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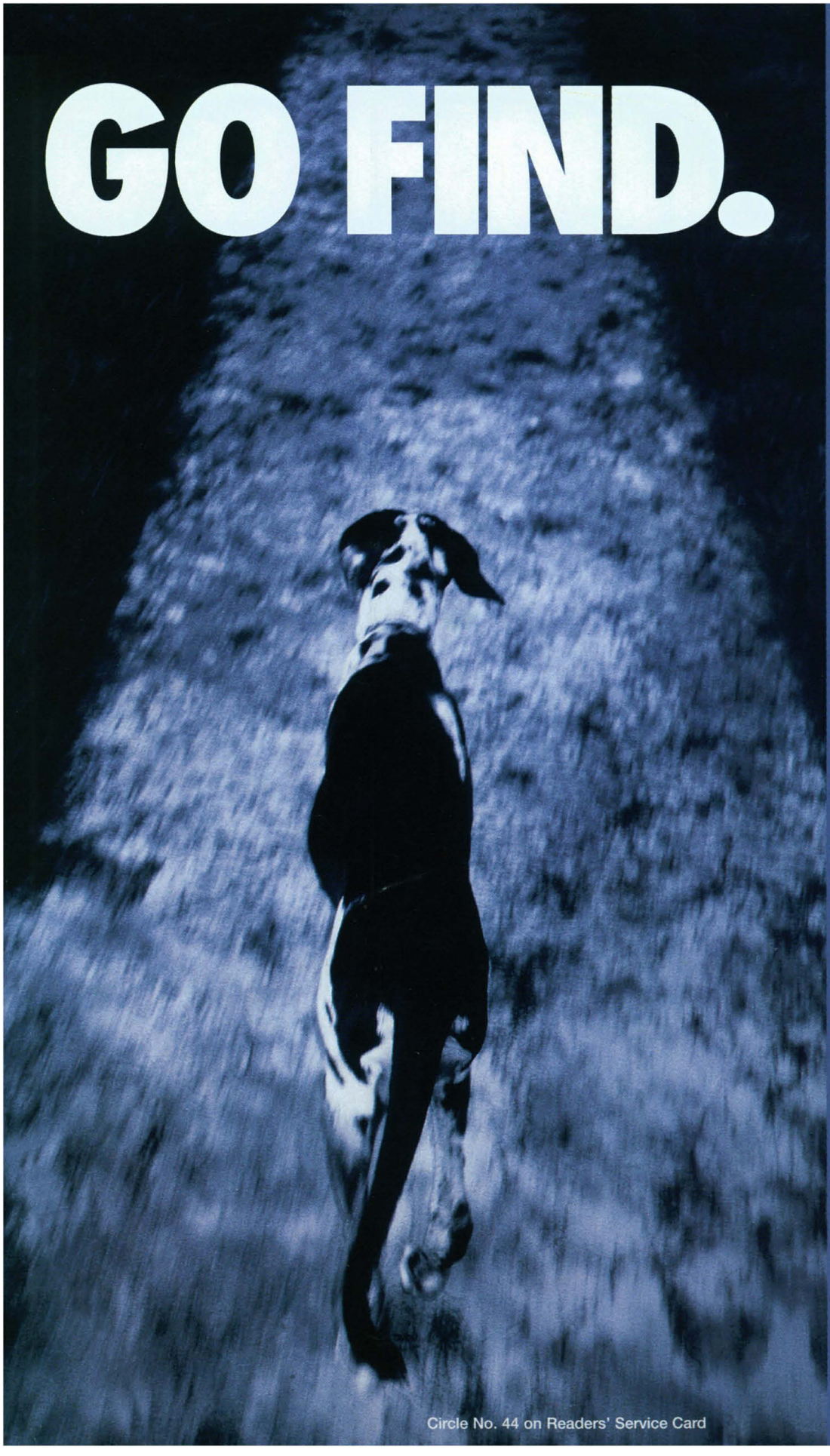

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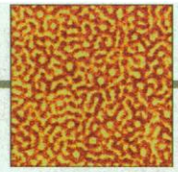

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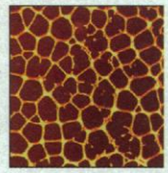

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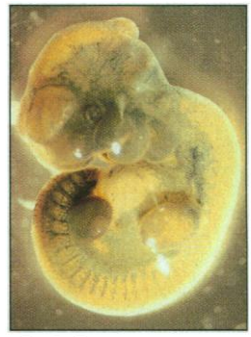

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At the heart of healthy blood vessels

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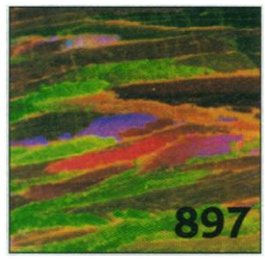
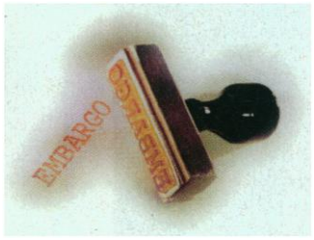


COVER Carbon and phenolic inverse opals can be more opalescent than gem opals because cages replace the periodic silica spheres of the natural gem. The colors change when liquids fill the cages, as for the pictured water-filled phenolic inverse opal (image width ~17 mm). The ability to form periodic arrangements of cages on the scale of optical wavelengths for many materials, including diamond, may be important for obtaining useful electronic and optical properties. [Image: A. A. Zakhidov, I. Khayrullin]



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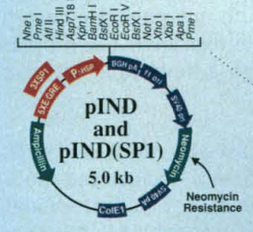

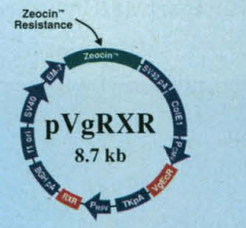

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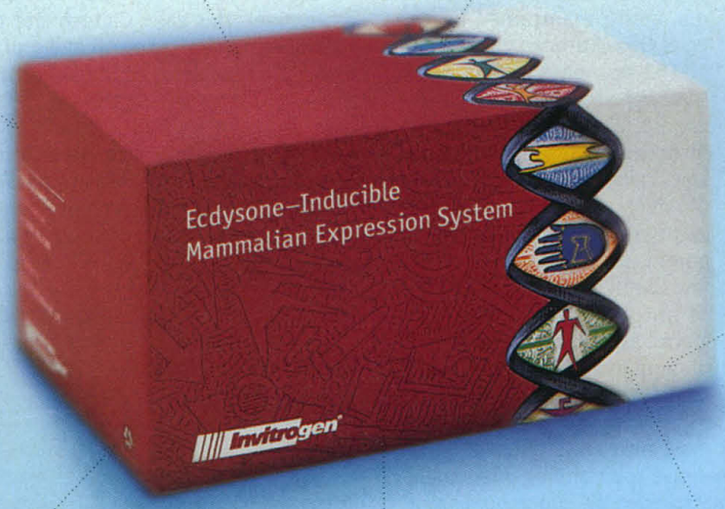
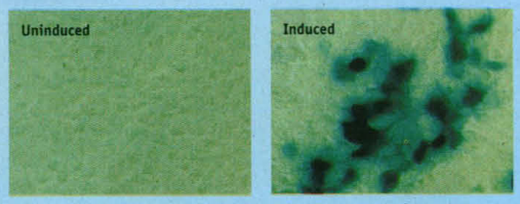


INDUCE WITH PONASTERONE A OR MURISTERONE A
CHO cells stably transfected with pIND(SP1)/Hygro/*lacZ*.
Lane 1 and 2: Uninduced
Lane 3: Induced with Muristerone A
Lane 4: Induced with Ponasterone A

STABLE CELL LINES-NO WAITING
The EcR-293, EcR-CHO, and EcR-3T3 cells stably express the functional ecdysone receptor and allow immediate induction following transfection with a pIND vector.



Uninduced and induced transiently transfected 293 cells stained with X-gal.

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BETTER WITH A TWIST

The second-order nonlinear optical responses of chiral molecules, such as frequency doubling, can be enhanced by supramolecular ordering. Verbiest *et al.* (p. 913) show that Langmuir-Blodgett films of substituted helicene molecules form helical fibers. Films of one molecular handedness are better organized and show much stronger second-order nonlinearity (by a factor of 30) than films of racemic mixtures. These helicene molecules would not normally be expected to exhibit high second-order effects, but the formation of chiral helical bundles enhanced certain components of the susceptibility tensor describing optical nonlinearity. The ability to form layers of opposite chirality will be useful for generating thicker films that maintain their nonlinear properties through quasi-phase-matching methods.

PATTERNS OF DEWETTING

Theoretical studies have pointed toward the formation of particular patterns, called spinodal modes, when a liquid film is deposited onto a substrate that is not wetted by the film. However, the experimental observation of these patterns has been difficult because they cannot easily be separated from other surface phenomena, such as the nucleation of dry patches at substrate defects. Herminghaus *et al.* (p. 916; see the Perspective by Reiter) provide experimental evidence for spinodal dewetting behavior in two systems, liquid crystal and liquid metal films. They can rationalize the observations in terms of the different forces dominant in the two systems.

SHAPING CHEMICAL REACTIONS

Although in principle it should be possible to use carefully prepared laser pulse sequences to control the outcome of chemical reactions such as photodissociation, in practice it is difficult to anticipate all of the possible outcomes as different states interact on different time scales. Assion *et al.* (p. 919) circumvent this difficulty by using an evolutionary algorithm to adjust the input laser pulse to a reaction to maximize formation of a particular product. Tailoring of femtopulse sequences allowed either of two different bond-cleaving reactions of an iron complex to be selected.

OPALESCENT CARBON

Ordered macroporous materials with three-dimensional periodicities on the scale of optical wavelengths are of interest, for example, as photonic band gap materials (which have band gaps for the propagation of photons at specific frequencies, allowing the control of light through the material). Zakhidov *et al.* (p. 897; see the cover and the Perspective by van Blaaderen) prepare microporous carbon materials via a synthesis route resembling the geological formation of opal, a gem consisting of small silica spheres with hydrous silica filling the voids between the spheres. They infiltrate crystals made of sintered silica spheres with carbon precursors and subsequently extract the silica. A range of ordered, stable materials with different properties of the wall materials depending on the synthesis conditions can be made that have periodicities at optical wavelengths.

LONG-TERM AGROECOSYSTEM EXPERIMENTS

Is world food production sustainable? What influence will global change have on ecosystems? Can historical trends in atmospheric contaminants be determined? Such questions are difficult to answer, in part because

the ecological processes involved are slow and short-term studies often fail to detect trends. Rasmussen *et al.* (p. 893) overview the contribution that a small number of long-term agroecosystem experiments (in some cases dating back to the middle of the last century) have been making in assessing changes in the environment and their influence on agricultural and natural ecosystems.

A THIN SKIN ON THE INNER CORE

Seismic waves travel faster through the inner core in a north-south direction than waves that travel east to west. Song and Helmberger (p. 924) present evidence for a subtle layer in the inner core based on analysis of seismic waves that traverse or reflect off of the inner core beneath the central Pacific Ocean. They use unusually broad pulses from long-period inner-core seismic waves, anomalous reflections from short-period inner-core waves, and a possible triplication of the short-period waves to model a thin isotropic outermost shell of randomly oriented iron grains (about 200 kilometer maximum thickness) that surrounds an anisotropic innermost core of iron grains aligned along a north-south direction. Such a model can be used to test theories about the geodynamo, the cooling of the core, and the structural transition between the inner and outer core.

ISOTOPIC GROWTH

Crystals of different isotopes of an element will have different lattice constants, but this effect is extremely small, typically on the order of 1 in 100,000, and is difficult to measure. Previous measurements have been made on isotopically pure single crystals, which can be hard to obtain at the level of perfection required for such measurements. Kazimirov *et al.* (p. 930) have grown germanium-76 films epitaxially on a normal germanium substrate and measured the small lattice mismatch between them by Bragg diffraction. Good agreement with theory is obtained for the temperature dependence of the effect.

WATCHING AN ENZYME AT WORK

To a geneticist, RNA polymerase initiates the process of gene expression by making a single-stranded RNA copy of the double-helical DNA genome. To a biochemist, RNA polymerase strings together single ribonucleotide triphosphates in a sequence dictated by the DNA template. Wang *et al.* (p. 902) use an optically controlled gauge to measure force and velocity online, revealing how RNA polymerase appears to a physicist: moving at constant speed at times, pausing at other moments, and even moving backward occasionally.

TESTING MALE FITNESS

Haldane's rule predicts that the fitness loss from hybridization between species will affect the viability and fertility of the heterogametic sex more than the homogametic sex. Presgraves and Orr (p. 952; see the Perspective by Turelli) study two genera of mosquito to test theoretical explanations for Haldane's rule. Analysis of the structure of the Y chromosomes and the effects of hybridization on fertility and viability reveal some of the mechanisms operating behind Haldane's rule.

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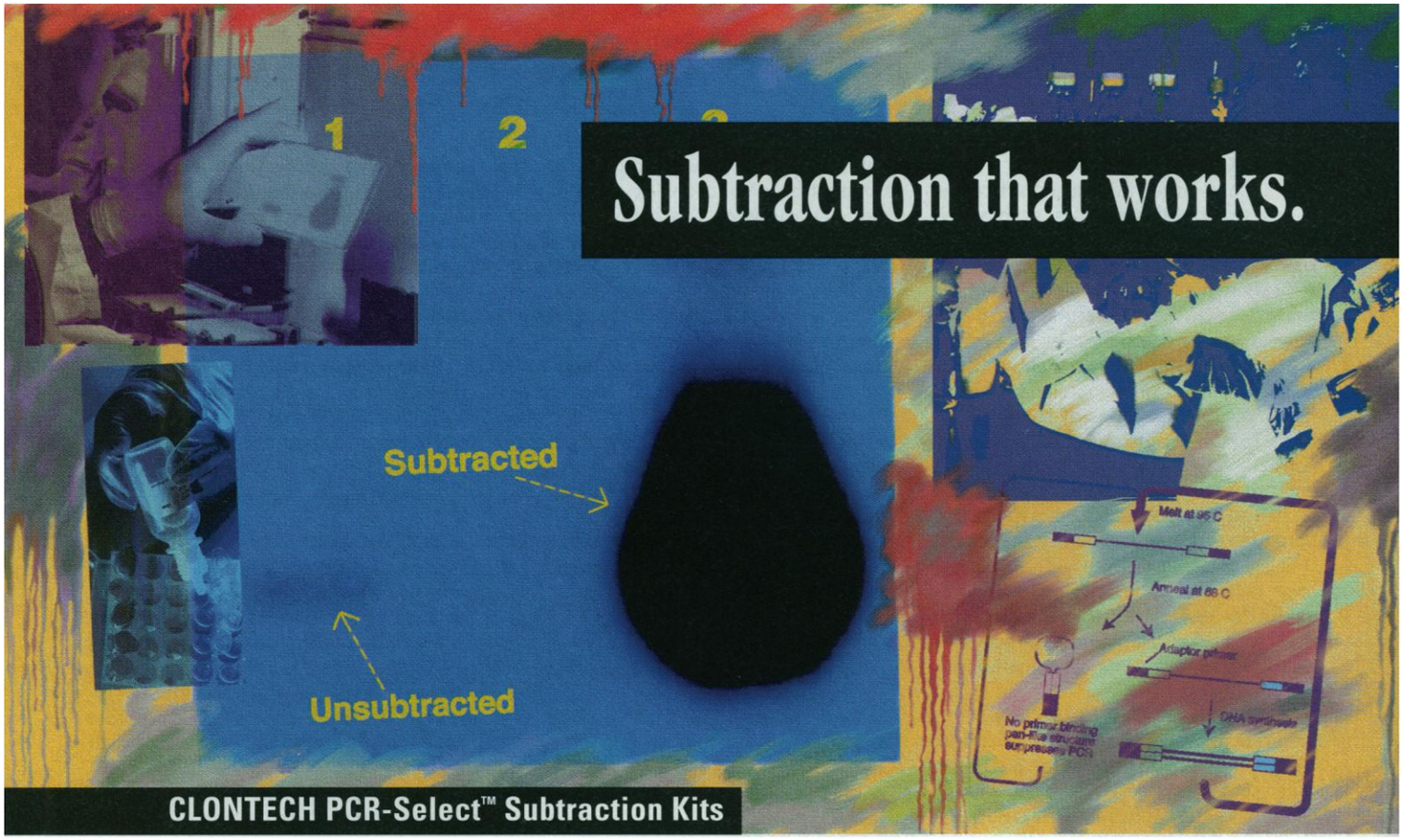
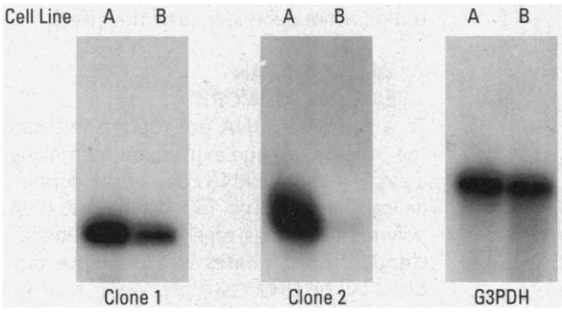


Illustration inspired by the art of Robert Rauschenberg (1925).



PCR-Select is a powerful method for isolating and cloning differentially expressed genes. cDNA amplified from two cell lines (A & B) was blotted and hybridized to labeled cDNA clones isolated using the PCR-Select Differential Screening Kit (#K1808-1). Results confirm differential expression of both clones. Control hybridization with G3PDH, a housekeeping gene, indicates lanes were equally loaded.

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THIS WEEK IN *SCIENCE*

CONTINUED FROM PAGE 841

PLANNING A COLONY

Filamentous multicellular colonies of the cyanobacterium *Anabaena* require both photosynthesis and nitrogen fixation, but these processes must occur in different cells. Determination of the fate and organization of these two cell types within the colony represents a simplified case of pattern formation. Yoon and Golden (p. 935; see the Perspective by Haselkorn) have identified a small peptide signal that emanates from one cell type to inhibit differentiation of similar neighbors. Thus, through cell-cell signaling, the nitrogen-fixing cells form a pattern distributed throughout the colony of cyanobacteria.

HEPATITIS C VIRUS TARGET

Approximately 70 million people worldwide are chronically infected with hepatitis C virus (HCV), which can result in hepatitis, cirrhosis, and liver cancer. The inability to infect cells with HCV in vitro has made it difficult to study events in the virus life cycle that could provide clues to vaccines and therapeutic strategies. Pileri *et al.* (p. 938) have found that the viral envelope protein E2 binds to the major extracellular loop of the human protein CD81. Only chimpanzees who had been vaccinated with the viral envelope and resisted subsequent viral infection had antibodies that inhibited the ability of HCV to bind to CD81.

STICKING WITH IT

Inflammatory sites entice leukocytes to leave the circulation and move into the surrounding tissue. One of the adhesion molecules that participates in this process is CD44. Maiti *et al.* (p. 941) found that a cytokine commonly produced at such sites, tumor necrosis factor–α, increases the adhesiveness of the CD44 on leukocytes by stimulating the cells to decorate CD44 with sulfate, not by inducing increased production of CD44. Thus, sulfation is a regulated, inducible process that contributes to the increased adhesiveness of leukocytes and that may aid their function during inflammation.

LONG LIVE ... THE FLY

Understanding the process of aging may help in extending life-span and in maintaining improved quality of life. Lin *et al.* (p. 943; see the news story by Pennisi) isolated a mutant fly, *methuselah*, with a 35% increase in average life-span. The mutation was confined to a single gene that also confers improved resistance to stress. The *methuselah* gene product is related to a set of receptors involved in cellular signal transduction.

LESS AGGRESSIVE, MORE SUCCESSFUL

Why are certain organisms so successful when introduced into a new environment? One possiblity is behavior modification. Holway *et al.* (p. 949; see the news story by Strauss) identify loss of intraspecific aggression—and a concomitant lack of territoriality—in an introduced species of ant. In its native range, the Argentine ant exhibits pronounced aggression, but seldom do colonies introduced in southern California. In paired lab combinations, nonaggressive colonies have lower mortality and actually cooperate, providing significant advantages over aggressive, territorial combinations.

TECHNICAL COMMENT SUMMARIES

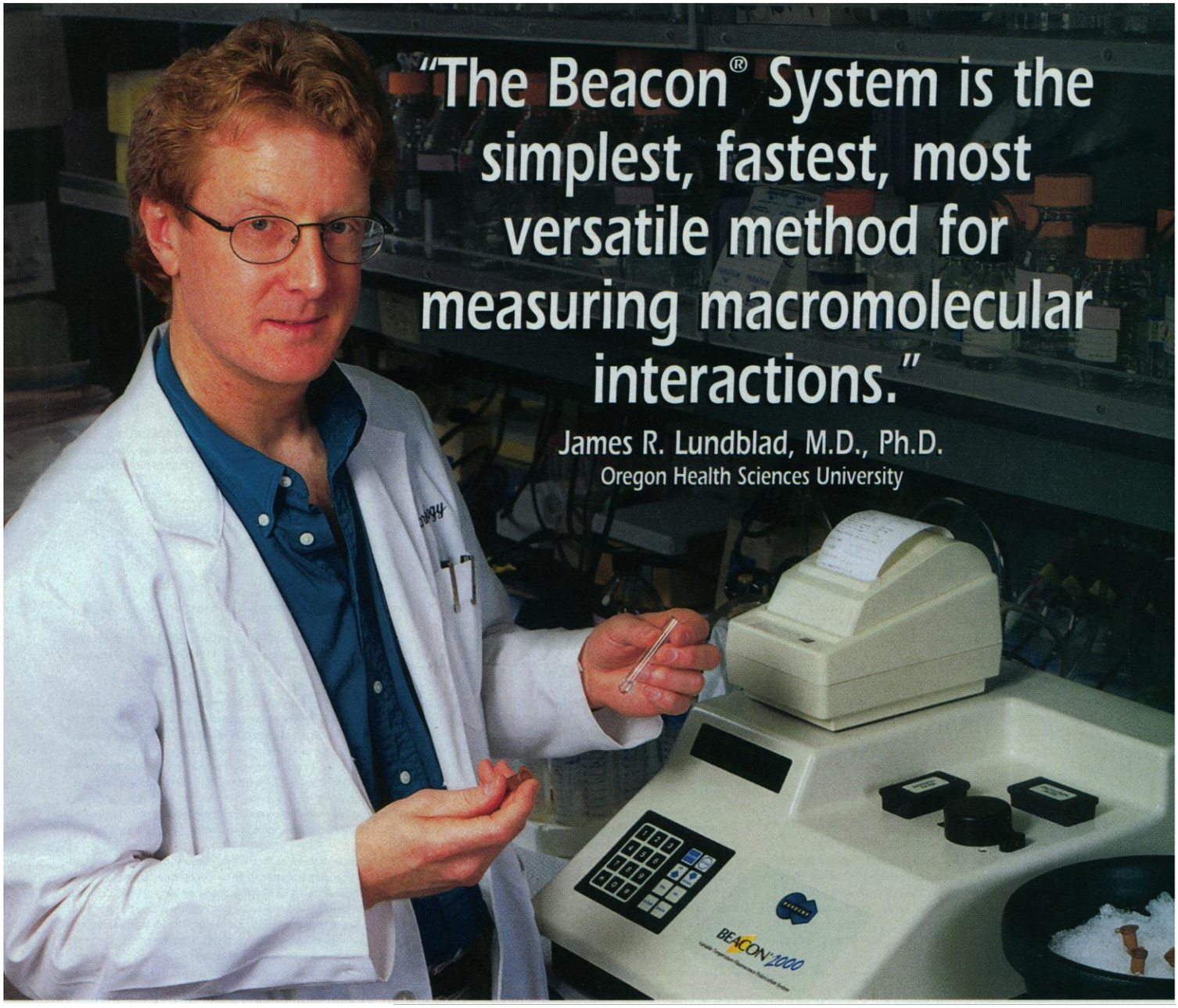
Ebola Virus, Neutrophils, and Antibody Specificity

The full text of these comments can be seen at www.sciencemag.org/cgi/content/full/282/5390/843a

Z.-y. Yang *et al.* reported that the secreted glycoprotein (sGP) of Ebola virus interacted with human neutrophils through the CD16b surface receptor (Reports, 13 Feb., p. 1034).

T. Maruyama *et al.* comment that the study "did not exclude the possibility that the rabbit antibody used to detect the binding of Ebola sGP" mediated the interaction between virus and cell. They "performed flow cytometry to study the putative interaction of sGP with neutrophils" with human and rabbit monoclonal antibody fragments specific for sGP. They "could not detect any binding of sGP to neutrophils." They also did not observe absorption of sGP by purified neutrophils. They conclude that "Ebola sGP does not bind FcγRIIIb (CD16) or any other receptor on neutrophils.

In response, Yang *et al.* confirmed the inability to detect binding with an antibody fragment. However, they give several reasons for this result, and they performed a new experiment, which suggests that the explanation provided by Maruyama *et al.* "does not account for all of the available data." "Additional studies," they say, "will be required to determine whether CD16 is directly or indirectly responsible for the interaction." (Yang *et al.* also provide a correction to the far-left graph of figure 1A of their report.)



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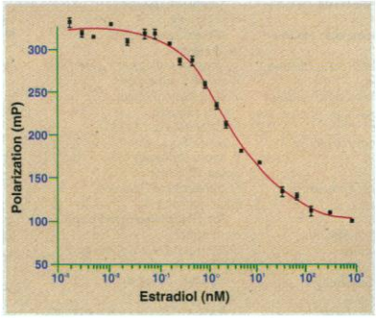

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Lundblad, J. R., *et al.*, Fluorescence polarization analysis of protein-DNA and protein-protein interactions, *Molec. Endocrinol.*, **10**, 607-612 (1996).
Laurance, M. E., *et al.*, Differential activation of viral and cellular promoters by human T-cell lymphotropic virus-1 Tax and cAMP-responsive element modulator isoforms, *J. Biol. Chem.*, **272**, 2646-2651 (1997).
Lundblad, J. R., *et al.*, Adenoviral E1A-associated protein p300 as a functional homologue of the transcriptional co-activator CBP, *Nature*, **374**, 85-88 (1995).

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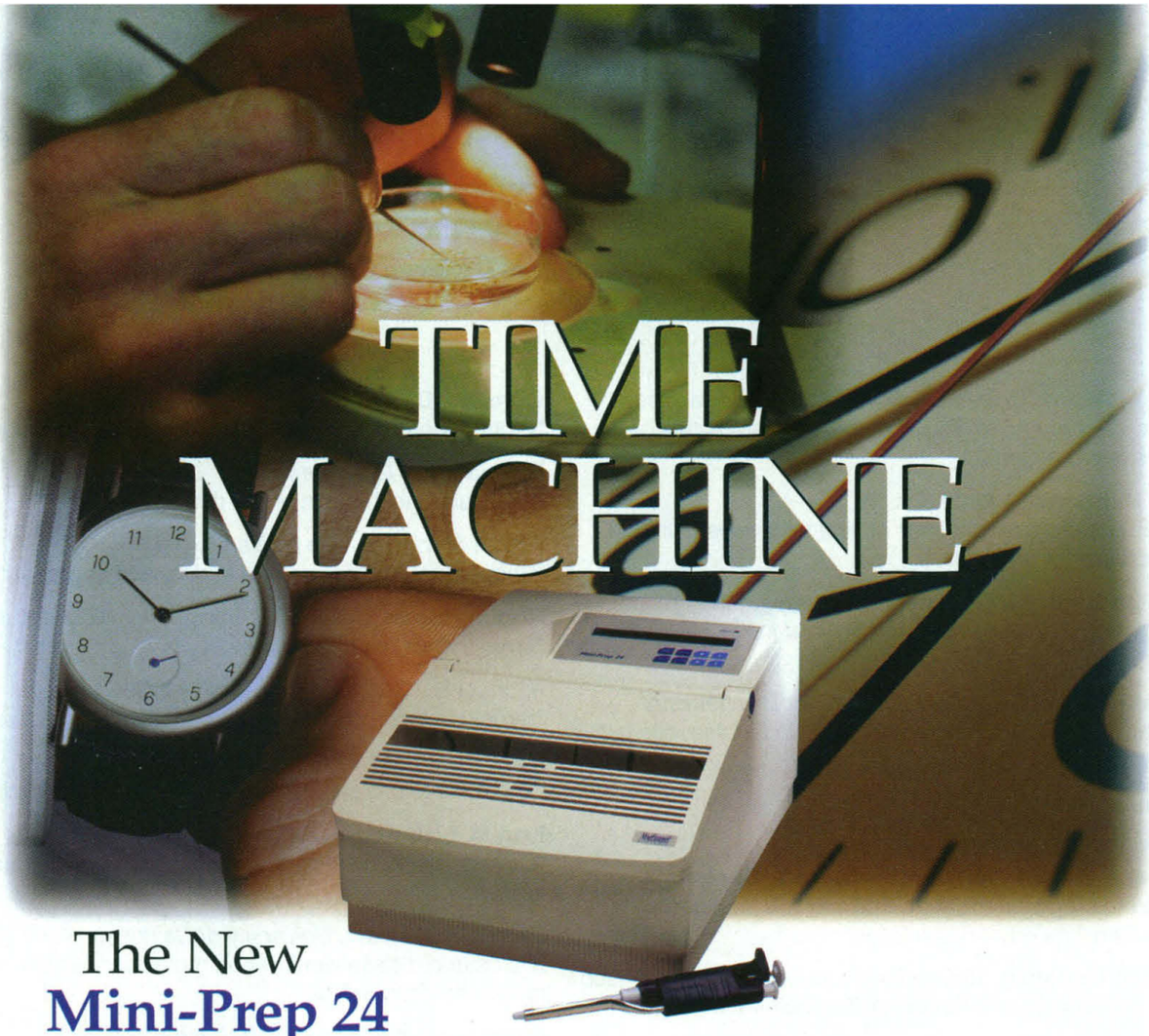

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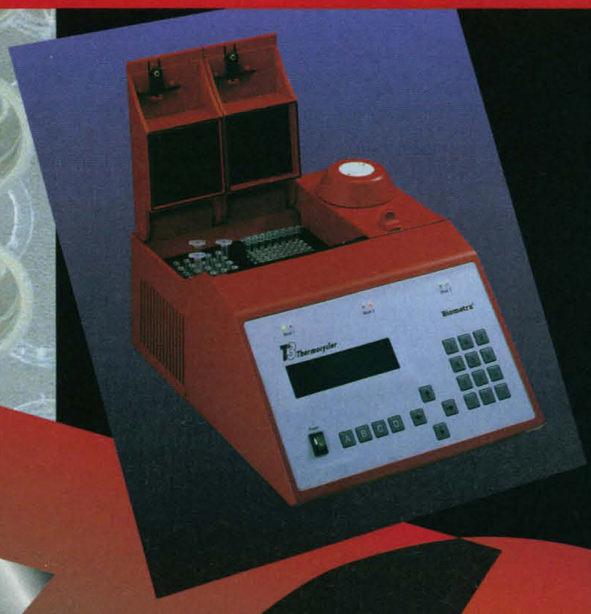

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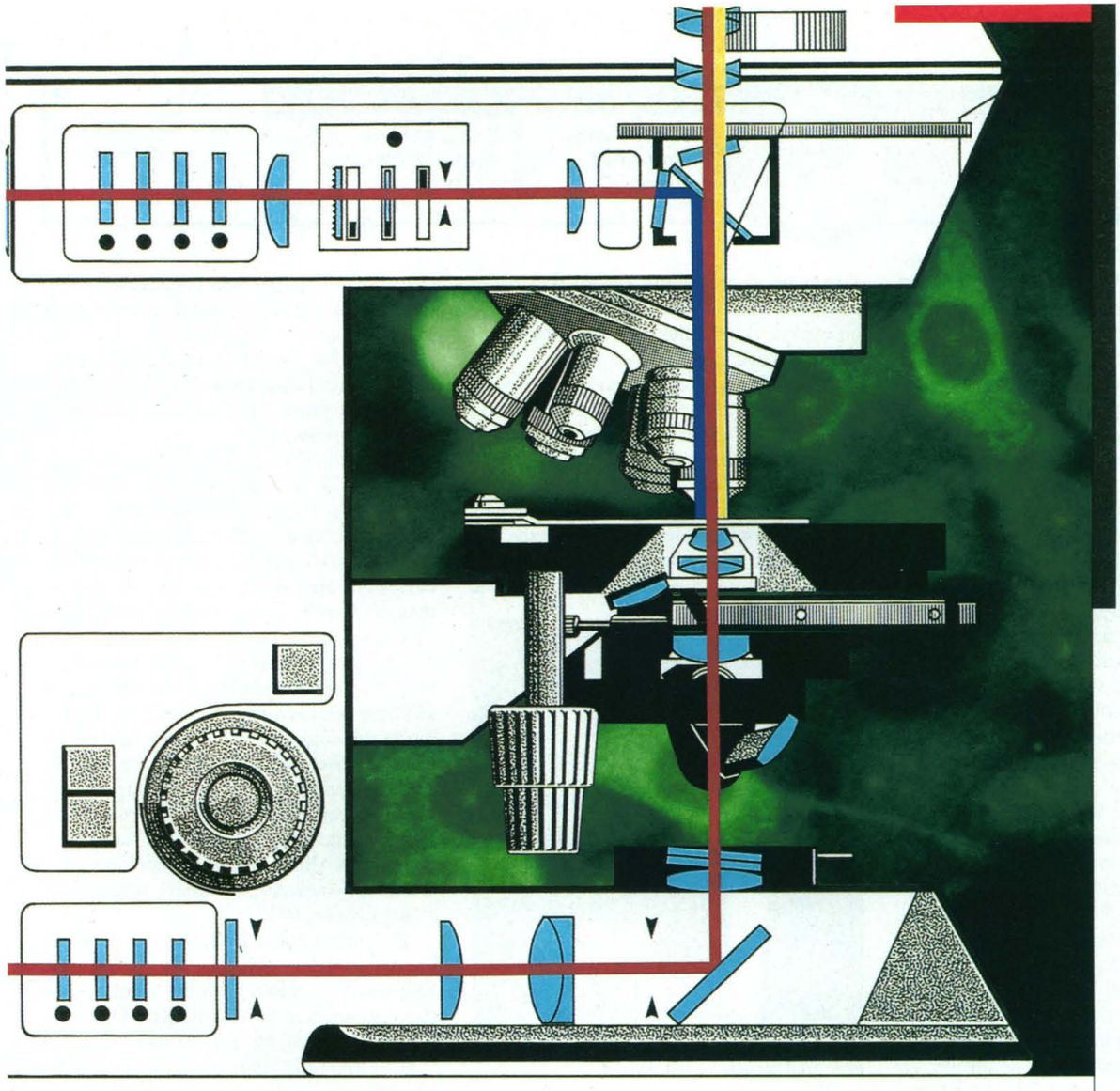

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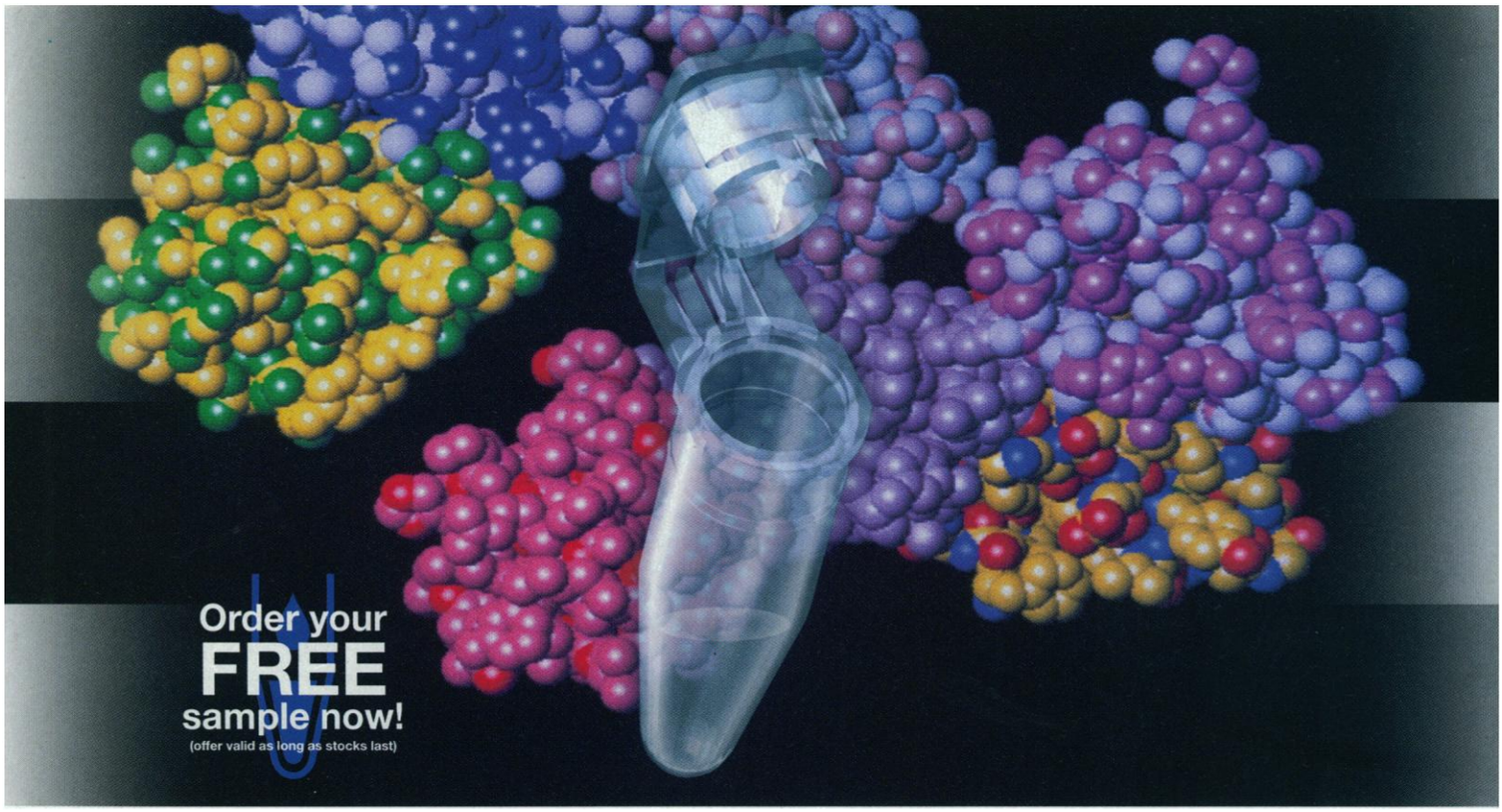

Background picture: Insuline, computer generated molecular model

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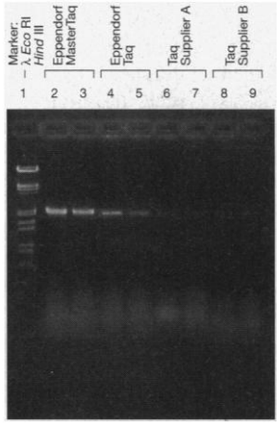
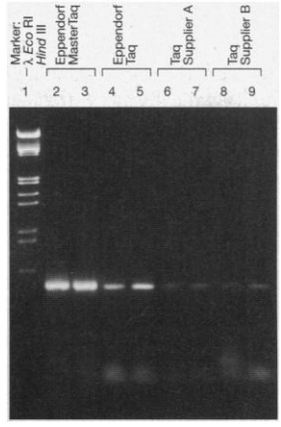


● Fig.1: Amplification of a SSU rRNA gene from total genomic algae DNA
PCR was performed from genomic algae using different Taq DNA Polymerases. Equal volumes of the PCR reactions were analyzed by gel electrophoresis.



● Fig. 2: Amplification of a GAPDH specific DNA fragment from genomic blood DNA
PCR was performed from human genomic blood with different Taq DNA Polymerases. Equal volumes of the PCR reactions were analyzed by gel electrophoresis.

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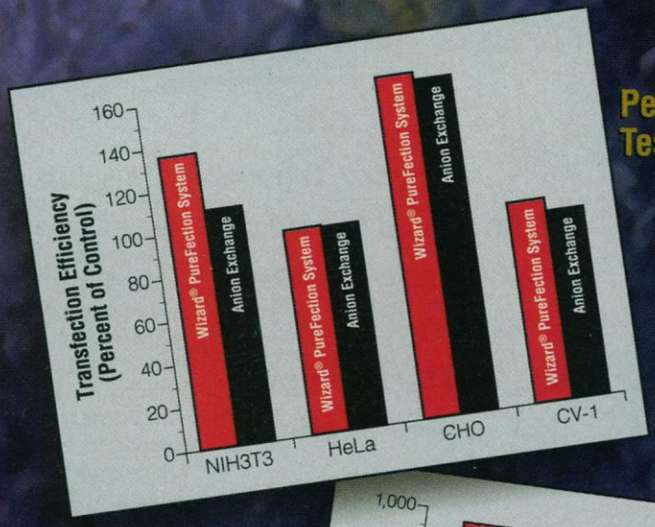

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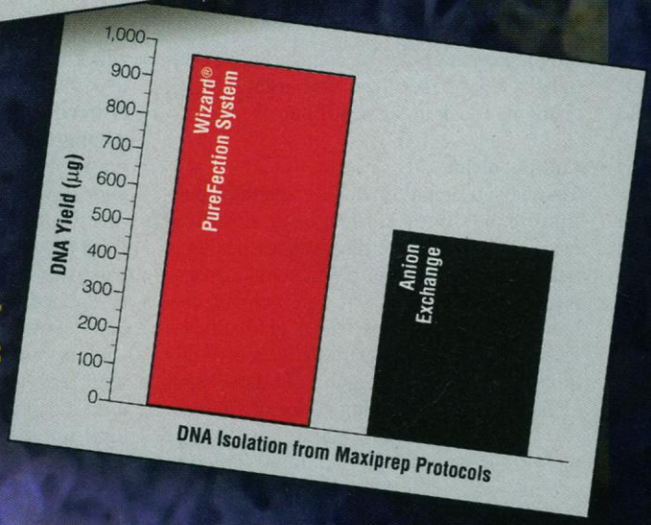

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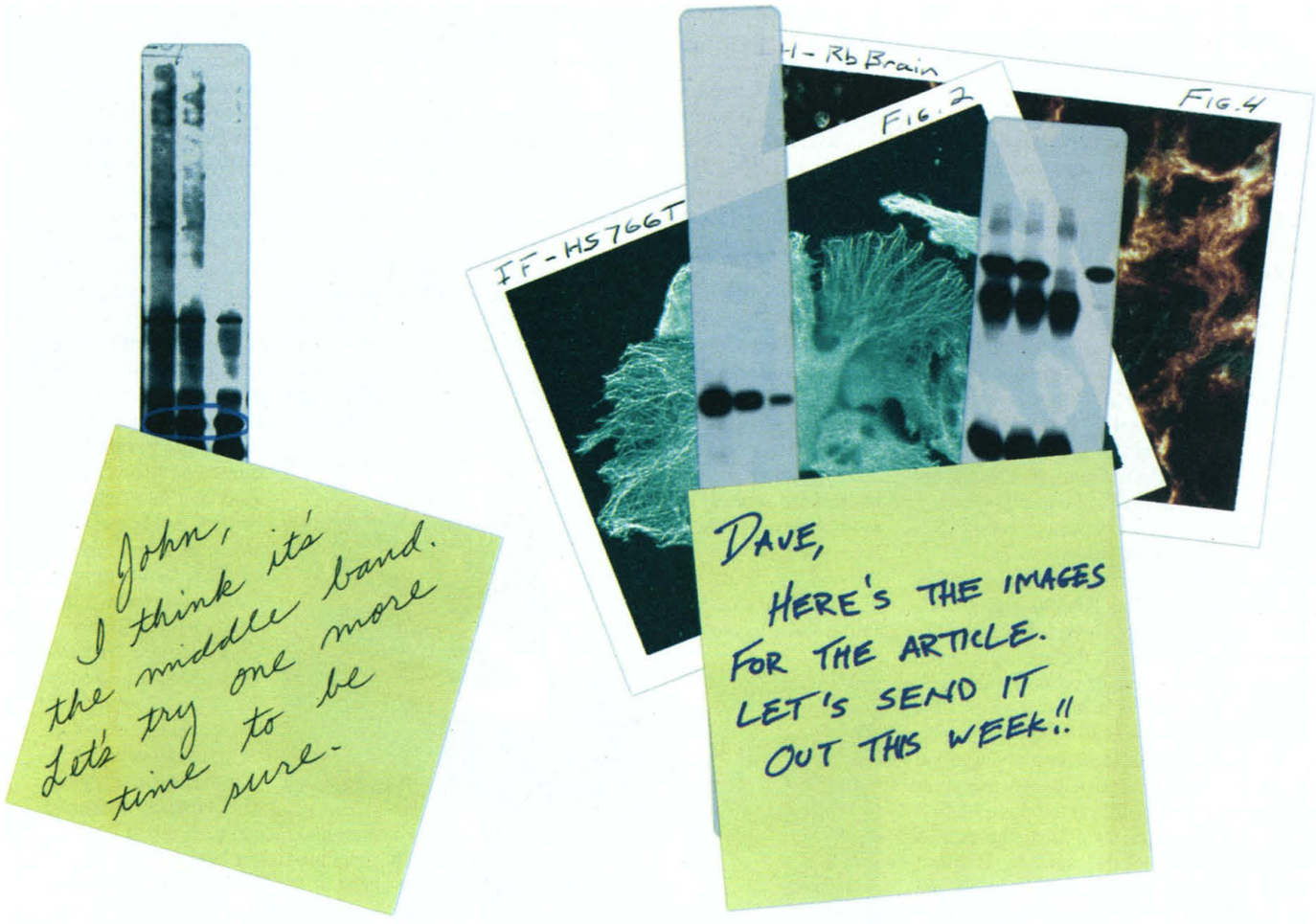

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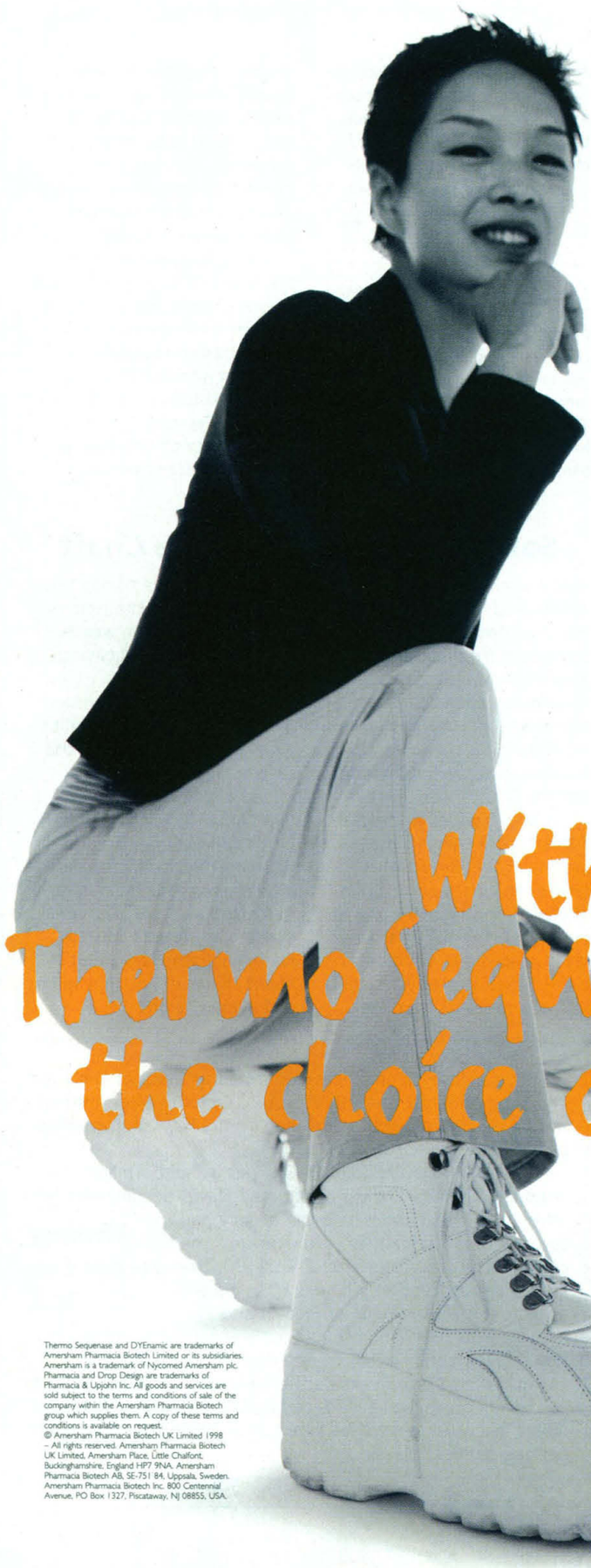

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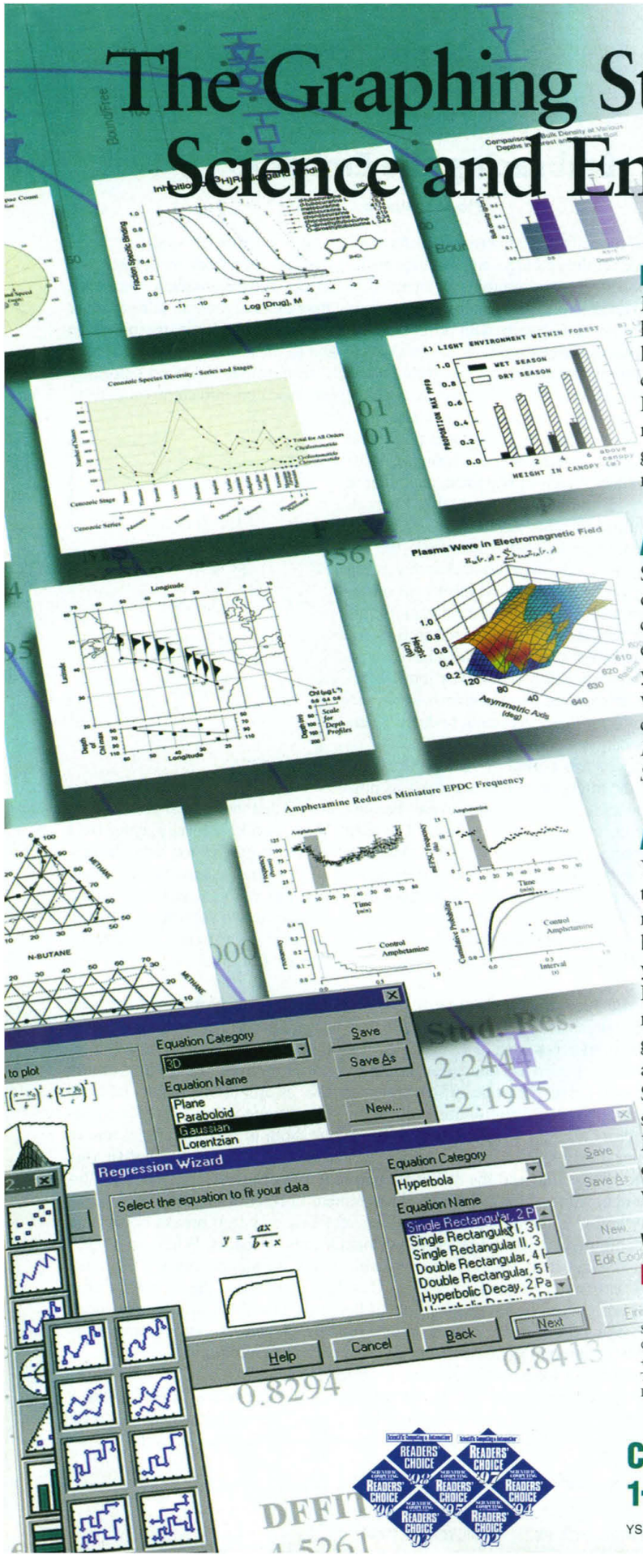

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The NCI Clinical Trials Cooperative Groups have banked tumor specimens from large numbers of uniformly treated cancer patients with a variety of malignancies. Each group has a review process for research proposals. If proposals receive favorable reviews, specimens with clinical, treatment and outcome data can be made available to researchers through collaborative arrangements. These banked specimens are most useful for clinical correlative studies on uniformly treated patient populations. Contact the NCI Human Specimen and Data Information System website at: http://www.specimens.ims.nci.nih.gov, or the NCI Tissue Expediter, (301)496-7147; e-mail: tissexp@mail.nih.gov.

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The Cooperative Family Registry for Breast Cancer Studies (CFRBCS) provides biological specimens with associated family history, clinical, demographic and epidemiologic data from participants with a family history of breast cancer, breast/ovarian cancer, or Li-Fraumeni syndrome, and their relatives. The CFRBCS's repository is particularly suited to support interdisciplinary and translational breast cancer research. Contact the CFRBCS website at: http://www-dceg.ims.nci.nih.gov/cfrbcs, or Dr. Daniela Seminara, NCI, (301) 496-9600; e-mail: seminard@epndce.nci.nih.gov.

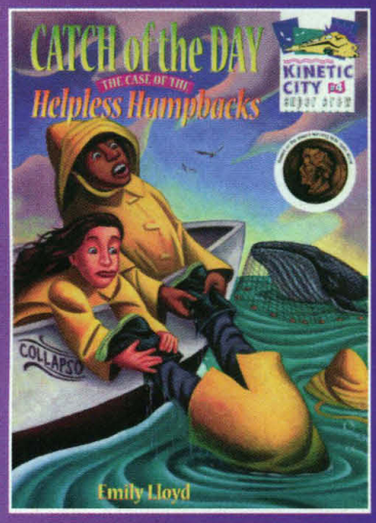
The NCI Cooperative Breast Cancer Tissue Resource (CBCTR) can provide researchers with access to over 9,000 cases of formalin-fixed, paraffin-embedded primary breast cancer specimens, with associated pathology and clinical data. The collection is particularly well-suited for validation studies of diagnostic and prognostic markers. Contact CBCTR's website at: http://www-cbctr.ims.nci.nih.gov, or Ms. Sherrill Long, Information Management Services, Inc., (301) 680-9770; e-mail: sherrill@ims.nci.nih.gov.

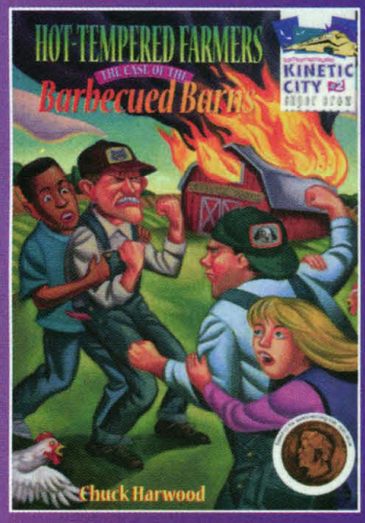
The NCI AIDS Malignancy Bank (AMB) is a collection of tissue and biological fluids with associated clinical and follow-up data from patients with HIV-related malignancies. The specimens and clinical data are available for research studies, particularly those that translate basic research findings to clinical application. Contact the AMB website at: http://cancernet.nci.nih.gov/amb/amb.html, or Dr. Ellen Feigal, NCI, (301) 496-6711; e-mail: ef30d@nih.gov.

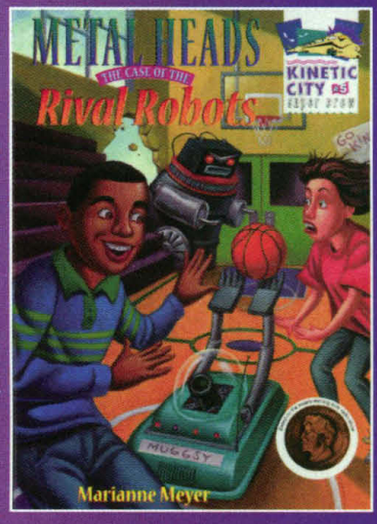
Each of the resources listed above has an established review process for specimen requests and/or requirements that must be met for access to specimens. Additional details may be obtained from the resource websites and/or resource contacts.

The NCI Breast Cancer Specimen and Data Information System can provide additional information on breast cancer tissue resources (http://www-napbc.ims.nci.nih.gov).

Other human specimen resources for cancer research may be available through collaborative arrangements. Contact the NCI Tissue Expediter at, (301) 496-7147, e-mail: tissexp@mail.nih.gov.







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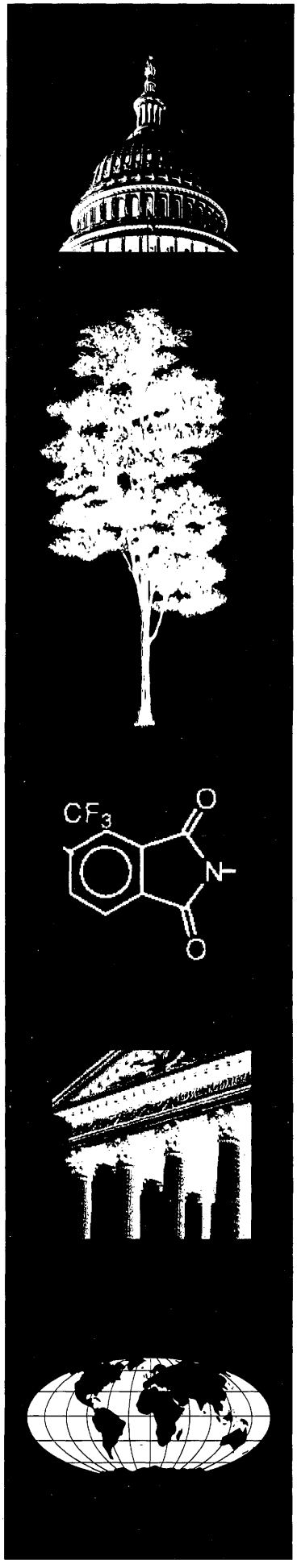

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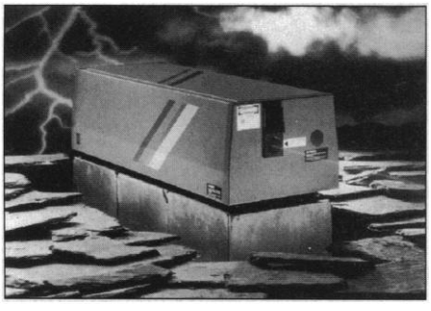

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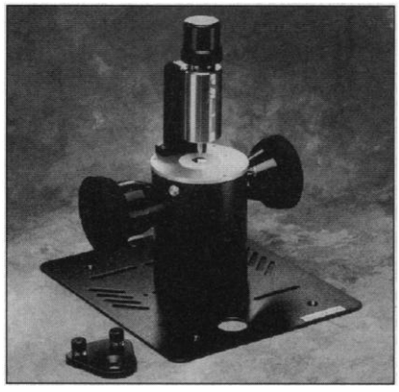

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