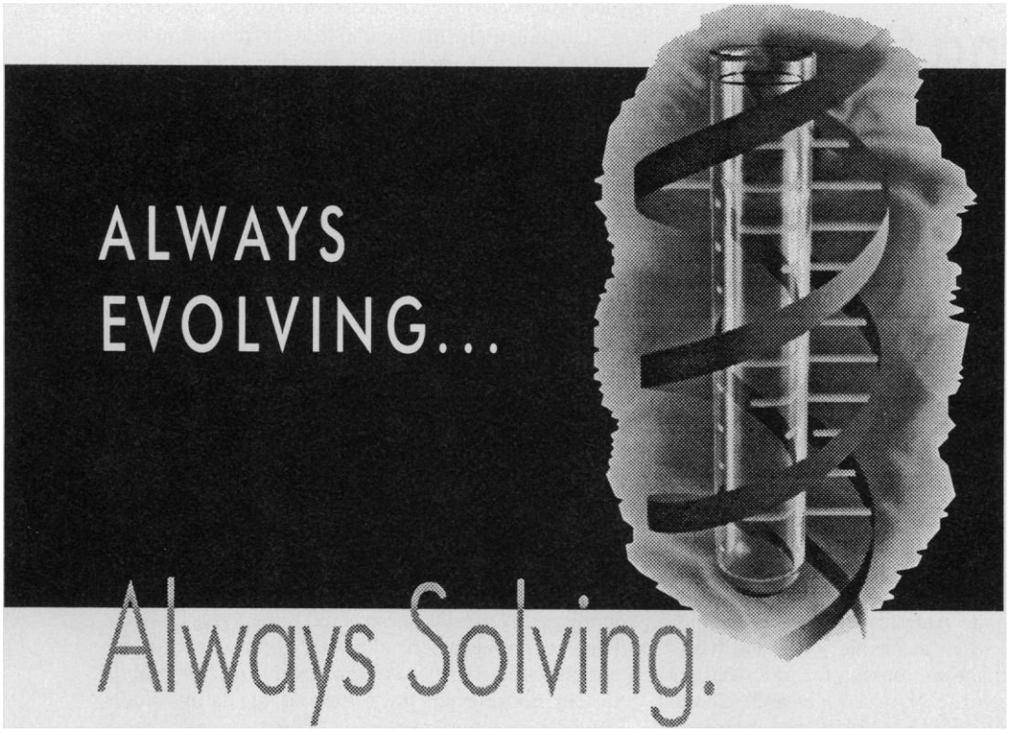
You should have 0-3 years' experience in the pharmaceutical industry, a working knowledge of GLP/GMP, and a BS in Chemistry to qualify for these positions. GC/HPLC experience desired.

Medical Writers

A minimum of 3-5 years' experience in pharmaceutical R&D, including experience in the preparation and review of clinical documents for regulatory submission, and a BS in the biological sciences are required for these positions.

In addition to an excellent compensation and benefits package, Johnson & Johnson offers a LIVE FOR LIFE Wellness Program with on-site fitness centers, smoke-free workplaces in campus-like settings, and programs that can help you balance your work life with your family life. To apply for these or future opportunities with the Johnson & Johnson family of companies, send your resume suitable for scanning into our state-of-the-art database (i.e, clean/clear, no graphics, and preferably unfolded) to; Dept. 65, Johnson & Johnson Recruiting, Employment Management Center, P.O. Box 16597, New Brunswick, NJ 08906-6597. We are an equal opportunity employer and support diversity in the work place.

Johnson & Johnson



Gen-Probe is changing the way medicine is practiced through the continual evolution of genetic probe-based technology. Today, we are the acknowledged leader in DNA probe diagnostics, with more FDA-cleared DNA probe products than any other company.

At Gen-Probe, improving technology is a non-stop pursuit. We continue to build upon our leadership position by using our patented and proprietary technologies to develop, manufacture and market new products while making existing tests faster, more sensitive and easier to use.

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As one of the few emerging biotech companies that is profitable and has proven R&D, manufacturing, marketing and sales skills, Gen-Probe will continue to grow and prosper based on our sound technology, our philosophy of innovation and our ability to improve existing products while developing new ones.

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New NIH Tenure-Track Pathway.

Positions Equivalent To Assistant Professor.

A new tenure-track pathway has been created within the intramural program of the National Institutes of Health to provide an opportunity for outstanding candidates completing postdoctoral training to establish themselves as independent investigators. Successful applicants for tenure-track positions will be provided with a long-term commitment of salary, personnel and other research resources needed to conduct an independent research program. The following positions are available at a level equivalent to that of an Assistant Professor:

Biochemistry of Membrane Transporters
Michael M. Gottesman, MD

Position available to develop an independent research program on the biochemistry of energy-dependent plasma membrane transport systems to complement on-going research on drug transporters. Resources include laboratory space, shared facilities, and a budget to support two postdoctoral fellows. PhD or MD degree and a minimum of three years experience in purification and analysis of membrane transporters required. Laboratory of Cell Biology (OE-54), NCI, Building 37, Room 1B22, 37 CONVENT DR MSC 4255, BETHESDA MD 20892-4255.

Cell Biochemistry and Biology
John A. Hanover, PhD

Position available to develop an independent research program to complement ongoing projects dealing with nuclear transport, signal transduction, and intracellular trafficking of proteins and lipids. Candidates should have experience in biochemistry, cell biology, and molecular biology. A fully instrumented light and electron microscopy facility exists in the laboratory which will be available to the tenure-track scientist. Laboratory of Cell Biochemistry and Biology (OE-54), NIDDK, Building 8, Room 402, 8 CENTER DR MSC 1800, BETHESDA MD 20892-1800.

Cell and Developmental Biology
Robert T. Simpson, MD, PhD

Talented scientist sought to complement strong programs in developmental and cell biology. Research currently encompasses chromatin structure and gene regulation in *Saccharomyces* (R.T. Simpson), hormonal control of adipocyte metabolism (C. Londos), preimplantation embryogenesis in mice (J. Dean), cAMP control of gene expression during development of *Dictyostelium* (A. Kimmel), protein folding (R.W. Hartley) and control of embryonic globin expression (A. Dean). Within this eclectic group of experimental systems, exists a common thread of interest in gene regulation. Laboratory of Cellular and Developmental Biology (OE-54), NIDDK, Building 6, Room B1-26, 6 CENTER DR MSC 2715, BETHESDA MD 20892-2715.

Kidney Diseases
James E. Balow, MD

Position available to develop an independent research program in progressive kidney diseases. Candidates must have an MD degree and be qualified as a clinical nephrologist. Expertise in current methods in molecular biology/pathology, as well as in design and execution of clinical studies is required. In addition to appropriate laboratory space and equipment, support by up to two postdoctoral fellows and a technician will be provided. Candidates will be evaluated for tenure within a period not to exceed six years. Kidney Diseases Section (OE-54), NIDDK, Building 10, Room 9N222, 10 CENTER DR MSC 1818, BETHESDA MD 20892-1818.

Neurobiology
Edward H. Oldfield, MD

Position available to conduct research on new biological approaches to the treatment of Parkinson's disease and other CNS disorders using animal models. Candidate must have a PhD and/or MD with previous postdoctoral experience in neurobiology, molecular biology, advanced histologic techniques, quantitative autoradiography, cell culture and high pressure liquid chromotography. Candidate will direct the daily activities of a busy laboratory and work as part of a multidisciplinary team studying disease processes affecting the CNS and the basic neurobiology of neural recovery and repair. Surgical Neurology Branch (OE-54), NINDS, Building 10, Room 5D37, 10 CENTER DR MSC 1414, BETHESDA MD 20892-1414.

Neurobiology/Experimental Gene Therapy
Edward H. Oldfield, MD

Position available to conduct research on the applications of gene therapy for the treatment of CNS tumors and other neurological disorders. Candidate must have a PhD and/or MD with previous postdoctoral experience in molecular biology and histology. A strong background or interest in neurobiology, animal models for disease, and the development of *in vivo* therapies required. Duties include directing the daily activities of a busy laboratory. Surgical Neurology Branch (OE-54), NINDS, Building 10, Room 5D37, 10 CENTER DR MSC 1414, BETHESDA MD 20892-1414.

Signal Transduction
Allen M. Spiegel, MD

An opportunity is available to develop an independent, first-rate research program that complements ongoing research on the structure and function of G proteins and G protein-coupled receptors. Individuals of the highest caliber with a research interest in signal transduction, preferably related to G proteins, and with substantial experience in biochemistry and molecular biology should apply. Metabolic Diseases Branch (OE-54), NIDDK, Building 10, Room 9N222, 10 CENTER DR MSC 1818, BETHESDA MD 20892-1818.

To Apply

Please send a cover letter, *curriculum vitae,* bibliography, and a two-page statement including research interests and career goals to the address listed with each position. In addition, please arrange to have letters of reference sent from three scientists who can provide an evaluation of your qualifications. If you have additional questions about the intramural program, please contact Dr. Michael Fordis, Director, Office of Education, Building 10, Room 1C129, 10 CENTER DR MSC 1158, BETHESDA MD 20892-1158, 301-496-2427, Fax 301-402-0483.

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National Institutes Of Health

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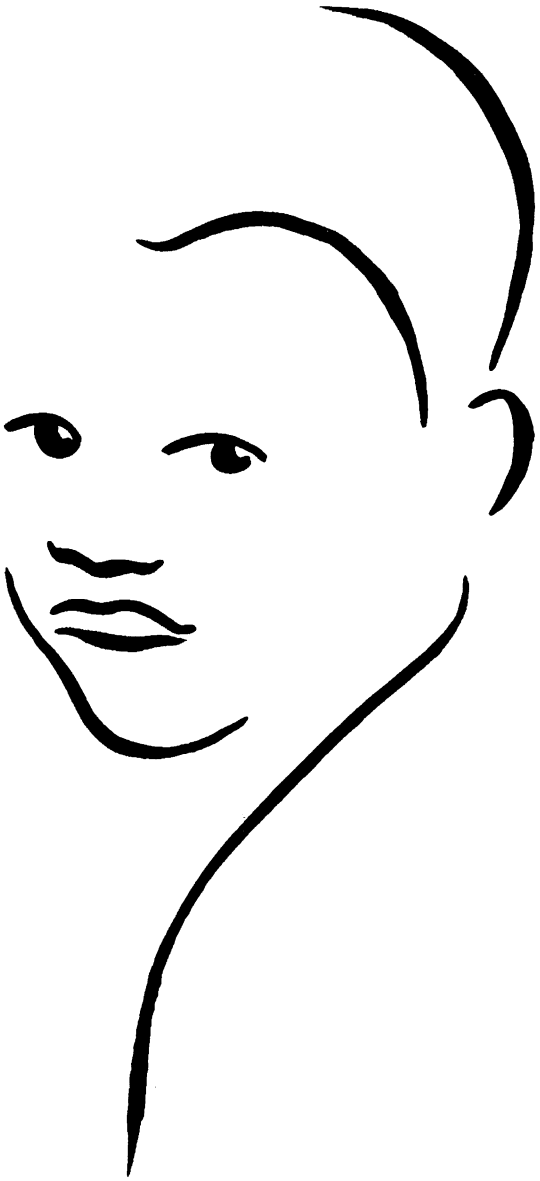
BS/MS Opportunities



Picture a boy of six. A boy whose life takes on dramatic improvement. A boy whose diabetes is now easily managed through an oral drug taken only once a day. Now picture someone else. Imagine a life that's been extended. Or saved. Or a life that, thanks to new medication, no longer includes chronic pain or the need for invasive surgery.

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Our work is to provide new and better pharmaceutical answers to real-life needs. At magnificent state-of-the-art laboratories in seaside Connecticut, our multidisciplinary research teams focus on developing unique drug therapies to treat: • inflammatory diseases, such as arthritis • cardiovascular diseases • infectious diseases such as AIDS • central nervous system disorders • diabetes • cancer • and parasitic and infectious diseases in livestock and poultry.

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- **Molecular Biology**
- **Organic Chemistry**
- **Pathobiology**
- **Peptide Chemistry**
- **Pharmacokinetics**
- **Pharmacy**
- **Protein Chemistry**
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As well as experiencing interaction with one of the world's finest corporate scientific communities, you will enjoy the many cultural, recreational and educational advantages easily accessible to our southeast Connecticut location. Relocation assistance is available. Please send detailed resume to: Employee Resources, Pfizer Inc, Central Research Division, Eastern Point Road, Groton, CT 06340. An equal opportunity employer.

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Central Research

Howard Hughes Medical Institute

Fellowships for Biological and Biomedical Sciences

The Howard Hughes Medical Institute announces the 1995 competitions for fellowship programs that support training in fundamental biological and biomedical research. Awards, based on international competitions, focus on research directed to understanding basic biological processes and disease mechanisms. Fellowships may be held at academic or nonprofit research institutions.

Predoctoral Fellowships in Biological Sciences

Up to five years of support for full-time graduate study toward a Ph.D. degree in biostatistics, cell biology and regulation, epidemiology, genetics, immunology, neuroscience, or structural biology. Applicants must not have completed the first year of postbaccalaureate graduate study in biology. *Application deadline: early November.*

Postdoctoral Research Fellowships for Physicians

Three years of support for training in fundamental research subsequent to at least two years of postgraduate clinical training and no more than two years of postdoctoral research training. *Application deadline: early January.*

Research Training Fellowships for Medical Students

An opportunity for medical students in the United States to explore a burgeoning interest in fundamental research. Support is awarded for one year of full-time fundamental research in a laboratory at the student's medical school or another institution (except NIH in Bethesda, Maryland). *Application deadline: early December.*

Research Scholars at the National Institutes of Health

Under this joint HHMI–NIH program, medical students in the United States spend an intensive year in research in the intramural program at NIH in Bethesda, Maryland. Residence is provided at the Cloister on the NIH campus. *Application deadline: early January.*

1995 Program Announcements and Applications

For Predoctoral Fellowships:

Hughes Fellowship Program
The Fellowship Office
National Research Council
2101 Constitution Avenue
Washington, DC 20418
United States of America
Telephone: (202) 334-2872
Fax: (202) 334-3419
E-mail: infofell@nas.edu

For Other Programs:

Howard Hughes Medical Institute
Office of Grants and Special Programs
Department AL95
4000 Jones Bridge Road
Chevy Chase MD 20815-6789
United States of America
Telephone: (301) 215-8889
Fax: (301) 215-8888
Internet: fellows@hhmi.org

The Howard Hughes Medical Institute, an Equal Opportunity Employer, welcomes applications from all qualified candidates and encourages women and members of minority groups to apply.

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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. Fueling the pipeline, are R&D programs addressing blood cell growth and differentiation, coagulation, tissue growth and repair and immune modulation among others.

Our success as the largest biotechnology employer in Massachusetts is greatly fueled by our collaborative work environment driven by values and focused on the future. It attracts and inspires some of the brightest people whose ideas establish us as a leader.

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- **Preclinical Research**
- **Small Molecule Drug Discovery**
- **Clinical Development**

Please respond to: **Job Code: 94-923-SCI.**

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Senior Scientist/Lab Head

Senior Scientist to head the Mammalian Cell Expression group and to direct the group's ongoing research program into improved systems for the expression of recombinant genes in CHO cells. In addition, this individual will direct studies in the development of immortal cell lines from primary tissues for use in the identification and functional analysis of novel therapeutic proteins.

A PhD with at least 5 years of experience is required, with a strong background in mammalian cell biology and a good understanding of mammalian cell expression technology. Some supervisory experience would be an advantage. **Job Code: 94-C641-SCI.**

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Staff Scientist

Investigate immunologic activities of an exciting cytokine: IL-12. The ideal candidate will have a PhD with 3-5 years' experience in cellular immunology, including emphasis on T cell function and activation. Experience with molecular biology techniques would also be desirable. The candidate should be team oriented, but able to independently direct a research program. **Job Code: 94-C559-SCI.**

Please send or fax resume, indicating appropriate Job Code, to: Human Resources Department, Genetics Institute, Inc., 87 CambridgePark Drive, Cambridge, MA 02140. Fax: (617) 876-8847.

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. Genetics Institute is dedicated to building strength through diversity.

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Harnessing the Body's Power to Heal™

HUMAN GENETICS

TRANSLATING KNOWLEDGE INTO THERAPIES

Mercator Genetics is an emerging biopharmaceutical company leading the commercialization of recent advances in human genetics. The company is pioneering the discovery of new human therapeutic and diagnostic products for common diseases based upon the fundamental role that specific genes play in these serious diseases.

SENIOR SCIENTISTS

Positions are available for established scientists who can assume responsibility for the management and completion of high profile projects. Qualified candidates will possess a Ph.D. or M.D. and have a strong record in human molecular genetics and related areas of research . A minimum of four years of supervisory experience following a Post Doctorate is required.

(JOB# S-0923-SS)

SCIENTISTS

Positions are available for scientist with a Ph.D. and Post Doctoral experience in human molecular genetics, molecular biology, cell biology or related research. Mercator has established a dynamic group of scientists and is looking for creative individuals to make significant contributions to our team.

(JOB# S-0923-S)

Positions are also available for Post Doctorates with molecular biology, cell biology, human genetics or related experience.

(JOB # S-0923-PD)

RESEARCH ASSOCIATES

Positions are available for experienced research personnel. Backgrounds should include BS/MS in Human Genetics, Molecular Biology, Cell Biology or related fields. Qualified candidates will have at least two years lab experience and should be well versed in several of the following disciplines: cloning, library construction and screening, Southern hybridization, tissue culture, PCR, and DNA sequencing. Specific experience with automated sequencers and UNIX highly desirable.

(JOB # S-0923-RA)

BIOINFORMATICS

Scientist/Mathematician
A position exists for an experienced scientist/ mathematician with a Ph.D. in mathematics to provide computational solutions associated with human genetic analysis. You will develop algorithms for DNA sequence analysis, gene prediction and statistical disequilibrium calculations. Experience in UNIX, human genetic analysis and demonstrated programming skills required.

(JOB# S-0923-BS)

In addition to an exciting and challenging research environment, Mercator offers competitive salaries and benefits, employee stock option plan, and an attractive San Francisco Bay Area location. For consideration, please send resume with cover letter to: Mercator Genetics, Inc. Human Resources Department - Job#, 4040 Campbell Ave., Menlo Park, CA 94025. Mercator Genetics is an Equal Opportunity Employer.

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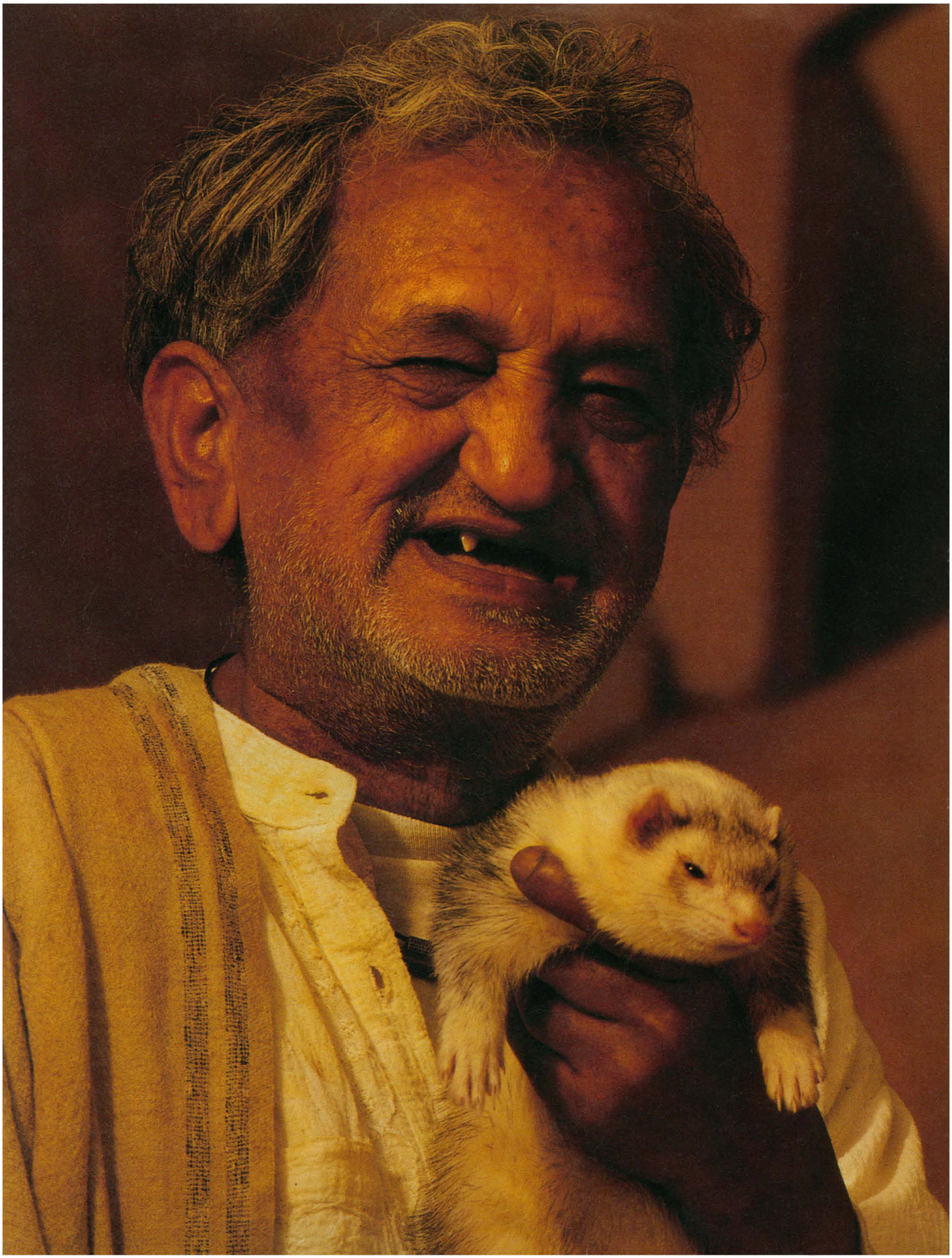

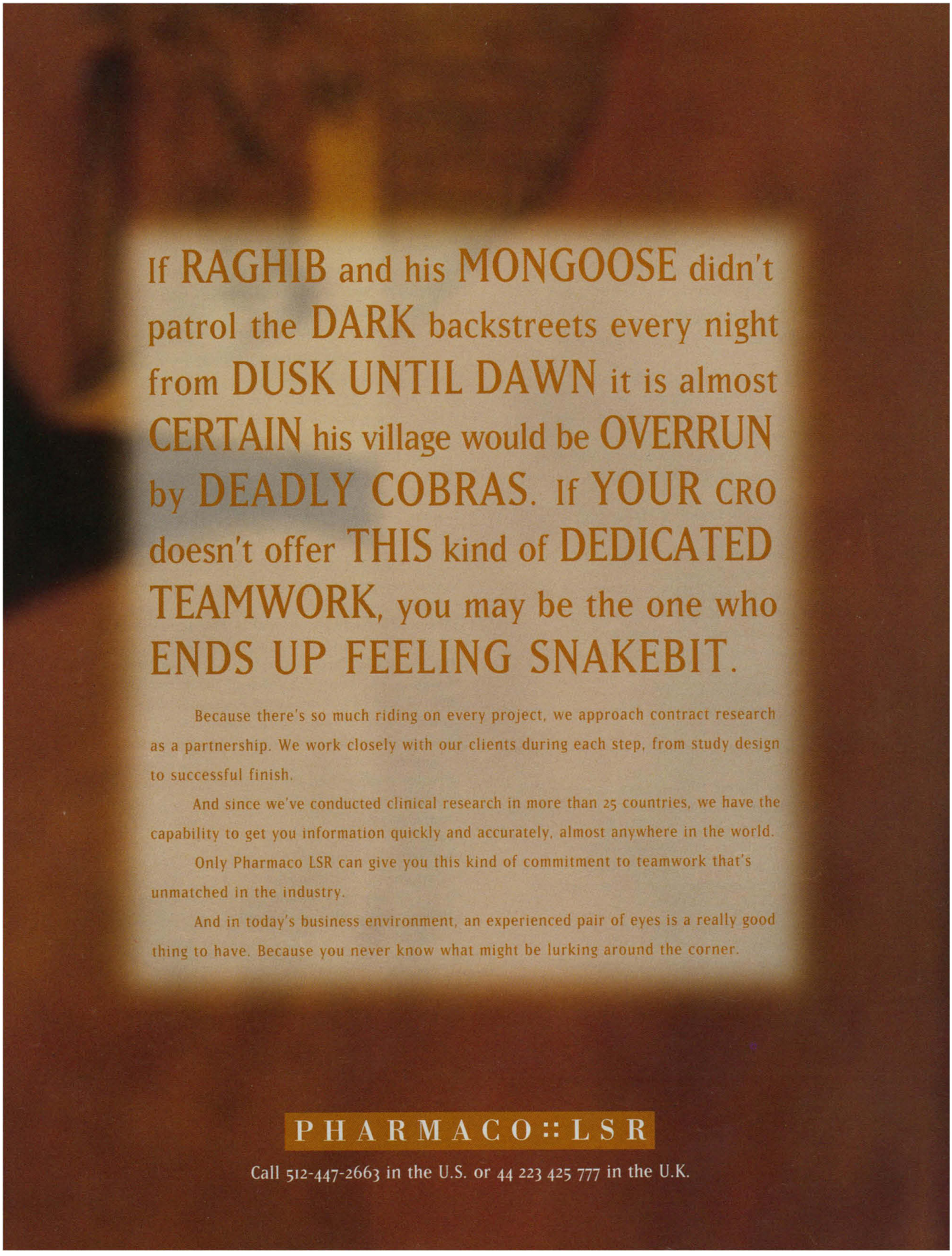
If RAGHIB and his MONGOOSE didn't patrol the DARK backstreets every night from DUSK UNTIL DAWN it is almost CERTAIN his village would be OVERRUN by DEADLY COBRAS. If YOUR CRO doesn't offer THIS kind of DEDICATED TEAMWORK, you may be the one who ENDS UP FEELING SNAKEBIT.
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AMERICAN ASSOCIATION FOR CANCER RESEARCH
86th Annual Meeting

Donald S. Coffey, Program Chairperson

Metro Toronto Convention Centre, Toronto, Ontario, Canada

March 18-22, 1995

Titles of Major Sessions

(Confirmed Chairpersons in Parentheses)

PLENARY SESSION

An Integrated View of the Cancer Cell (Donald S. Coffey)

SYMPOSIA

The Cell Cycle and Tumor Suppressor Genes (Thea D. Tlsty)

DNA Damage and Repair (Philip C. Hanawalt)

Natural Products in Chemoprevention (Michael B. Sporn)

Ribozymes and Antisense Oligonucleotides and the Alteration of Gene Expression (Kevin J. Scanlon)

Genetic Susceptibility to Cancer (Kenneth W. Kinzler)

Environmental Carcinogens and Their Impact (Kenneth Olden)

Cell Surface Glycosylation Defining Malignancy (Sen-itiroh Hakomori)

Peripheral Stem Cells and High-Dose Chemotherapy

Apoptosis (Alan R. Eastman)

Biology of Radiation Oncology (H. Rodney Withers and additional chairperson to be announced)

Biomarkers of Carcinogenesis (David Sidransky)

Transcription Factors and Carcinogenesis (Frank J. Rauscher)

Gene Therapy in Cancer Clinical Trials

Telomeres and Telomerases (Carol W. Greider and Jerry W. Shay)

Extracellular Matrix, Gene Expression, and Cell Signalling (Hynda K. Kleinman)

Mechanistic Basis for Ethnic Differences in Cancer Risk

Signal Transduction and Gene Control and Development (James E. Darnell)

Angiogenesis (Judah Folkman and Adrian L. Harris)

Genes, Development, and Cancer (Eric N. Olson)

Growth Factors, Their Receptors, and Differentiation (Angie Rizzino)

New Strategies and Targets for Chemotherapy (Joseph R. Bertino and Eddie Reed)

Genetic Approaches to Invasion and Metastasis (Robert S. Kerbel and Patricia S. Steeg)

Immunotherapy: Tumor Vaccines (David A. Berd)

Graft *versus* Tumor Effects

Dietary Intervention in Hormonal Carcinogenesis (Diane F. Birt and Lovell A. Jones)

The Role of Stromal-Epithelial Interactions in Growth and Neoplasia (Leland W. K. Chung)

Cancer Prevention and Intermediate Biomarkers (Peter Greenwald)

Translational Research in Breast Cancer

DNA Methylation (Peter A. Jones and Stephen B. Baylin)

METHODS WORKSHOPS

General, *In Situ*, and Quantitative PCR (including Differential Display)

Gene Targeting: Transgenics and Knockouts

CONTROVERSY SESSIONS

Are Estrogens Implicated in Breast Cancer?

Is Mammography Before Age 50 Beneficial?

What Are the Limits and Benefits of the PSA Assay?

Breast Cancer Prevention: What Will We Advise Women with BRCA1?

What Are the Risks of Electromagnetic Fields in Causing Cancer?

Is Bone Marrow Transplantation Indicated for Breast Cancer?

MEET-THE-EXPERT SUNRISE SESSIONS

New Developments in Clinical Pharmacology (Merrill J. Egorin)

Site-specific Gene Expression in Transgenic Animals (Norman Greenberg)

Organ-specific Carcinogenesis (Cheryl Lyn Walker)

Modeling and Analyzing Clinical Trials (Steven Piantadosi)

Multivariate Determinants of Radiocurability

Multidrug Resistance (Victor Ling)

Cytokines, Vaccines, and Gene Therapy (Jonathan W. Simons)

Tyrosine Kinases and Phosphatases

Prostate Cancer (John T. Isaacs)

Lung Cancer

Colon Cancer

Pediatric Malignancies (Joseph V. Simone)

Hematological Malignancies

Stem Cell Transplantation (Elizabeth J. Shpall)

Epidemiology and Cancer Prevention (Elizabeth W. Newcomb)

Is a Mutagenic Event Involved in Initiation? (Ann R. Kennedy)

Glutathione S-Transferase

Farnesyl Transferase as a Target for Therapy (Alexander W. Wood)

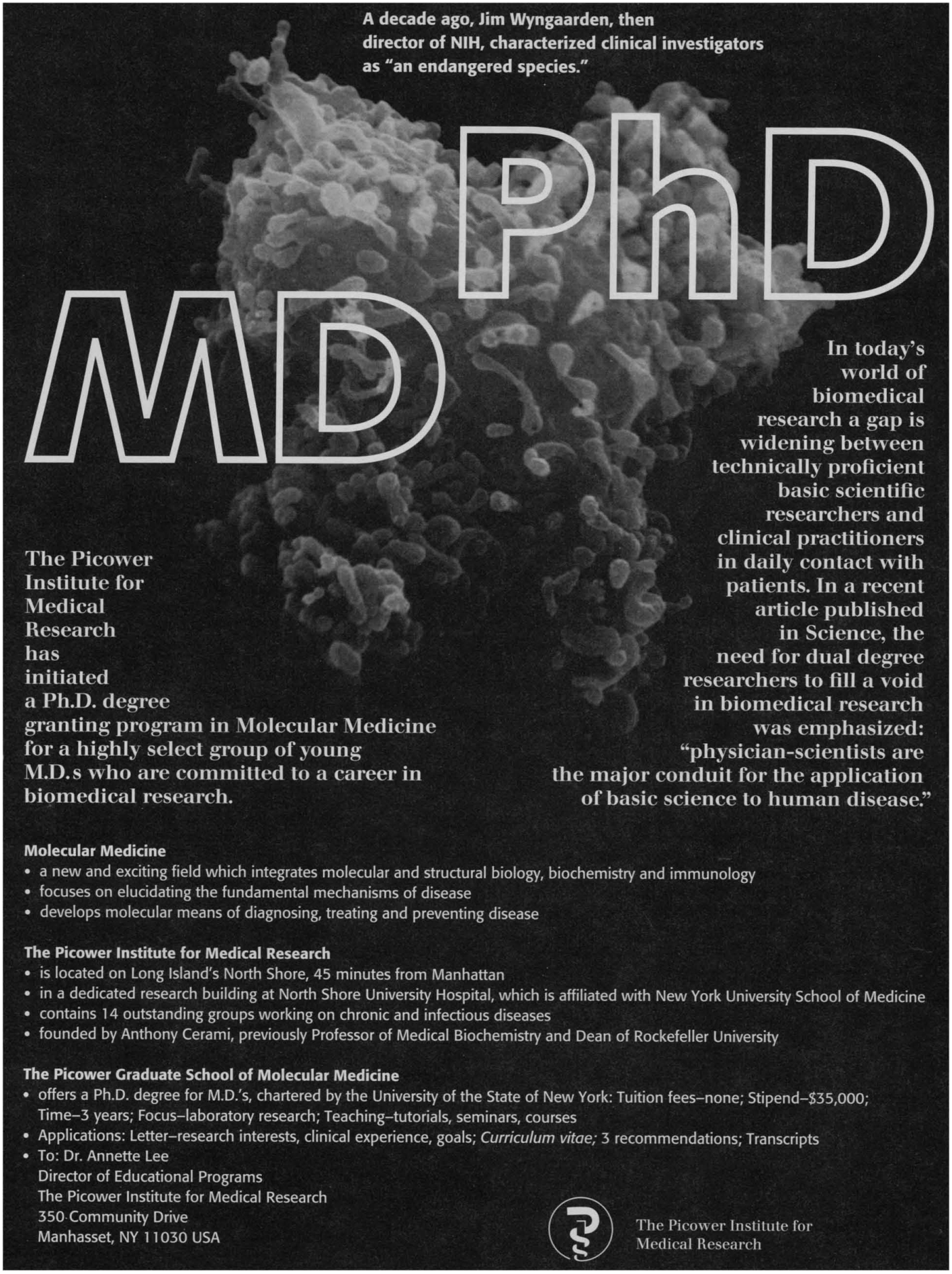
Liver Cancer Etiology and Prevention (John D. Groopman)

Biochemical Determinants of Carcinogenesis (Allan B. Okey)

EDUCATIONAL WORKSHOPS

To Be Announced

Abstract Deadline: October 14, 1994. Further Information: AACR Office • Public Ledger Building • Suite 816
150 S. Independence Mall West • Philadelphia, PA 19106-3483 • **TELEPHONE** (215) 440-9300 • **FAX** (215) 440-9313


A decade ago, Jim Wyngaarden, then director of NIH, characterized clinical investigators as "an endangered species."
MD PhD
In today's world of biomedical research a gap is widening between technically proficient basic scientific researchers and clinical practitioners in daily contact with patients. In a recent article published in Science, the need for dual degree researchers to fill a void in biomedical research was emphasized: "physician-scientists are the major conduit for the application of basic science to human disease."
The Picower Institute for Medical Research has initiated a Ph.D. degree granting program in Molecular Medicine for a highly select group of young M.D.s who are committed to a career in biomedical research.
Molecular Medicine
• a new and exciting field which integrates molecular and structural biology, biochemistry and immunology
• focuses on elucidating the fundamental mechanisms of disease
• develops molecular means of diagnosing, treating and preventing disease
The Picower Institute for Medical Research
• is located on Long Island's North Shore, 45 minutes from Manhattan
• in a dedicated research building at North Shore University Hospital, which is affiliated with New York University School of Medicine
• contains 14 outstanding groups working on chronic and infectious diseases
• founded by Anthony Cerami, previously Professor of Medical Biochemistry and Dean of Rockefeller University
The Picower Graduate School of Molecular Medicine
• offers a Ph.D. degree for M.D.'s, chartered by the University of the State of New York: Tuition fees–none; Stipend–$35,000; Time–3 years; Focus–laboratory research; Teaching–tutorials, seminars, courses
• Applications: Letter–research interests, clinical experience, goals; Curriculum vitae; 3 recommendations; Transcripts
• To: Dr. Annette Lee
Director of Educational Programs
The Picower Institute for Medical Research
350 Community Drive
Manhasset, NY 11030 USA
The Picower Institute for Medical Research

Wadsworth Center

Staff Scientist Positions

The Wadsworth Center is the multidisciplinary basic research and public health laboratory of the New York State Department of Health. Its staff of over 800 includes 170 doctoral level scientists housed in modern research facilities located in Albany, New York. Core technical facilities in biochemistry, ultra structural analysis, immunology, molecular genetics (including transgenics) and information resources ensure state-of-the-art equipment and laboratory services. Qualified staff are eligible for faculty appointment in the School of Public Health, State University of New York. Applications are invited for tenure track positions at various levels.

Molecular Epidemiology

Areas of interest include biological markers of xenobiotic exposure, effect and susceptibility, e.g., protein/DNA adducts, oncogene activation/tumor suppressor gene activation, and somatic cell mutations. Investigators will participate in population-based studies to better define health risks associated with environmental exposures and will develop an independent research program. **Dr. L. Kaminsky**, Search Committee Chair.

Immunology

Applications are invited from investigators with active research in chemical modulation of the immune system. The orientation is on mechanisms by which drugs and toxicants alter health, with emphasis on cell and molecular biology of the immune system and interactions with reproductive and nervous systems. An independent research program and interaction with interdisciplinary groups are expected. **Dr. D. Lawrence**, Search Committee Chair.

Environmental Microbiology

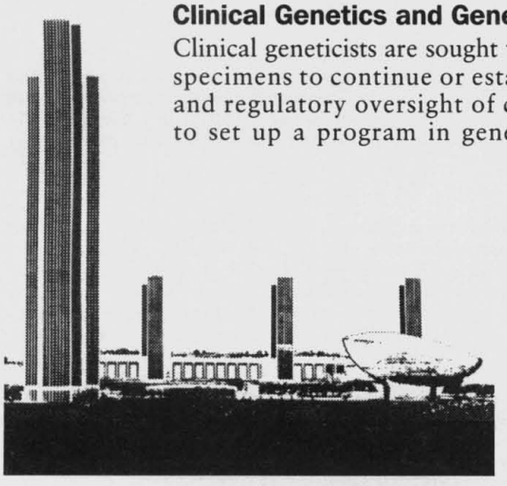
An individual is sought to direct a laboratory investigating molecular methods of identification of environmental microbes, physiology of cyanobacteria, biodegradation of xenobiotics, fermentation in anaerobic microbial ecosystems and structure-function relationships in microbial consortia. The candidate is expected to have a nationally recognized research program in contemporary environmental microbiology. **Dr. H. Taber**, Search Committee Chair.

Molecular Endocrinology and Neurobiology

Research scientists are sought to investigate the molecular genetics of defects in metabolism or reproduction; also, to investigate fundamental problems of the nervous system, such as development, cell death and signalling mechanisms, using the approaches of molecular biology. Candidates are expected to implement independent research programs. **Dr. David Martin**, Search Committee Chair

Developmental and Human Molecular Genetics

Applications are invited from investigators concentrating in: developmental genetics of humans or model organisms, especially the genetic mechanism of developmental diseases; and human molecular genetics, chromosome and/or gene structure, or gene expression. Candidates are expected to establish independent research programs. **Dr. Lorraine Flaherty**, Search Committee Chair.



Clinical Genetics and Genetic Epidemiology

Clinical geneticists are sought with expertise in cytogenetics and/or DNA analysis of human specimens to continue or establish a new laboratory responsible for diagnostic reports and regulatory oversight of clinical genetic laboratories. Other candidates are sought to set up a program in genetic epidemiology that will interface with the Newborn Screening Program, cytogenetics and DNA testing laboratories and researchers in human molecular genetics. **Dr. Ann Willey**, Search Committee Chair.

Applicants must have a doctoral degree and at least several years post-doctoral experience. A curriculum vitae with a description of career goals and the names of three references should be sent to the appropriate Search Committee Chair, Wadsworth Center, New York State Department of Health, PO Box 509, Albany, New York. 12201-0509. Applications will be accepted through December 31, 1994. *The Wadsworth Center is an affirmative action/equal opportunity employer. Women and minorities are encouraged to apply.*

CDC

CENTERS FOR DISEASE CONTROL AND PREVENTION

NIOSH

National Institute for Occupational Safety and Health

Chief, Toxicology and Molecular Biology Research Branch. The National Institute for Occupational Safety and Health (NIOSH) within the Centers for Disease Control and Prevention (CDC), is seeking applications for the Chief of the Toxicology and Molecular Biology Research Branch (TMBRB) within the newly created Health Effects Laboratory Division. The purpose of TMBRB is the development of new, innovative and molecular programs which examine the toxic effects of workplace exposures/agents on human, animal and cellular systems. This includes the leadership of the following specialized areas: toxicology, including immunotoxicology, neurotoxicology, genetic and reproductive toxicology; microbiology, including bacteriology, mycology, parasitology, and virology; cellular and molecular biology; immunology; and animal and human biology.

NIOSH is searching for a leader in the field of occupational safety and health who has the ability to direct a highly technical scientific research program which develops strategies to identify, prevent, ameliorate, and control occupational diseases. This program has national and international effect in that it deals with occupational hazards found in virtually all facets of employment within the United States and abroad. The ability to interact with representatives of other Federal, state and local agencies, labor groups, private industry, foreign occupational health organizations, and academia is required. An MD/Ph.D. is desirable. CDC/NIOSH is an equal opportunity employer and offers a smokefree environment. Please send resumes or requests for additional information regarding this position to the Morgantown Human Resources Office, NIOSH, 1095 Willowdale Road, Morgantown, West Virginia 26505.

Chief, Exposure Assessment Branch. The National Institute for Occupational Safety and Health (NIOSH) within the Centers for Disease Control and Prevention (CDC), is seeking applications for the Chief of the Exposure Assessment Branch (EAB) within the newly created Health Effects Laboratory Division. The purpose of EAB is to develop and establish new and innovative programs which examine the toxic effects of workplace airborne particulates and chemical, physical and biological agents and exposures. This position supervises a group of the following specialized areas: toxicology, microbiology, industrial hygiene, chemistry, etc. This program has national and international effect in that it deals with occupational hazards found in virtually all facets of employment within the United States and abroad.

NIOSH is searching for a leader in the field of occupational safety and health who has the ability to direct a substantial segment of a highly technical scientific research program which develops strategies to identify, prevent, ameliorate, and control occupational diseases. The ability to interact with representatives of other Federal, state and local agencies, labor groups, private industry, foreign occupational health organizations, and academia is required. An MD/Ph.D. is desirable. CDC/NIOSH is an equal opportunity employer and offers a smokefree environment. Please send resumes or requests for additional information regarding this position to the Morgantown Human Resources Office, NIOSH, 1095 Willowdale Road, Morgantown, West Virginia 26505.

Chief, Analytical Support Branch. The National Institute for Occupational Safety and Health (NIOSH) within the Centers for Disease Control and Prevention (CDC), is seeking applications for the Chief of the Analytical Support Branch (ASB) within the newly created Health Effects Laboratory Division. The purpose of ASB is to provide analytical services to all workplace and laboratory studies performed at NIOSH which are used by NIOSH research and service programs in the development of strategies to identify, prevent, and control workplace hazards and occupational disease. The position supervises a state-of-the-art analytical laboratory staffed with a team of professionals of various specialties which provide a wide range of analytical services for NIOSH programs, such as: agriculture; biotechnology; construction; indoor air quality; infectious diseases, etc. NIOSH research and the resulting recommendations, which are predicated in part upon the laboratory analysis conducted by this Branch, directly influence the health and well-being of workers around the country.

NIOSH is searching for a leader in the field of occupational safety and health who has the ability to plan, direct, and execute the analytical activities and services of the Branch and provide overall guidance to a staff of highly qualified research personnel. The ability to interact with representatives of other Federal, state and local agencies, labor groups, private industry, and academia is required. An MD/Ph.D. is desirable. CDC/NIOSH is an equal opportunity employer and offers a smokefree environment. Please send resumes or requests for additional information regarding this position to the Morgantown Human Resources Office, National Institute for Occupational Safety and Health, 1095 Willowdale Road, Morgantown, West Virginia 26505.

Chief, Engineering and Control Technology Branch. The National Institute for Occupational Safety and Health (NIOSH) within the Centers for Disease Control and Prevention (CDC), is seeking applications for the Chief of the Engineering and Control Technology Branch (ECTB) within the newly created Health Effects Laboratory Division. The purpose of ECTB is to develop and establish engineering solutions for the control of occupational disease including the development of personal protective equipment, computerized workplace simulations, mathematical models, industrial fabrication and systems for preventing/minimizing worker exposure to hazardous chemical, biological, and physical agents. The position directs a substantial segment of a highly technical scientific research program which develops strategies to identify, prevent, ameliorate, and control occupational diseases.

NIOSH is searching for a leader in the field of occupational safety and health who has the ability to plan, direct, and execute the engineering activities and services of the Branch and provide overall guidance and direction for this program to a staff of highly qualified professional personnel. The ability to interact with representatives of other Federal, state and local agencies, labor groups, private industry, foreign occupational health organizations, and academia is required. An MD/Ph.D. is desirable. CDC/NIOSH is an equal opportunity employer and offers a smokefree environment. Please send resumes or requests for additional information regarding this position to the Morgantown Human Resources Office, NIOSH, 1095 Willowdale Road, Morgantown, West Virginia 26505.

Chief, Pathology and Physiology Research Branch. The National Institute for Occupational Safety and Health (NIOSH), within the Centers for Disease Control and Prevention (CDC), is seeking applications for the Chief of the Pathology and Physiology Research Branch (PPRB) within the newly created Health Effects Laboratory Division. The purpose of PPRB is to examine the effects of workplace exposures on human and animal body functions through the use of state-of-the-art research methods and approaches in a focused, applied and preventive multi-faceted laboratory program. The position supervises highly technical scientific research work in such areas as: cellular, molecular, organ and whole body pathology; whole body and cellular physiology; cell biology; imaging; microscopy; molecular probes; animal pathology and physiology, histology; cellular and organ structure/function; pharmacology. The work managed and personally performed by this position has substantial public health implications for workers both in the United States and abroad.

NIOSH is searching for a leader in the field of occupational safety and health who has the ability to plan, direct, and execute the investigative activities and services of the Branch and provide overall guidance to a staff of highly qualified research personnel. The ability to interact with representatives of other Federal, state and local agencies, labor groups, private industry, foreign occupational health organizations, and academia is required. An MD/Ph.D. is desirable. CDC/NIOSH is an equal opportunity employer and offers a smokefree environment. Please send resumes or requests for additional information regarding this position to the Morgantown Human Resources Office, NIOSH, 1095 Willowdale Road, Morgantown, West Virginia, 26505.

Pioneer Hi-Bred International, Inc., is a world leader in agricultural genetics. Founded in 1926, we are a publicly-held corporation with research, production and sales organizations worldwide. Our dynamic RESEARCH AND PRODUCT DEVELOPMENT DIVISION is currently seeking motivated and experienced professionals to join us in our on-going program of crop improvement.

SENIOR RESEARCH ASSOCIATE

Maize Genetics (Job #1006)

Responsibilities involve: maintaining inventory/database incorporating genetic data with pedigrees; participating in all facets of maize molecular genetics research program including field/lab studies; collaborating with internal/external peers to conduct and interpret genetic investigations; isolating genes by transposon tagging; mapping mutant loci using classical methods and molecular markers; writing reports/manuscripts; and supervising personnel. Requirements include Ph.D. in molecular genetics, molecular biology, biochemistry or related science area; or MS and 4 years directly related laboratory/field experience in eukaryotic molecular genetics; or 6 years experience and a BS. Excellent interpersonal and cross-functional skills essential. *(APPLICATION DEADLINE FOR THIS POSITION IS 11/1/94)*

POST-DOCTORAL ASSOCIATE

Molecular Pathology (Job #1021)

Candidate will identify maize genes which play key roles in host-pathogen interactions using efficient transposon tagging tools and a recently developed reverse-genetics technology. Goals of the group include the isolation and characterization of disease resistance genes, the elucidation of signal transduction pathways that are activated by pathogens, and the identification of defense genes that are required for resistance. Requirements include a Ph.D. in plant pathology, molecular biology, or eukaryotic genetics and a willingness to work as part of a team composed of Pioneer researchers and collaborators from academic institutions. Good communications skills necessary including the ability to write-up results for publication in a timely manner. Initial appointment is for 2 years with a 3rd year upon approval. Position is available immediately. *(APPLICATION DEADLINE IS 11/1/94)*

RESEARCH MANAGER

Specialty Grain Traits (Job #1022S)

This position will be responsible for optimizing the biosynthesis of specific proteins. This individual will work closely with cell and molecular biologists toward the goal of obtaining optimal expression of genes in transgenic seeds. EDUCATION/EXPERIENCE: Ph.D. or equivalent experience in molecular biology or biochemistry plus 3 or more years relevant research experience. Only candidates with experience in gene isolation and protein biochemistry will be considered. Research experience in the following areas is desirable: plant molecular biology, seed proteins, metabolic pathways and alteration of pathway flux. *(APPLICATION DEADLINE IS 10/21/94)*

RESEARCH ASSOCIATE

Specialty Grain Traits (Job #1023S)

Responsibilities will be to provide support in the design and construction of plasmid vectors. Skills necessary for this position include a thorough knowledge of recombinant DNA methods including DNA/RNA purification, sequencing, cloning, restriction enzyme analysis, PCR and bacterial transformation. Candidates must have experience using computer analysis programs, have good organizational skills and be able to interact effectively with individuals across broad research areas. Requires a BS with 4 years directly related experience or MS with 2 years directly related experience. *(APPLICATION DEADLINE IS 10/21/94)*

COORDINATOR

Gene Targeting (Job #1024S)

Responsibilities of the Coordinator, Gene Targeting will include: 1) coordinating a research team working primarily on homologous recombination and gene targeting in maize; 2) working closely with other lab and field groups to facilitate the transfer, testing and implementation of gene targeting and other molecular technologies related to plant transformation; and 3) development and implementation of a strategic plan that incorporates cost/benefit analysis of various technologies and evaluation of intellectual property issues. EDUCATION/EXPERIENCE: A Ph.D. or equivalent in molecular, cell or plant biology plus at least 5 years research experience in transformation, breeding or applied genetics, preferably of plants. Prior industrial experience in agricultural product development is preferred. Direct experience in managing research programs and personnel is essential and demonstrated success in setting and achieving research goals and/or in technology transfer is also important. Also essential is the ability to communicate and interact effectively with individuals from a variety of disciplines. *(APPLICATION DEADLINE IS 10/21/94)*

We offer excellent compensation, benefits and career growth potential, as well as excellent facilities and a highly cooperative research environment. Please send cover letter indicating job number and C.V. by the respective deadline to: **Gary Walljasper, Workforce Manager, Pioneer Hi-Bred International, Inc., 6800 Pioneer Parkway, P.O. Box 212, Johnston, IA, 50131-0212.** *We are an Equal Opportunity Employer.*

PIONEER®

PIONEER HI-BRED INTERNATIONAL, INC.

ABL-Basic Research Program

POSTDOCTORAL FELLOWSHIPS

at the National Cancer Institute-Frederick Cancer Research and Development Center

Molecular Mechanisms of Carcinogenesis

George F. Vande Woude, Ph.D., Program Director molecular basis of neoplastic transformation; role of proto-oncogenes in cell cycle regulation

Stephen H. Hughes, Ph.D. structure and function of HIV reverse transcriptase; *ski* oncogene; expression of cytoskeletal genes; retroviral vectors; transgenic birds and mammals

George N. Pavlakis, M.D., Ph.D. eukaryotic gene regulation; molecular biology of HIV and pathogenesis of AIDS

Barbara K. Felber, Ph.D. molecular biology of human retroviruses; posttranscriptional mechanisms of gene regulation

Peter F. Johnson, Ph.D. mammalian bZIP transcription factors: protein structure, dimeric interactions, mechanisms of transcriptional activation, and regulatory functions during cell differentiation and development

Deborah Morrison, Ph.D. role of the proto-oncogene c-*raf* in mitogenic and developmental pathways; structure/function analysis of c-*raf*; identification of signal-transducing molecules

David Kaplan, Ph.D. signal-transducing molecules in mitogenesis, oncogenesis, and development; identification and characterization of substrates of receptor and nonreceptor tyrosine kinases; function of *trk* genes

Chemistry of Carcinogenesis

Anthony Dipple, Ph.D. polycyclic aromatic hydrocarbon carcinogenesis and mutational specificity; chemical carcinogen-DNA interactions

Robert C. Moschel, Ph.D. chemical synthesis of carcinogen-modified DNA; physical chemistry of carcinogen-DNA interactions; DNA adduct-induced mutagenesis in bacteria and mammalian cells; chemotherapy adjuvants

Chromosome Biology

Stuart J. Austin, Ph.D. chromosome stability in bacteria: regulation of plasmid replication and distribution of copies to daughter cells

Donald Court, Ph.D. regulation of gene expression by transcription initiation, transcription termination, and RNA processing

Eukaryotic Gene Expression

Jeffrey N. Strathern, Ph.D. recombination; pseudogene formation; DNA repair in yeast; cell type regulation; gene expression

David J. Garfinkel, Ph.D. molecular biology of the retrotransposon Ty; genome rearrangement; insertional mutagenesis; gene regulation

Amar J.S. Klar, Ph.D. mating-type switching of fission and budding yeast; genetics and molecular biology of recombination; gene regulation

Molecular Virology and Carcinogenesis

Stephen Oroszlan, Ph.D. immunochemistry and protein chemistry of retroviruses; structure and function of retroviral gene products; viral proteases

Alan R. Rein, Ph.D. retroviral genetics; functional analysis of retroviral genes using natural and synthetic mutants; viral pathogenicity

Nancy R. Rice, Ph.D. study of the *rel* oncogene and the related NF-kB family of transcription factors.

Mammalian Genetics

Neal G. Copeland, Ph.D. development of mouse models of human disease; neurofibromatosis; gene targeting in ES cells

Nancy A. Jenkins, Ph.D. molecular genetics of mouse development; transgenic mice; receptor/ligand interactions and their role in development

Peter J. Donovan, Ph.D. development of the mouse germ line; germ cell gene expression; sterile mutants; cell adhesion molecules

Macromolecular Structure

Alexander Wlodawer, Ph.D. structure of enzymes and cytokines studied by X-ray diffraction

Christopher J. Michejda, Ph.D. antineoplastic and antiviral drug design; biochemical and molecular pharmacology

R. Andrew Byrd, Ph.D. structure of proteins and carbohydrates studied by macromolecular NMR techniques

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The ABL-Basic Research Program is dedicated to basic research in molecular biology, biochemistry, crystallography, genetics, virology, and organic chemistry. The scope of current projects is indicated by the research interests of the senior scientists listed above. Senior staff members enjoy complete independence in their choice of research problems and are accorded excellent facilities to accomplish their goals. A vigorous seminar program, implemented by formal and informal arrangements with the National Institutes of Health, Johns Hopkins University, University of Maryland, and other research and academic institutions, provides opportunities for extensive interaction within the scientific community.

The Frederick Cancer Research and Development Center is located in Frederick, Maryland, which with its proximity to Washington, D.C., and Baltimore offers a rich scientific and cultural environment, as well as a quiet country setting.

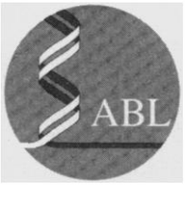
Fellowships are awarded on an equal opportunity basis to recent recipients of an M.D., a Ph.D., or an equivalent degree in the biological or biochemical sciences. Postdoctoral training opportunities are available with the staff members listed above as well as other scientists associated with the Program.

Appointments are made for one to three years. **Annual stipends** generally range from $25,000 to $31,000, depending upon experience.

Interested individuals are encouraged to apply well in advance of their availability date. The ABL-Basic Research Program does not discriminate in employment on the grounds of sex, race, color, age, religion, disability, or national origin.

To apply, send a letter describing your research interests, a curriculum vitae, and the names and addresses of three references to the investigator(s) of interest, c/o: **ABL-Basic Research Program, Personnel Department/Sci, NCI-FCRDC, P.O. Box B, Bldg. 428, Frederick, Maryland 21702-1201.**

The Basic Research Program is operated by Advanced BioScience Laboratories, Inc., under contract with the National Cancer Institute. EOE M/F/D/V



BASIC RESEARCH PROGRAM