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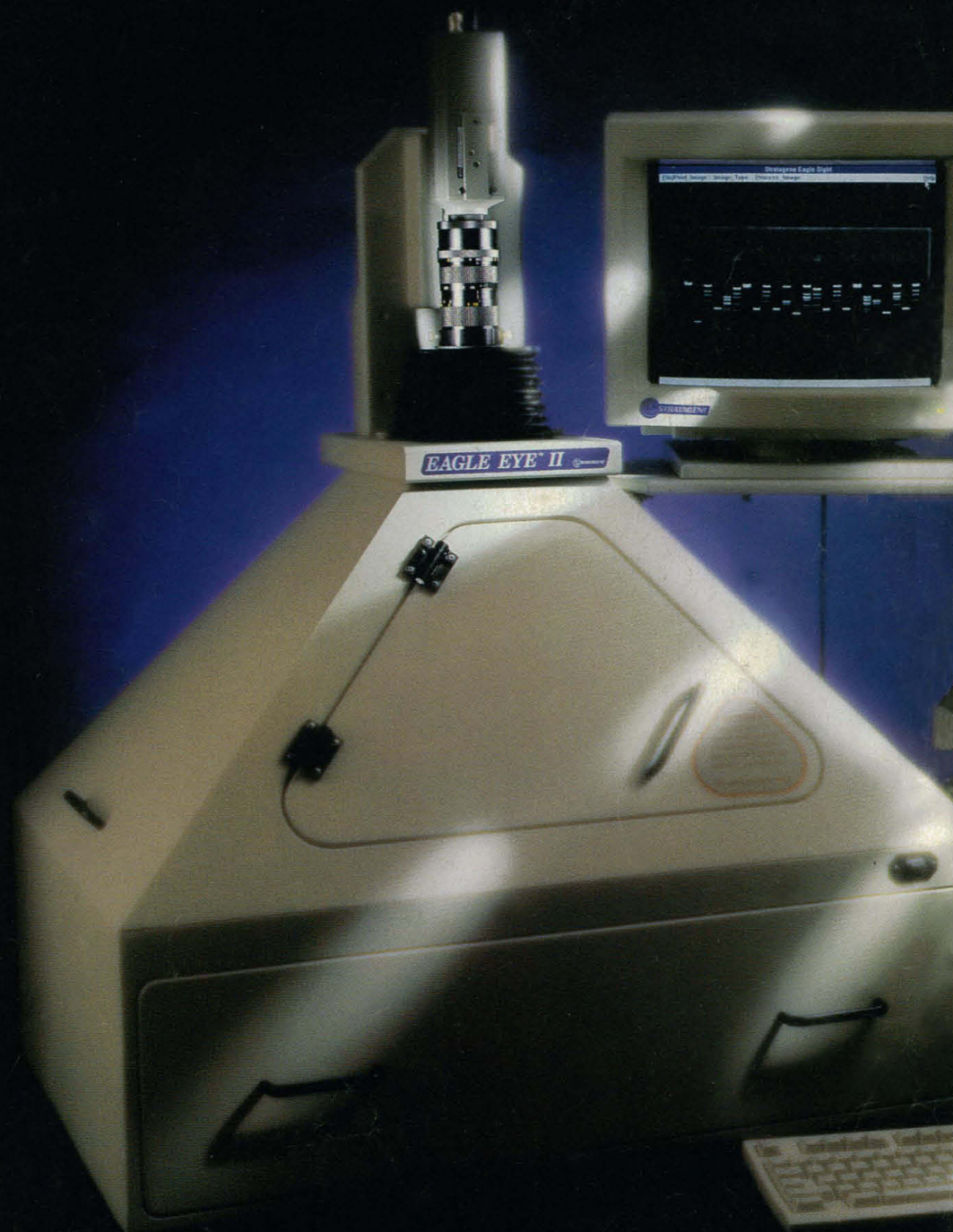
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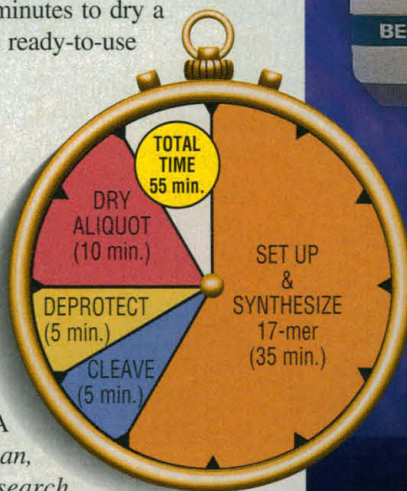
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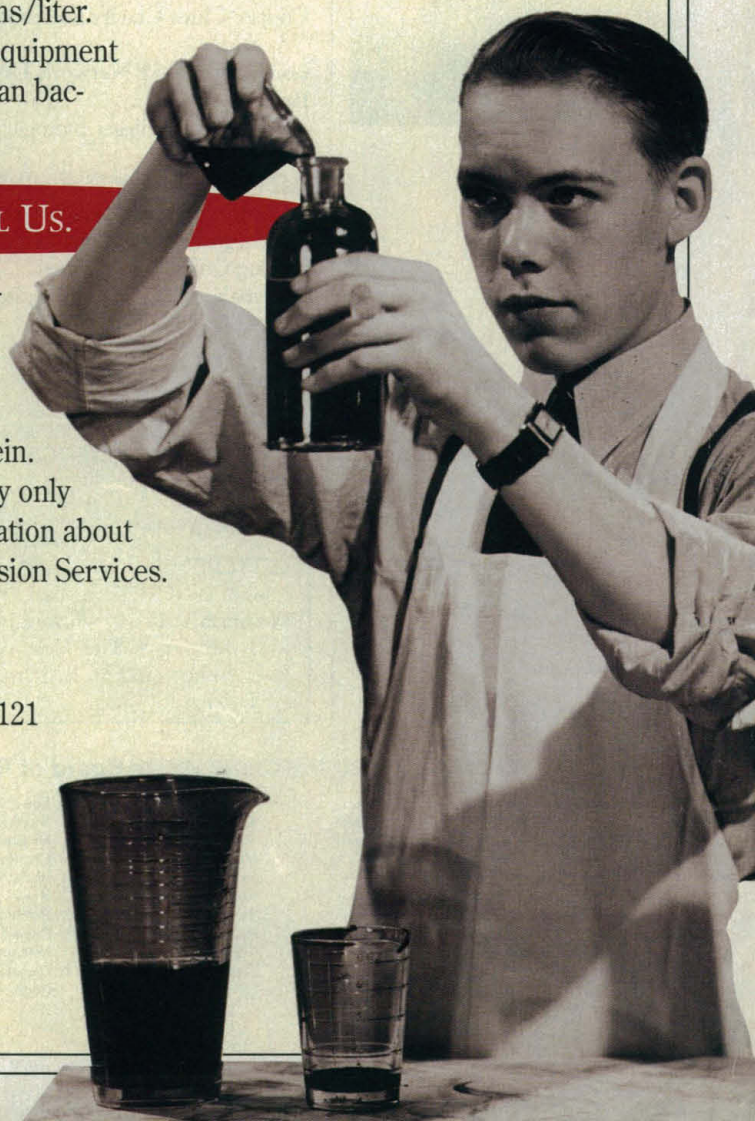
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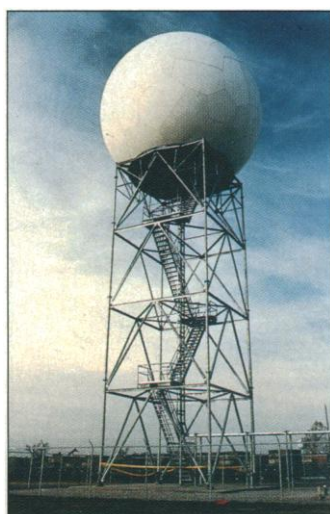


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COVER

Scientific themes depicted on postage stamps from east Asian countries. (For a description of each stamp, see page 345.) A special section beginning on page 345 features News reports, a Policy Forum, and Perspectives on the emerging scientific powers of Asia—

South Korea, Taiwan, Hong Kong, Singapore, and China—and Japan's role in the region's scientific development. [Stamps: U.S. National Postal Museum and Ding-Shinn Chen. Package photo: Rick Kozak, Washington, DC]



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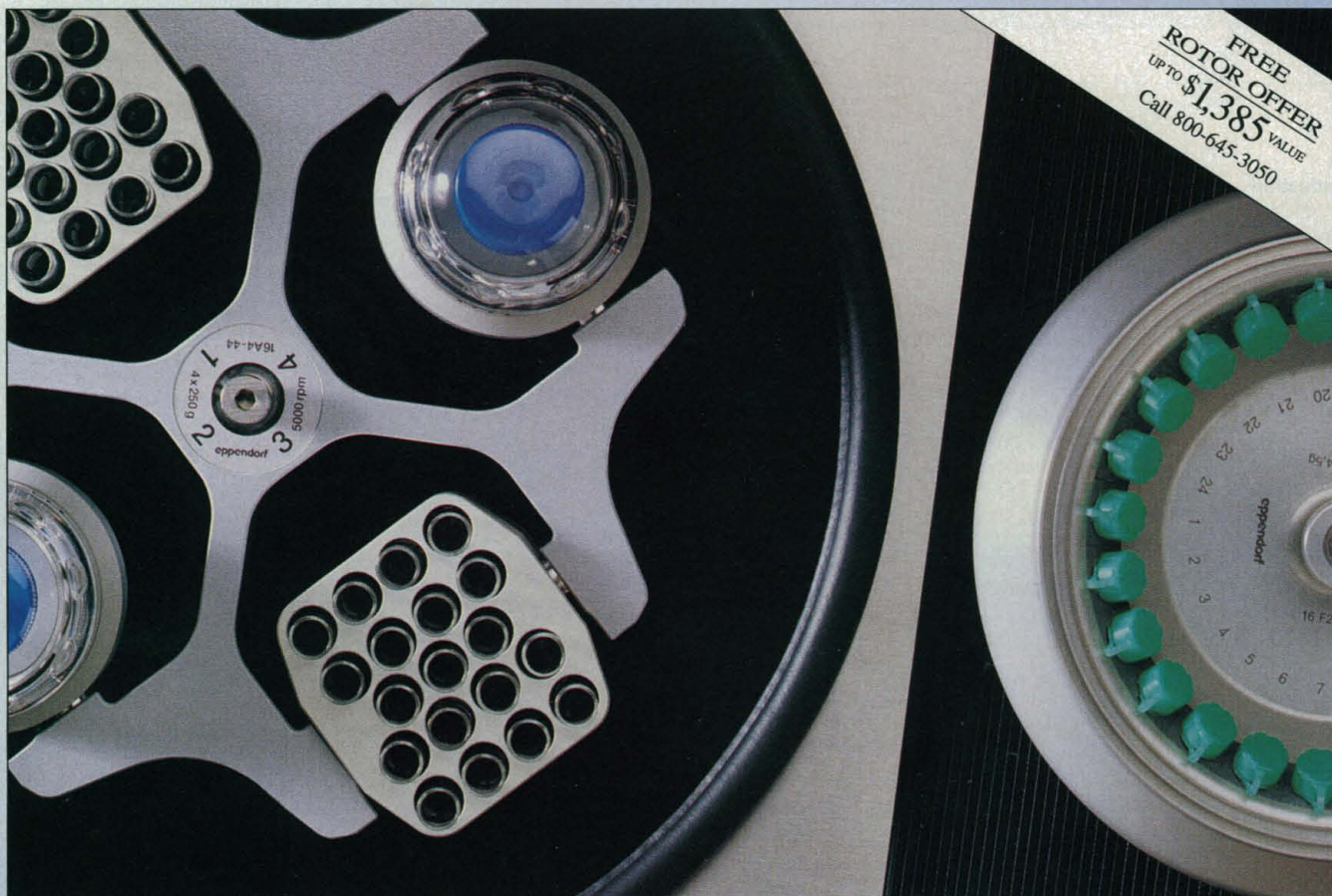
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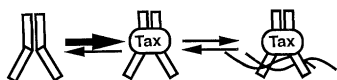
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Better binding to DNA

The replication of human T cell leukemia virus type I (HTLV-I) and its ability to cause malignant transformation of cultured cells requires the viral Tax protein. Tax activates transcription of the HTLV-I long terminal repeat promoter, and this activation requires the DNA binding sites for activating transcrip-



tion factor (ATF) proteins, a family of basic region-leucine zipper (bZIP) proteins. Because Tax itself does not bind DNA, it has been thought that Tax functions through the ATF proteins, but the mechanism has been unclear. Wagner and Green (p. 395) found that Tax can enhance the dimerization of ATF (and other bZIP) proteins even without DNA present. This increase in homodimer formation in turn causes increased DNA binding by the bZIP proteins.

□

Deep frozen hydrogen

Molecular hydrogen is the most abundant molecule in the universe, but its dipole symmetry makes it spectroscopically quiet and hard to detect. Sandford *et al.* (p. 400) argue that weak infrared absorption features associated with a dense molecular cloud complex in the constellation Ophiuchus are due to hydrogen molecules incorporated into solid water ice, where the interaction between hydrogen and the ice lattice creates characteristic vibrational transitions. Interstellar molecular hydrogen is thought to form when hydrogen atoms combine on grain surfaces and then evaporate, but this result indicates that in a

Kinase assembly and cell cycle control

Activation of cyclin-dependent kinases (CDKs) controls the key transition points in the cell cycle. Cyclins can activate CDKs in vitro by forming heterodimers, but in vivo other proteins, such as Cks in yeast, are necessary for cell cycle progression. Parge *et al.* (p. 387) have determined the crystal structure of one of the human isoforms of Cks, CksHs2, which binds to the catalytic subunit of CDKs. They found that the molecule forms a hexameric 12-stranded β barrel structure through the assembly of three dimer units. Sequenced-conserved regions between the yeast and human forms are involved in β strand exchange between the dimer subunits and form metal- and anion-binding sites for hexamer assembly. Molecular modeling indicates that six kinase subunits can assemble onto the hexamer and suggests that CksHs2 may act as a hub for CDK oligomerization, an event that may be critical for activating CDKs in vivo.

sufficiently dense environment, hydrogen can be trapped onto these grains by the deposition of other molecules.

□

Making more CO₂

One hypothesis to explain the reduced atmospheric CO₂ levels in the past is that greater amounts of CO₂ were consumed by increased biologic productivity in the polar oceans. Shemesh *et al.* (p. 407) tested this notion by examining carbon and nitrogen isotopes in the organic content of diatoms to characterize CO₂ concentrations in surface waters and biologic demand. Diatoms are one of the main primary producers in polar oceans. The data from two core sites in the Southern Ocean imply that primary production, in contrast to predictions, was in fact lower during the last glacial maximum than it is today.

□

Flooding frequency

The recurrence interval of severe floods is typically greater than instrumental records in watersheds, but with accurate

dating the sedimentary record can provide information on the long-term frequency as well as indications of climatic conditions required for frequent devastating floods. Ely *et al.* (p. 410) examined well-dated river deposits in the southwestern United States to determine flood frequencies during the past 5000 years. Severe floods clustered into several distinct intervals during which the climate was cool and moist and El Niño events were frequent.

□

Changes in the field

Earth's magnetic field helps shield the planet and atmosphere from cosmic radiation. Large variations in the past of the abundances of carbon-14 and those other nuclides produced by cosmic radiation in the upper atmosphere seem to imply that the intensity of the field has changed greatly, but independent confirmation from paleointensity measurements in rocks has been difficult to obtain. Mankinen and Champion (p. 412) provide a record of paleointensity for the past 45,000 years from well-dated lava flows on Hawaii. Through

comparison with other records globally, the data imply that the intensity of the field was reduced by about 35 percent between 45,000 and 10,000 years ago. The pattern is consistent with the inferred increase in production of cosmogenic isotopes in the past.

□

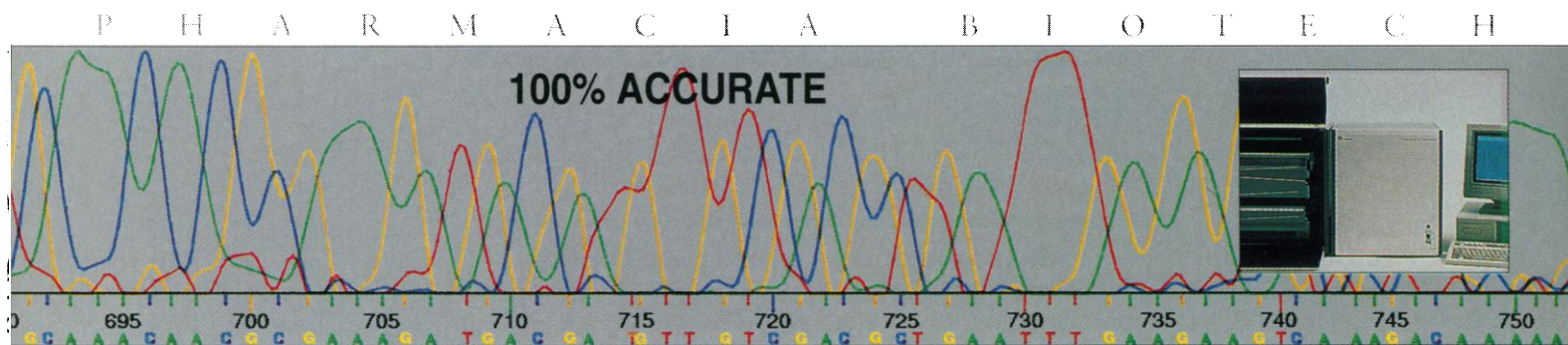
Abscess formation

Bacteroides fragilis is the most common anaerobic bacterium isolated from many human infections, including intra-abdominal abscesses. Purified preparations of the bacterial polysaccharide capsule have been shown to produce sterile abscesses in rodent models. Through chemical modification analyses, Tzianabos *et al.* (p. 416) have identified structural motifs within the polysaccharides that are essential for abscess formation.

□

Breaking the rule

One cell, one receptor—this rule apparently governed T and B lymphocytes, where the principle of allelic exclusion held that only one antigen-specific allele of the receptor would be expressed. Previous studies showed that rearrangements of the T cell receptor (TCR) α locus could occur in mature $\alpha\beta$ T cells, but only one type of cell surface α chain was expressed. Padovan *et al.* (p. 422) have used mouse monoclonal antibodies to the variable chains V α 2, V α 12, and V α 24 to examine the cell surface expression of TCR α in normal human T cells. One-third of the cells expressed two V α chains in independent, functional TCRs. These results have implications for autoimmunity and T cell cross reactivity.



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In another study (4), the leading competitor's DNA sequence error as a function of length increased rapidly from 1% in the 0-350 nucleotide range to about 17% at 500 nucleotides, reaching a plateau of 25% error at 560 nucleotides. Furthermore, to get reliable data, this instrument required a redundancy of 8.4 reads per nucleotide.

In contrast, a standard ALF DNA Sequencer was more than 99% accurate over 500 base pairs and sequenced with a low overall redundancy of 2.8 (one third of the rival sequencer) in the course of the European Community *Saccharomyces cerevisiae* genome sequencing project (5).

1. Data supplied by M. Uhlen and T. Hultman from routine sequencing run at the Royal Institute of Technology, Stockholm, Sweden.

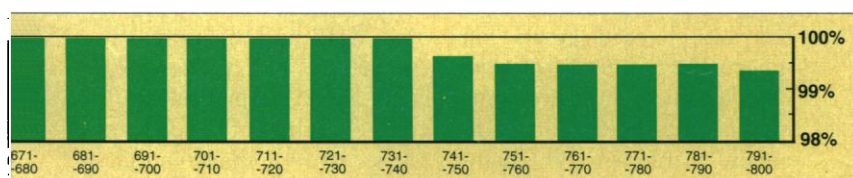
2. Comparison of three non-isotopic automated DNA sequence analysis systems. Poster presentation at the San Diego Conference on Nucleic acids, Nov. 20-22, 1991. Van Ranst, M., Fiten, P., Voet, M., Volckaert, G., Opendakker, G.

3. Uniform scoring system for the assessment of DNA sequencing accuracy. *Meth. Mol. Cell. Biol.* 3 (1992) 243-245, Van Ranst, M., Fiten, P., Voet, M., Volckaert, G., Opendakker, G.

4. Sequence length and error analysis of Sequenase and automated Taq cycle sequencing methods. *BioTechniques* 14 (1993) 442-447, Koop, B.F., Rowan, L., Chen, W.-Q., Deshpande, P., Lee, H., Hood, L.

5. An efficient low redundancy large scale DNA sequencing strategy: Primer walking on plasmid and cosmid DNA using T7 DNA polymerase and fluorescein-15'-dATP as internal label. Submitted for publication in *BioTechniques*, Voss, H., Wiemann, S., Zimmermann, J., Grothues, D., Sensen, C., Schwager, C., Stegemann, J., Erle, H., Rupp, T., Sproat, B., Ansoerge, W.

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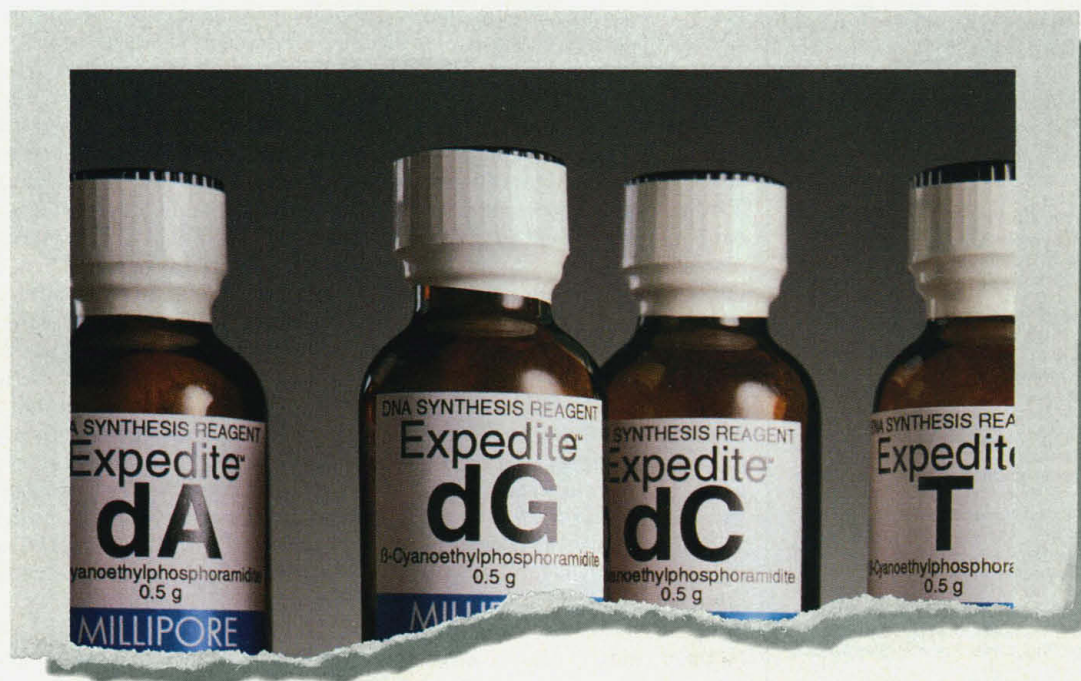
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Half-Day DNA. And That's Just The Half Of It.



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For instance, a pair of 20-mer PCR primers can be synthesized in about an hour and worked up in about two, so you can start using your new DNA by noon.

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chemistry can be deprotected in only 15 minutes at 55°C or 2 hours at room temperature.

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Separate, quantify, or sequence carbohydrates in one day with Glyko FACE® technology

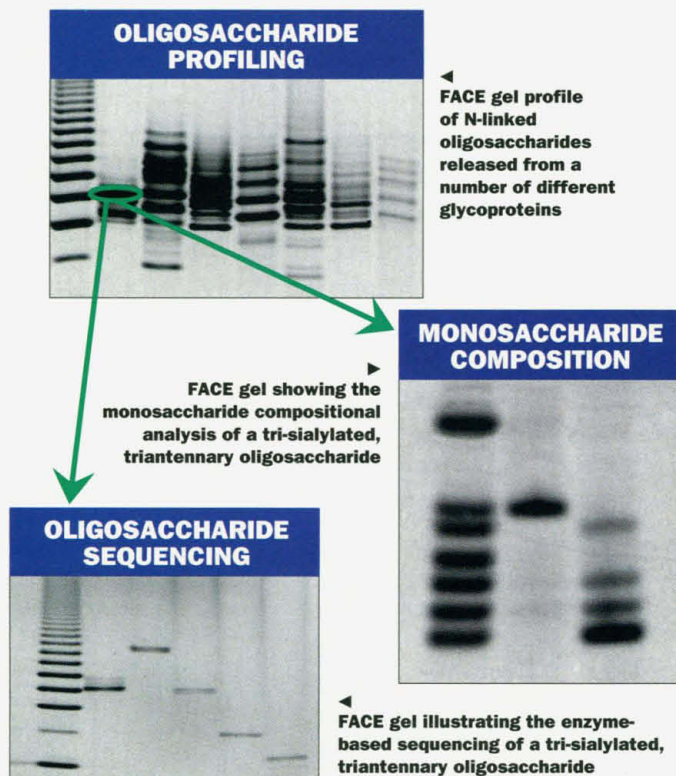
If you're working with DNA or protein, you're ready to work with carbohydrates

Glyko's FACE (*Fluorophore Assisted Carbohydrate Electrophoresis*) technology, makes it possible for you to work with and analyze complex carbohydrates using the same technique you already use every day in your laboratory: polyacrylamide gel electrophoresis.

Now, in less than one day, you can perform profiling, composition, or sequencing experiments such as the ones shown here, using FACE chemistry kits.

Color-coded FACE kits make carbohydrate analysis easy and reliable

FACE kits are color-coded and are designed to provide a complete approach to carbohydrate analysis...starting



with the enzymatic or chemical release from the glycoconjugate to the separation, isolation, or sequencing of oligosaccharides.

Everything you need is included: enzymes or release chemicals, fluorescent-labeling reagents, electrophoresis

The FACE Imager and FACE Analytical Software give you the ability to analyze, quantify, and document the results of N-linked and O-linked oligosaccharide profiling, monosaccharide composition, and sequencing gels

standards, controls, running buffers, precast polyacrylamide gels, and complete protocols.



Glyko FACE kits now available for carbohydrate or glycoconjugate analysis include:

- **N-LINKED OLIGOSACCHARIDE PROFILING KIT**
- **O-LINKED OLIGOSACCHARIDE PROFILING KIT**
- **MONOSACCHARIDE COMPOSITION KIT**
- **N-LINKED OLIGOSACCHARIDE SEQUENCING KIT**
- **O-LINKED OLIGOSACCHARIDE SEQUENCING KIT**

Sequence your oligosaccharides with Glyko recombinant glycosidases

Glyko offers the most complete line of recombinant glycosidases available, each cloned to be free of other glycosidases, protease activity, and carbohydrates:

- **PNGase F**, releases Asn-linked oligosaccharides
- **NANase I**, releases α 2-3 N-acetylneuraminic acid
- **NANase II**, releases α 2-3,6 N-acetylneuraminic acid
- **NANase III**, releases α 2-3,6,8 N-acetylneuraminic acid
- **Neuraminic Acid Linkage Analysis Kit** contains NANase I, II, and III
- **HEXase I**, releases β 1-2,4,6 N-acetylglucosamine
- **MANase I**, releases α 1-2,3,6 mannose
- **FUCase I**, releases α 1-6 fucose

We want to be your carbohydrate research partner

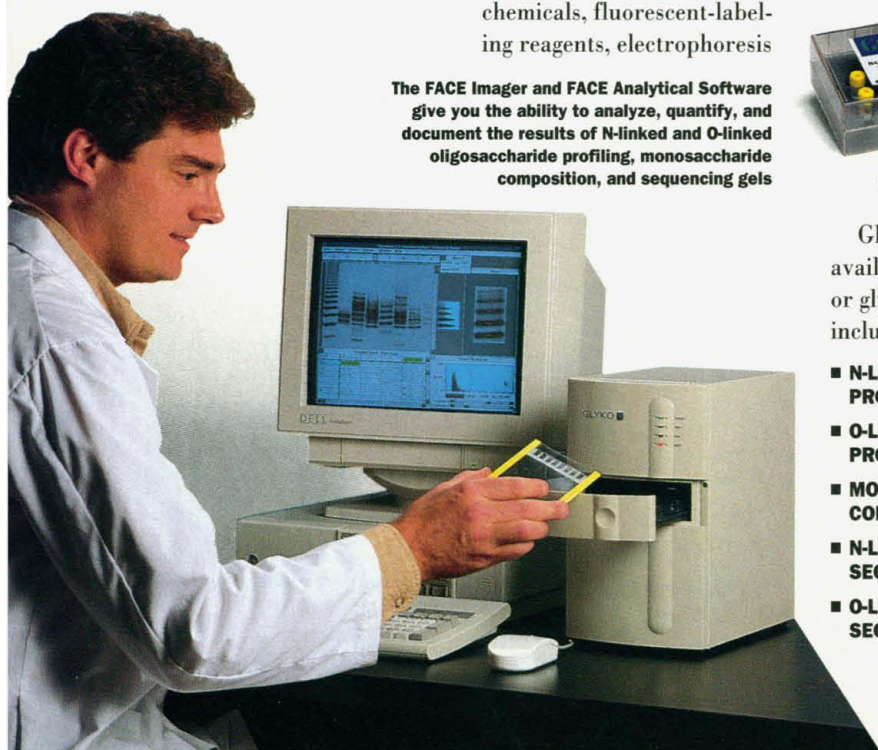
When your research requires a unique application of FACE technology, Glyko scientists will work with you to develop a custom FACE kit.

If you have only an occasional need for carbohydrate analysis, or lack the personnel to perform the analyses you require, our scientists can do it for you.

For more information, please call Glyko, Inc. toll free at 1 800 33 GLYKO (334 5956) or fax us at 1 415 382 7889.



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PRINCIPLES of SOUND RETIREMENT INVESTING

Monthly Expenses	Income
Rent 775	1915
Telephone 6032	845
Gas 60	
Electricity 4568	
Car Loan 240	
Student Loans 175	
Insurance 125	
Credit Cards 165	
Overdraft (CHK) 189	
Groceries 300	
Entertainment 100	
Clothes 50	
Medical 200	
	275

IRONICALLY, THE TIME TO START SAVING FOR RETIREMENT IS WHEN IT LOOKS LIKE YOU CAN LEAST AFFORD IT.

Can't afford to save for retirement?

The truth is, you can't afford not to. Not when you realize that your retirement can last 20 to 30 years or more. You'll want to live at least as comfortably then as you do now. And that takes planning.

By starting to save now, you can take advantage of tax-deferral and give your money time to compound and grow. Consider this: set aside just \$100 each month beginning at age 30 and you can accumulate over \$154,031* by the time you reach age 65. But wait ten years and you'll have to budget \$211 each month to reach the same goal.

Even if you're not counting the years to retirement, you can count on TIAA-CREF to help you build the future you deserve—with flexible retirement and tax-deferred annuity plans, a diverse portfolio of investment choices, and a record of personal service that spans 75 years.

Over a million people in education and research put TIAA-CREF at the top of their list for retirement planning. Why not join them?

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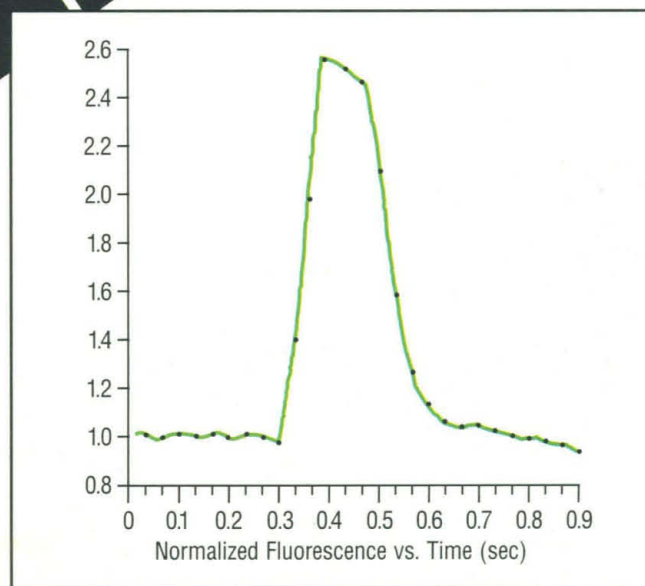


Image series and graph showing calcium response during a single beat of a continuously beating rat heart cell stained with Fluo-3. (Images acquired and analyzed using the INSIGHT-IQ™ system; cells courtesy of Dr. Scott Henry, Parke-Davis, Ann Arbor, MI.)

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REFERENCE REAGENTS FOR MURINE AND HUMAN CYTOKINES

The Biological Response Modifiers Program (NCI), the Division of Microbiology and Infectious Diseases (NIAID), and the National Institute for Biological Standards and Control (United Kingdom) have made available reference reagents for murine and human cytokines. The reagents are available in small amounts (approx. 1 µg/sample) for use in the calibration of *in vitro* bioassays and in-house standards only and are not to be used for experimental purposes.

HUMAN REFERENCE REAGENTS CURRENTLY AVAILABLE:

IFN-α	IL-1-α	IL-3	IL-6	G-CSF	TGF-β1
IFN-β	IL-1-β	IL-4	IL-7	GM-CSF	TNF-α
IFN-γ	IL-2	IL-5	IL-8	M-CSF	TNF-β
LIF					

MURINE REFERENCE REAGENTS:

IFN-α	IL-3
IFN-β	IL-4
IFN-γ	GM-CSF
TNF-α	

TO OBTAIN THESE REAGENTS, CONTACT:

Dr. Craig W. Reynolds
Biological Response Modifiers Program
NCI-FCRDC
Building 1052, Room 253
Frederick, MD 21702-1201
FAX: 301-846-5429

Shipments will be made collect express. Please allow 3 to 4 weeks for delivery.

BIOLOGICALS AVAILABLE FROM THE NATIONAL CANCER INSTITUTE

The repository of the Biological Response Modifiers Program (BRMP), Division of Cancer Treatment (DCT), NCI, NIH, announces the availability of recombinant human lymphokines IL-1α, IL-1β, and IL-2; the monoclonal antibody 11B.11 against mouse IL-4; and the monoclonal antibody 3ZD against human IL-1β.

Use of these materials is limited solely to *in vivo* and *in vitro* basic research studies and is **not** intended for administration to humans.

The lymphokine materials are aliquoted in 100 µg amounts (>10⁶ units) and are available to investigators with peer-reviewed support. However, manufacturers' restrictions prohibit distribution of these materials to for-profit institutions or commercial establishments.

The monoclonal antibodies are available to peer-reviewed investigators, for-profit institutions or commercial establishments. The 11B.11 antibody is available in either 3 or 20 mg vials. The 3ZD antibody is available in 5 or 20 mg amounts.

Investigators wishing to obtain any of these materials should send requests to:

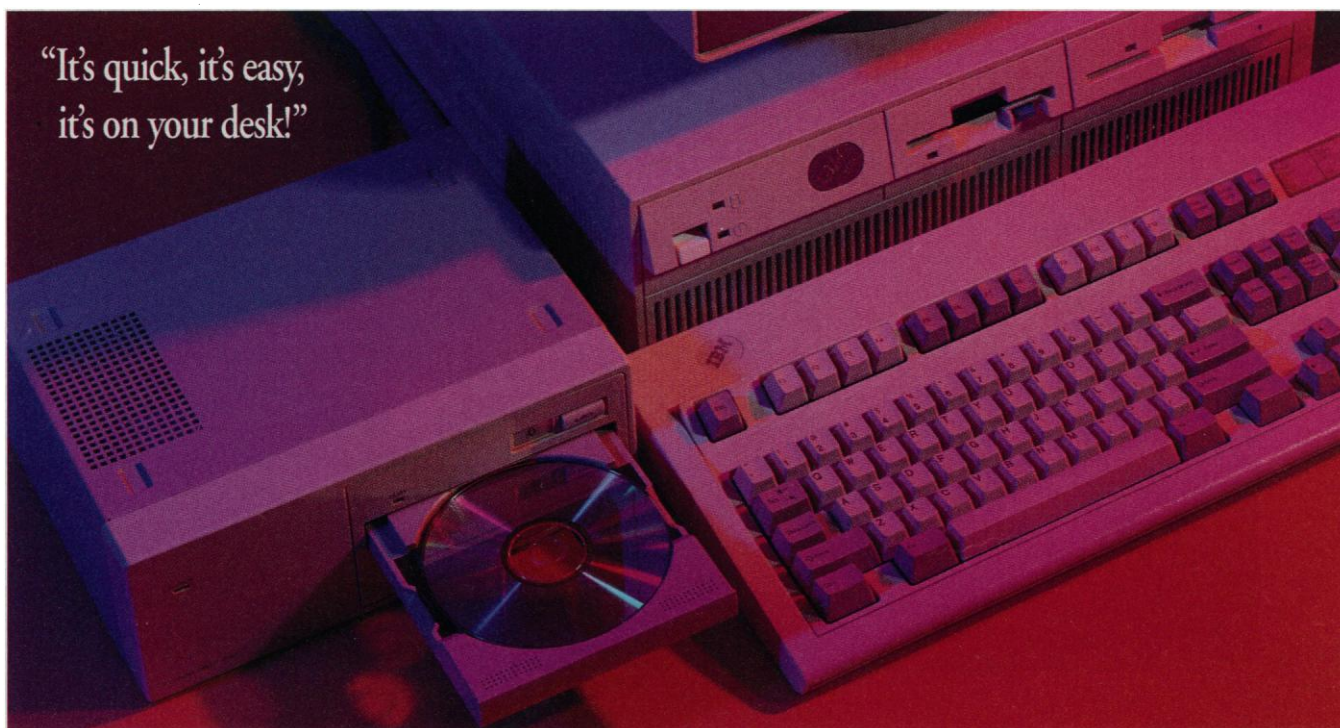
Dr. Craig W. Reynolds
Biological Response Modifiers Program
NCI-FCRDC
Building 1052, Room 253
Frederick, MD 21702-1201
FAX: 301-846-5429

All requests should be accompanied by:

(1) A brief paragraph outlining the purpose for which materials are to be used, (2) the amount desired, (3) description of investigator's peer-reviewed support. Recipients will be required to sign a Materials Transfer Agreement and to pay shipping and handling costs. Please allow 4 to 6 weeks for delivery.

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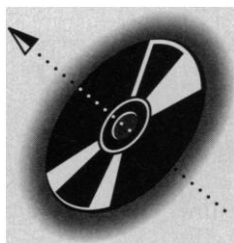
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1994 CALENDAR OF EVENTS

Endocrinology

Endocrinology Under 35

Scientific Organization: A. De Bellis (I) • E. Schipani (USA)
Rome, Italy • May 25-27

Paracrine and Autocrine Signals in the Hypothalamic Pituitary Complex

Scientific Organization: L. Martini (I) • D. de Wied (NL) • S.M. McCann (USA)
Stresa, Italy • September 9-10

Endothelins in Endocrinology

Scientific Organization: I. T. Cameron (UK) • M. J. Dunn (USA) • M. Serio (I)
Florence, Italy • October 6-8

Immunology

Differentiation Therapy

Scientific Organization: A. Kimchi (IL) • G.B. Rossi (I) • S. Waxman (USA)
Herzlia, Israel • March 7-10

Cytokines: Basic Principles and Practical Applications

Scientific Organization: A. K. Abbas (USA) • S. Romagnani (I)
Florence, Italy • March 28-30

Primary Immunodeficiency Diseases

Scientific Organization: F. Aiuti (I) • M. D. Cooper (USA) • F. S. Rosen (USA)
Orvieto, Italy • June 18-21

New Horizons in Gynaecological Malignancies

Scientific Organization: D. Ayalon (IL)
Eilat, Israel • November 16-18

Reproduction

Puberty: Basic and Clinical Aspects

Scientific Organization: C. Bergadá (ARG)
Buenos Aires, Argentina • April 6-8

Male Factor in Human Infertility

Scientific Organization: J. Tesarik (F)
Paris, France • April 21-22

Immunocontraception

Scientific Organization: O. Nilsson (S)
Uppsala, Sweden • June 30 - July 1

Recent Advances In:

Nutritional Aspects of Osteoporosis

Scientific Organization: P. Burckhardt (CH) • R. P. Heaney (USA)
Lausanne, Switzerland • May 5-7

Where Phenotype Does Not Match Genotype

Scientific Organization: M.I. New (USA)
Volterra, Italy • October 13-14

Gordon Research Conferences

co-sponsored by Ares-Serono Symposia for Europe

Fractals

May 1 - 6 • San Miniato (I)

Extrachromosomal Elements: Mitochondria and Chloroplasts

May 1 - 6 • Volterra (I)

Phase Transitions in Non-Metallic Solids

May 8 - 13 • Volterra (I)

Bioelectrochemistry

September 18 - 23 • Irsee (FRG)

New Visualization Technologies for Science Education

September 25 - 30 • Irsee (FRG)

Modern Developments in Thermodynamics

October 2 - 7 • Irsee (FRG)

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How to teach a plant self-defense.

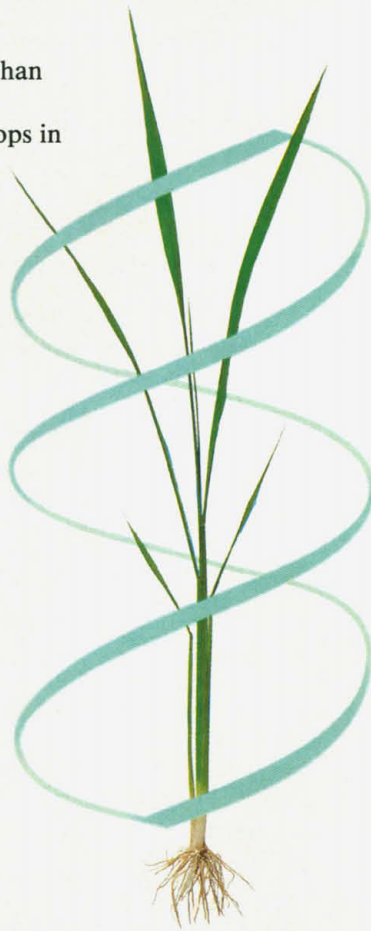
Although a ravenous insect, such as the rice stem borer, may not be your vision of doom, to a rice plant it represents potential disaster. That's why the researchers at Mitsubishi Kasei are teaching them to fight back. Using the latest advances in genetic engineering, they're creating rice plants that kill more than an insect's appetite.

As one of the most important food crops in the world, rice is a staple for billions of people. Ensuring an adequate supply is one of the major goals for our researchers. Using a number of methods to introduce the right combination of DNA into a plant, they're creating new strains that, in addition to being insect resistant, are also disease

resistant, less susceptible to the weather and give a bigger yield.

But genetic engineering and plant research are just part of a whole world of research that Mitsubishi Kasei

is involved in. From basic chemicals and materials to electronics and pharmaceuticals, we're pioneering many products and processes that make life richer, healthier and easier for people everywhere. That's because turning research into reality is something we do best. To get a more detailed look at Mitsubishi Kasei, call or write for our annual report. You'll see how we're helping to feed a world that's hungry for more than just new ideas.



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