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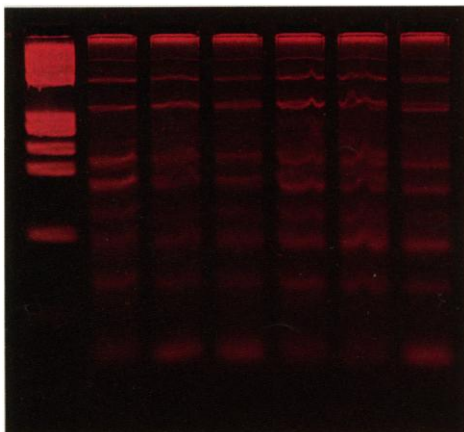
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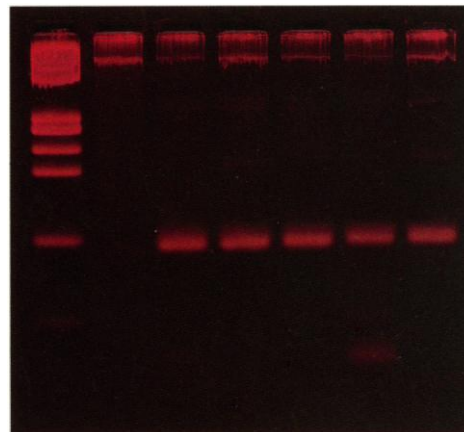
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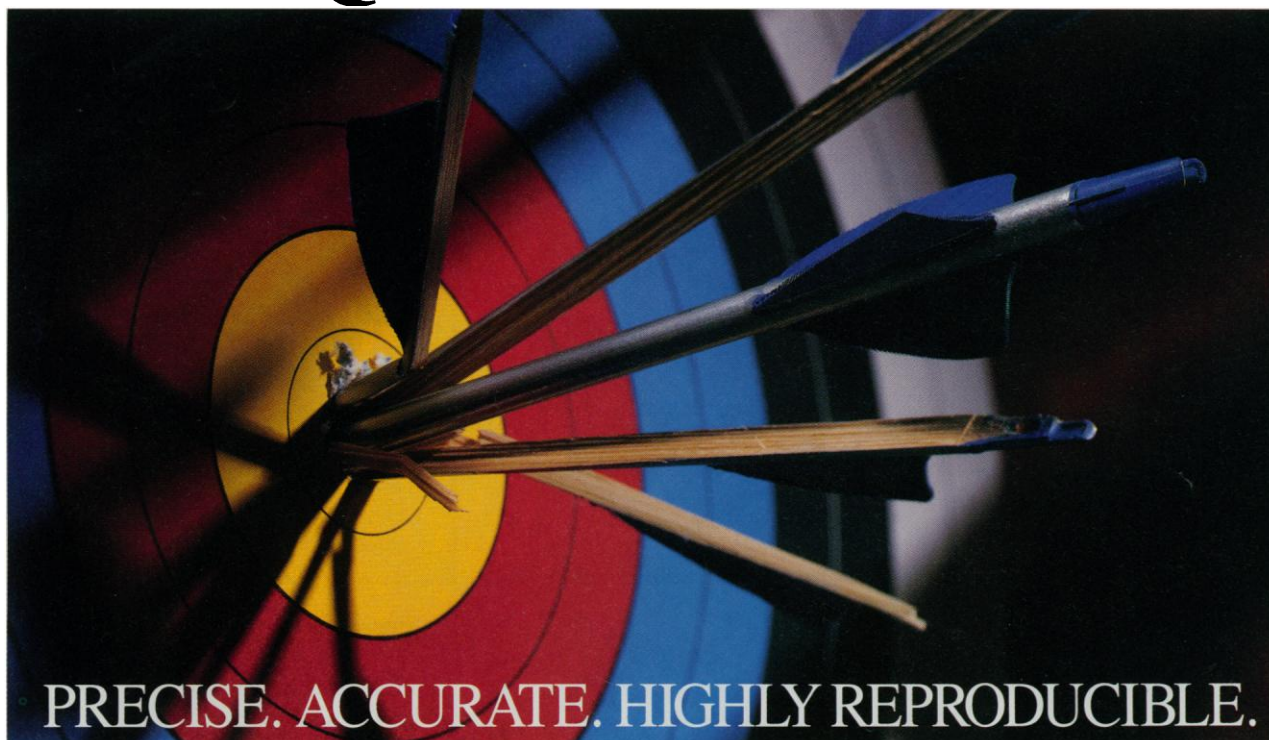
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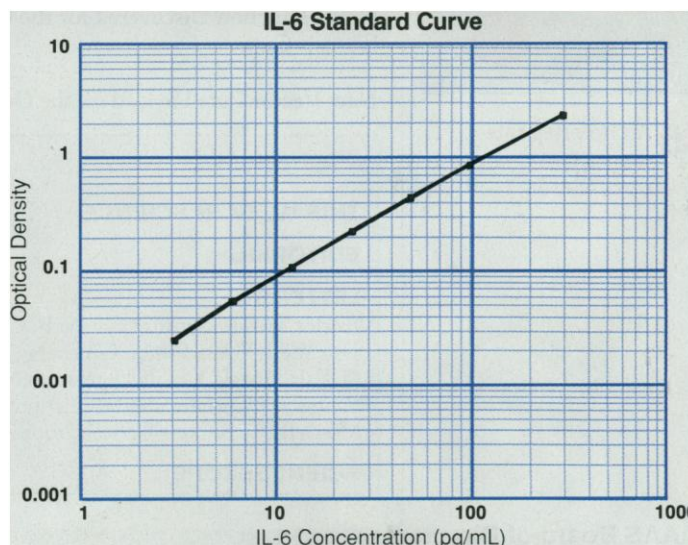
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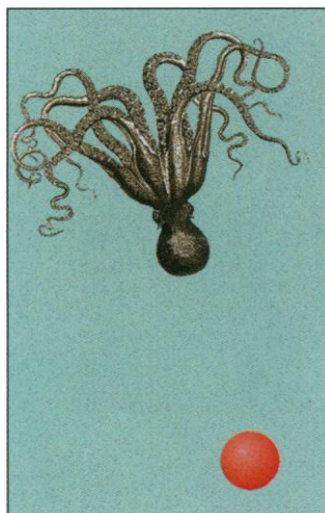
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learns by
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COVER

Europe is in the midst of a big step toward economic unity. This year marks the creation of the European Community's single market, and at least five countries are expected soon to join the 12 current members. The implications for science of this trend toward a more

tightly knit Europe are explored in a special news report section (pages 457 to 477) and in a series of Perspectives from leading figures in European science (pages 478 to 488). [Illustration: Bill Firestone]



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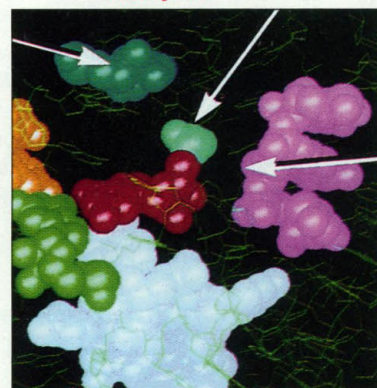
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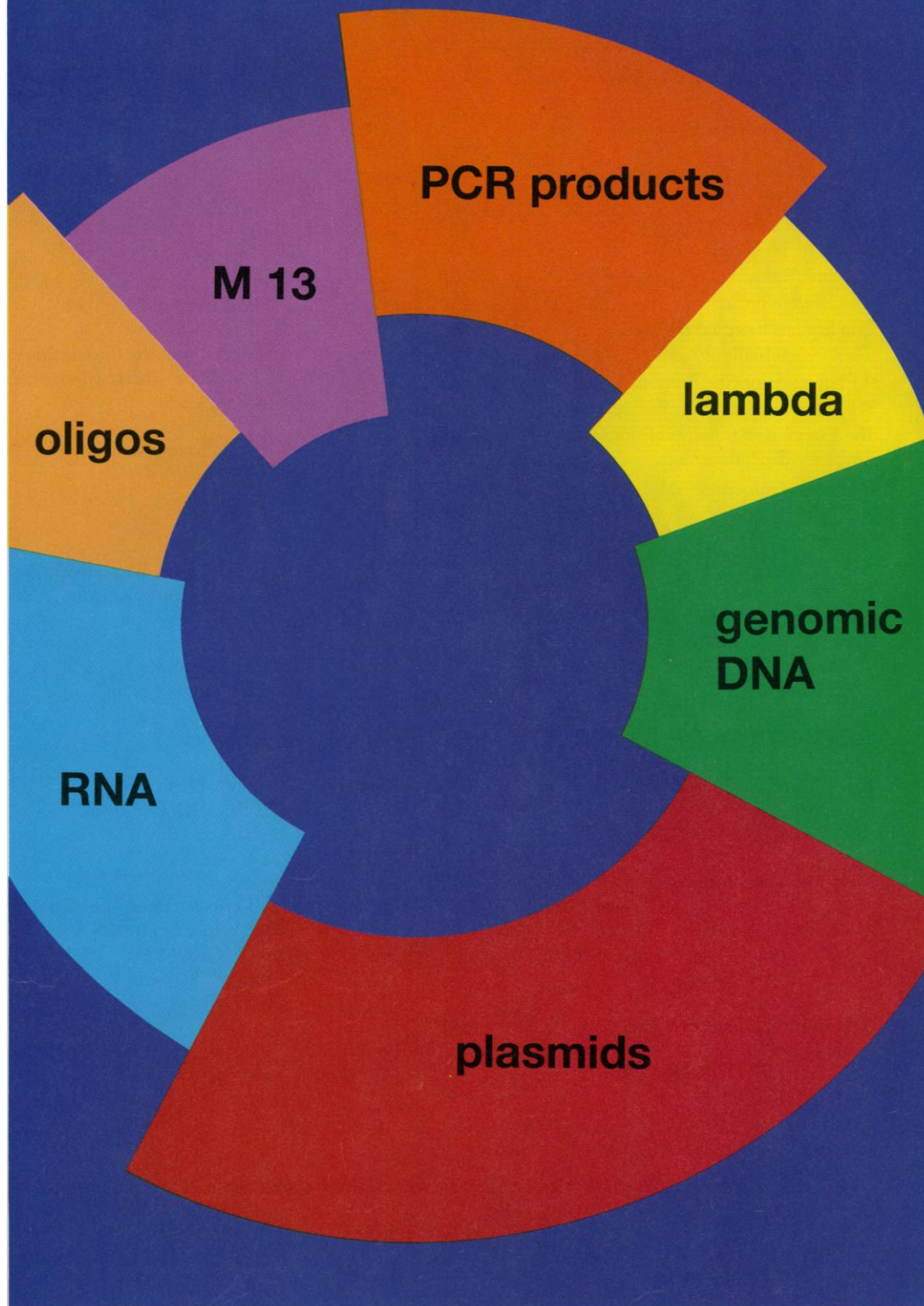
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Cosmic fractals

In some ways, the distribution of galaxies and clusters in the universe exhibits fractal properties that may help cosmologists understand how the uniform early universe could evolve into the highly structured cosmos we see today. Luo and Schramm (p. 513) show that the galaxy and cluster correlation functions can be modeled with a "limited" fractal of dimension 1.2. The authors further argue that these kinds of fractals could have grown by diffusion-limited aggregation, starting from sheetlike two-dimensional astrophysical seeds such as the wakes of cosmic strings or domain walls formed in the early universe.

Lower mantle signatures

One result of upwelling mantle plumes, perhaps derived from the lower mantle, is the formation of volcanic ocean islands. The geochemistry of the basalts in these islands provides information on the origin of the plumes and their interaction with the surrounding mantle during their ascent and partial melting. Hart *et al.* (p. 517) used Sr, Nd, Pb, and He isotopic data from 570 islands to examine these issues. Several distinct mantle source regions or reservoirs were identified that form fan-shaped mixing arrays. These arrays appear to derive from a region with an isotopic signature suggestive of the lower mantle.

Plant factory

Polyhydroxybutyrate (PHB), a biodegradable thermoplastic polymer, is a nonproteinaceous storage material in many bac-

teria. Poirier *et al.* (p. 520) transferred genes encoding two enzymes, acetoacetyl-coenzyme A reductase and PHB synthetase, from the bacterium *Alcaligenes eutrophus* into *Arabidopsis thaliana*. The plants accumulate PHB in granules, which are similar to those found in the bacteria, in their cytoplasm, nucleus, and vacuole.

DNA repair

Pyrimidine dimers can form between adjacent bases along a DNA strand through ultraviolet irradiation; Morikawa *et al.* (p. 523) have determined the x-ray structure of one of the enzymes that initiates the repair of this mutation, T4 endonuclease V. This bacteriophage T4 enzyme makes use of two catalytic activities; the dimerized bases are removed by glycosylation at one of the sugar rings, and then the DNA strand is cleaved at that site. Although this protein is classified as an all α -helix structure, the NH_2 -terminal segment interpenetrates two major helices and prevents their contact. Sites for the glycosylation reaction and for DNA binding are proposed.

Large RNA structure

The biological activity of many RNA molecules is dependent on the formation of the appropriate three-dimensional (3-D) structure. Wang and Cech (p. 526) devised a technique for investigating the 3-D structure of larger RNAs and applied it to the *Tetrahymena* ribozyme, or catalytic RNA, because the ability of the ribozyme to bind and cleave substrate is structure-dependent. They derivatized the guanosine substrate of the

Octopus see, octopus do

Octopuses can learn to perform a task simply by watching another octopus that has been trained. Such observational learning is known to occur in vertebrate species and is thought to be preliminary to conceptual thought. Fiorito and Scotto (p. 345) found that *Octopus vulgaris* individuals would observe a neighbor performing a learned task (choosing a colored ball) in an adjacent tank. The observers, after being put in isolation, consistently chose the same color ball, even though they were not rewarded or punished for doing so.

Tetrahymena ribozyme with a metal chelator, which then enters the active site of the ribozyme and cleaves the RNA at positions in its vicinity. Nucleotides that are near each other in 3-D space can be identified, thus providing information regarding the catalytic center.

Membrane recycling and cystic fibrosis

In patients with cystic fibrosis (CF), the CFTR gene (cystic fibrosis transmembrane conductance regulator) is defective. Bradbury *et al.* (p. 530; see news story by Barinaga, p. 444) show that the CFTR gene, which is thought to function as a cAMP (adenosine 3',5'-monophosphate)-dependent chloride channel, also regulates the recycling of plasma membrane in a cAMP-dependent manner. Endocytosis and exocytosis in cells from a CF patient were regulated by cAMP only after transfecting the cells with the CFTR gene.

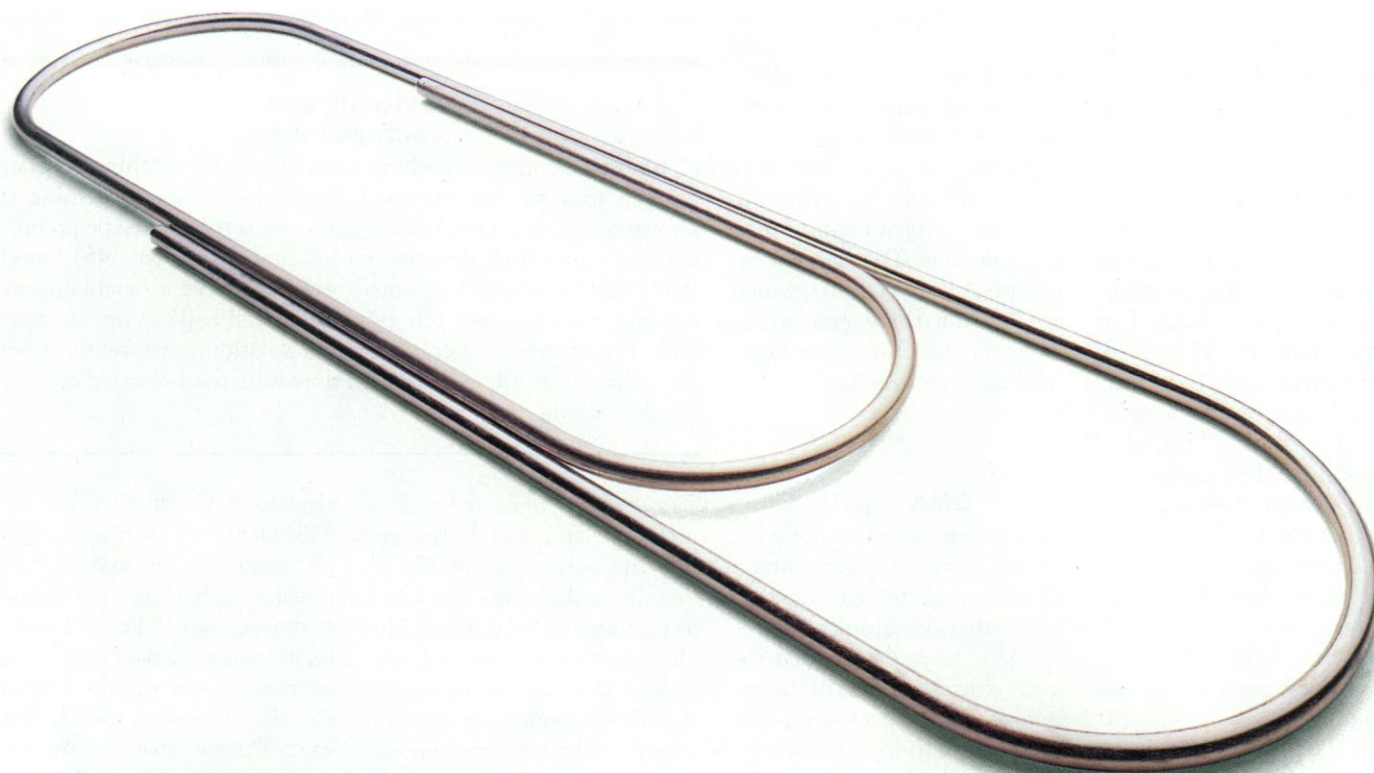
Control of myoD

Identification of the transcriptional control elements for the human *myoD* gene, which is necessary for differentiation of skeletal muscle cells, has revealed that this gene is subject to both positive and negative

regulation. Goldhamer *et al.* (p. 538) identified an enhancer and promoter that led to *myoD* expression in both myogenic and nonmyogenic cell lines. However, in transgenic mouse embryos expression was strictly limited to cells of skeletal muscle lineage. During development the expression of the *myoD* gene may require derepressing both cis and trans elements that exert negative control.

Phosphorylation and HIV infection

Surprisingly little is known about the biochemical mechanisms by which the human immunodeficiency virus (HIV) produces its cellular effects. Cohen *et al.* (p. 542) studied the effects of HIV infection on phosphorylation of cellular proteins on tyrosine, an event known to be important in regulating the function of T cells. Phosphorylation of several proteins on tyrosine residues was increased in HIV-infected cells. Furthermore, herbimycin A, an inhibitor of tyrosine kinases, inhibited syncytium formation induced by co-culture of T cells that expressed the HIV envelope glycoprotein gp41 with CD4^+ Jurkat cells. Tyrosine kinase inhibitors may prevent some of the deleterious effects of the HIV virus on T cells.



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Some of the international meetings scheduled for 1992 are:

2nd Int. Congress on Cytokines : Basic Principles and Clinical Applications

March 23-25 / Florence (I)

Scientific Organization: A.K. Abbas (USA), T.R. Mosmann (CDN) and S. Romagnani (I)

4th Int. Symposium on Hypoglycemia

March 23-24 / Rome (I)

Scientific Organization: D. Andreani (I) and V. Marks (UK)

3rd Int. Symposium on Reproductive Medicine

April 13-15 / Malta

Scientific Organization: E. Steinberger (USA) and G. Frajese (I)

Implantation in Mammals

April 23-24 / Geneva (CH)

Scientific Organization: A. Campana (I)

9th Workshop on Development and Function of the Reproductive Organs

May 25-27 / Peebles (UK)

Scientific Organization: S.G. Hillier (UK)

Heterogeneity of Cancer Cells

June 16-17 / Milan (I)

Scientific Organization: S. Garattini (I)

"Redo" Vascular Surgery

Renal, Aorto-Iliac and Infrainguinal Areas

June 25-27 / L' Aquila (I)

Scientific Organization: R. Coubier (F), A.M. Imparato (USA) and C. Spartera (I)

Local Systems in Reproduction

July 6-7 / Paris (F)

Scientific Organization: R.R. Magness (USA) and F. Naftolin (USA)

5th Int. Congress on Reproductive Immunology

August 31- September 3 / Rome (I)

Scientific Organization: F. Dondero (I) and S. Isojima (J)

5th Conference on Differentiation Therapy

September 2-5 / Villasimius, Sardinia (I)

Scientific Organization: M. Hozumi (J), G.B. Rossi (I) and S. Waxman (USA)

3rd Int. Symposium on Endocrinology Under 35

September 7-9 / Rapallo (I)

Scientific Organization: A. De Bellis (I), E. Cordella-Miele (USA) and K.B. Marschke (USA)

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Biology, Signal Transduction and Physiology

September 21-23 / Geneva (CH)

Scientific Organization: M. Ascoli (USA) and D.L. Segaloff (USA)

Growth '92: Two Decades of Experience in Growth

October 8-9 / Santiago de Compostela (E)

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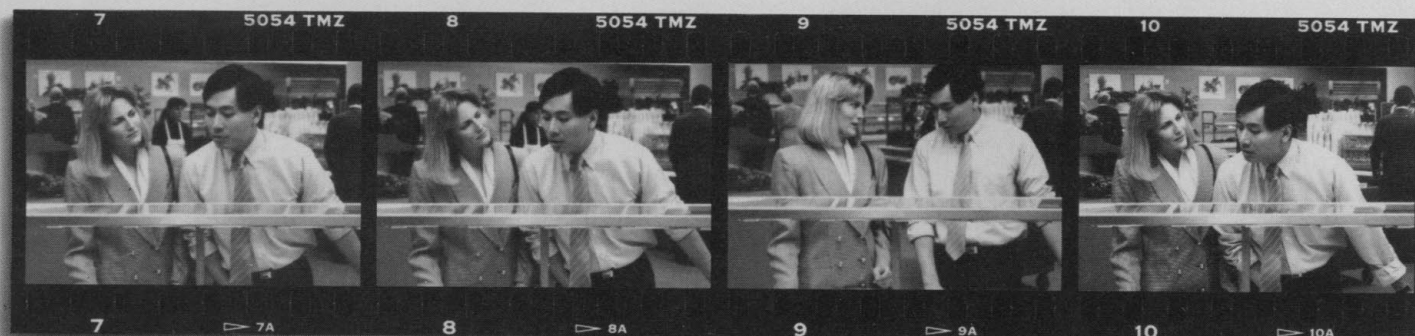
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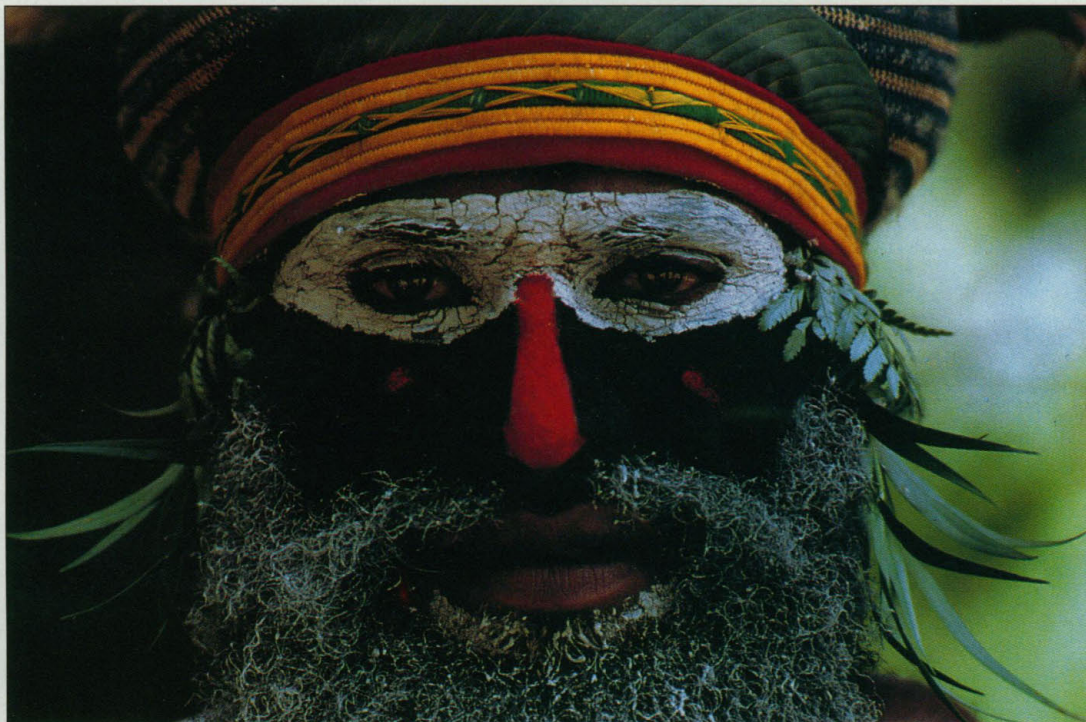
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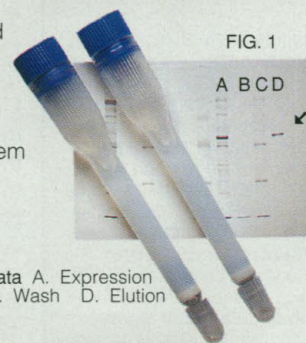


Figure 1: Expression Data A. Expression B. Flow Through C. Wash D. Elution

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1. Cell 56, 673-682 (1989). 2. Nature 340, 61-63 (1989). 3. Cancer Research 51, 958-963 (1991).
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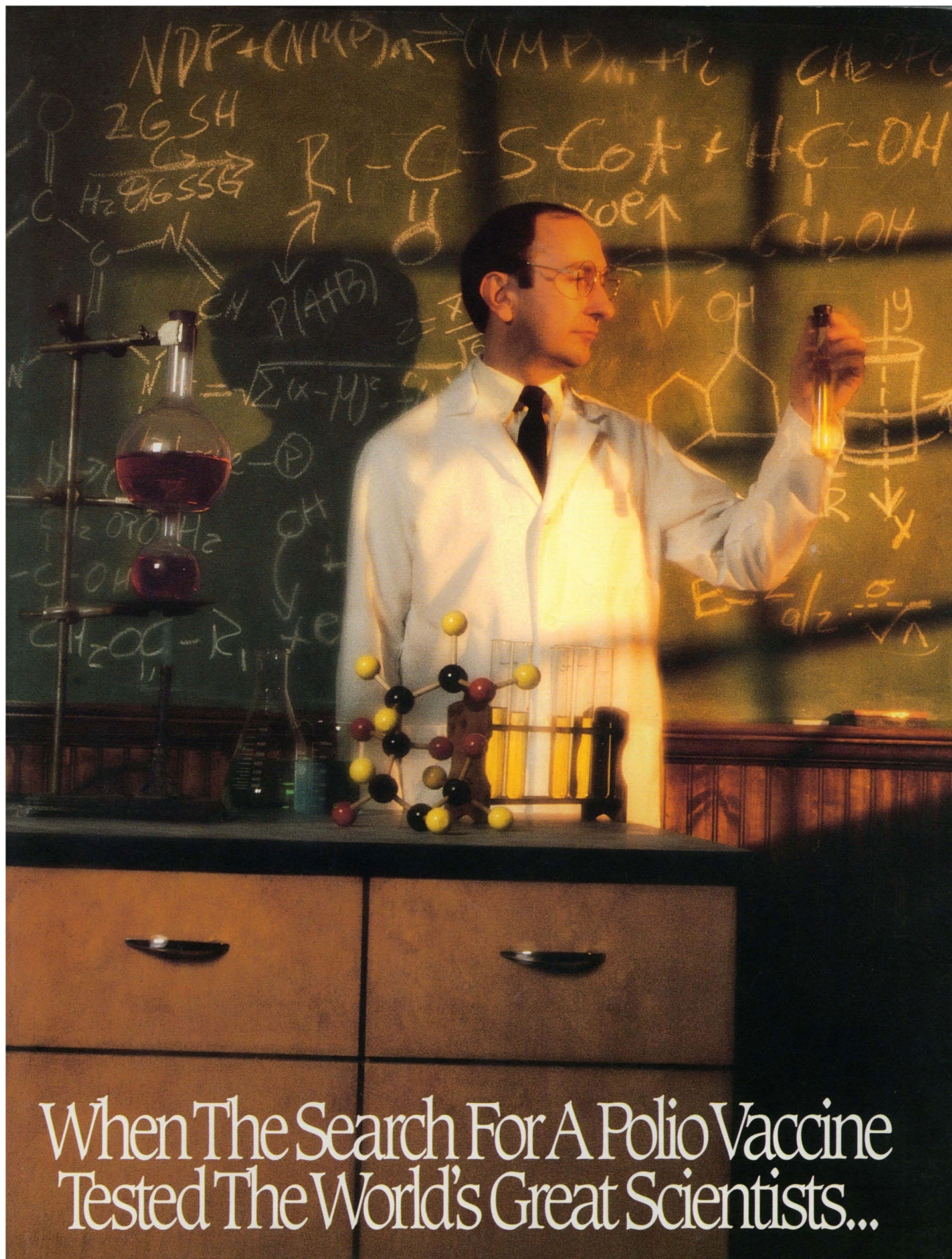
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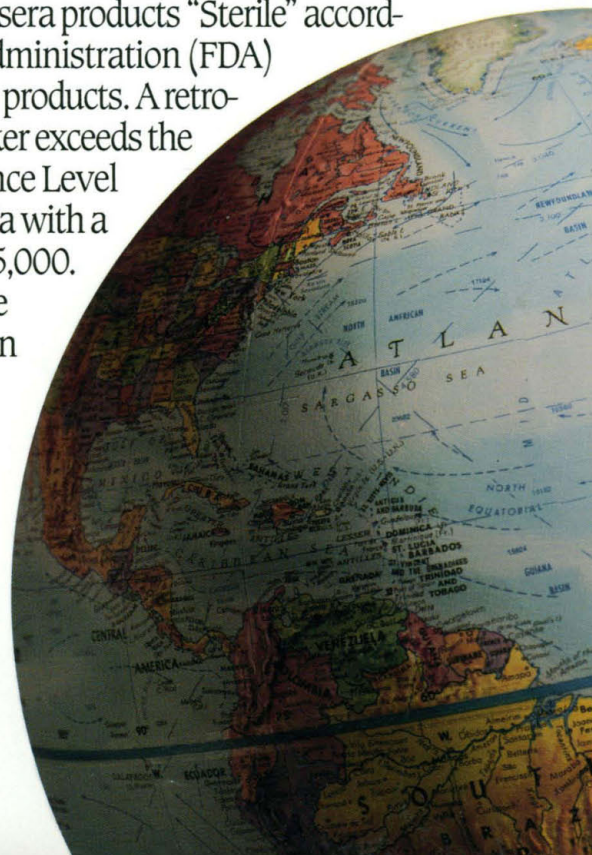
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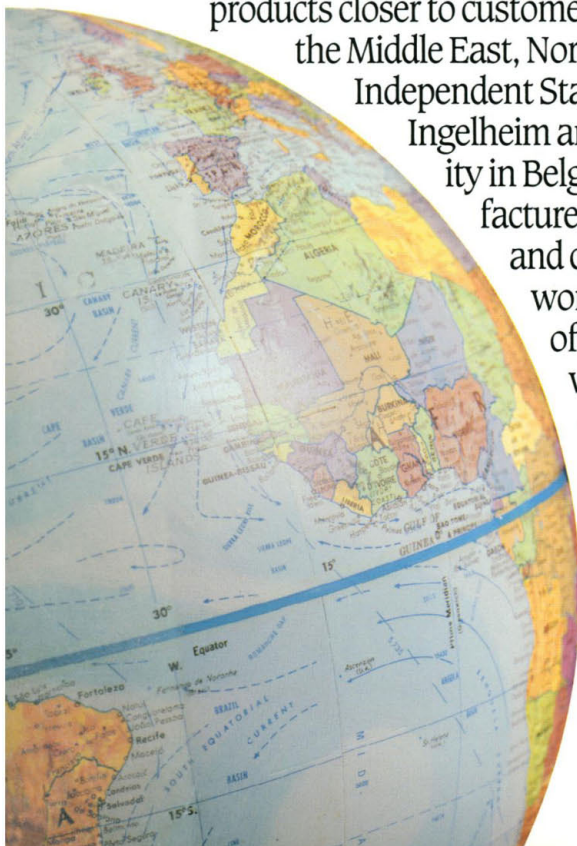
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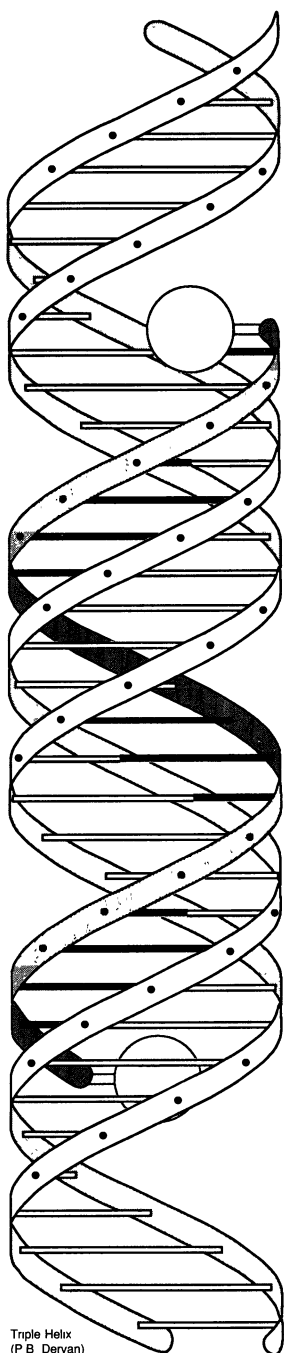
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For complete details regarding the scientific program, registration, abstract submission, or exhibits, see the 27 March issue of *Science* Magazine, call 202-326-6461, or fax your request to 202-289-4021.

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REQUEST FOR APPLICATIONS

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The Human Frontier Science Program (HFSP) aims to promote, through international collaboration, basic research to elucidate the complex mechanisms of living organisms, including man. Applications are invited for the support of research grants, fellowships and workshops in the areas set out below. The program distributed about \$13 m on new awards this year and aim to spend a similar amount in 1993.

Research Areas of the HFSP

(A) Basic research for the elucidation of brain functions

1. Perception & Cognition
2. Movement & Behaviour
3. Memory & Learning
4. Language & Thinking

(B) Basic research for the elucidation of biological functions through molecular level approaches

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Research Grants : Grants for basic research carried out jointly by research teams in different countries. The principal applicant must be from one of the eligible countries*.

Fellowships : Long-Term (*up to 2 years*), **Short-Term** (*up to 3 months*); Fellowships for researchers from the eligible countries who wish to do research in foreign countries, or for researchers outside the eligible countries who wish to do research in one of the eligible countries.

Workshops : Grants for international workshops organized by researchers from the eligible countries.

* The eligible countries for the current year are Canada, France, Germany, Italy, Japan, Switzerland, U.K., U.S.A. and non-summit EC member countries. (Details in the guidebook).

Application Deadline : September 30, 1992

For Research Grants and Long-Term Fellowships, the awards will be announced in April 1993. Applications for Short-Term Fellowships and Workshops can be submitted throughout the year.

Guidebooks and Application forms may be obtained upon written request by using the address form below. Please indicate which program activity you are interested in.

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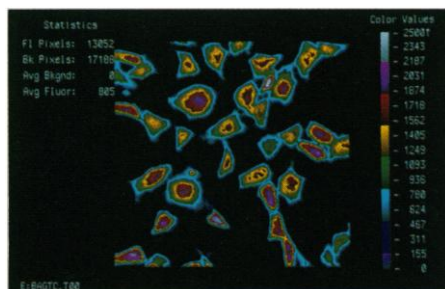
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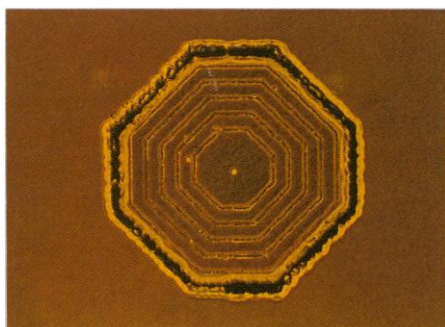
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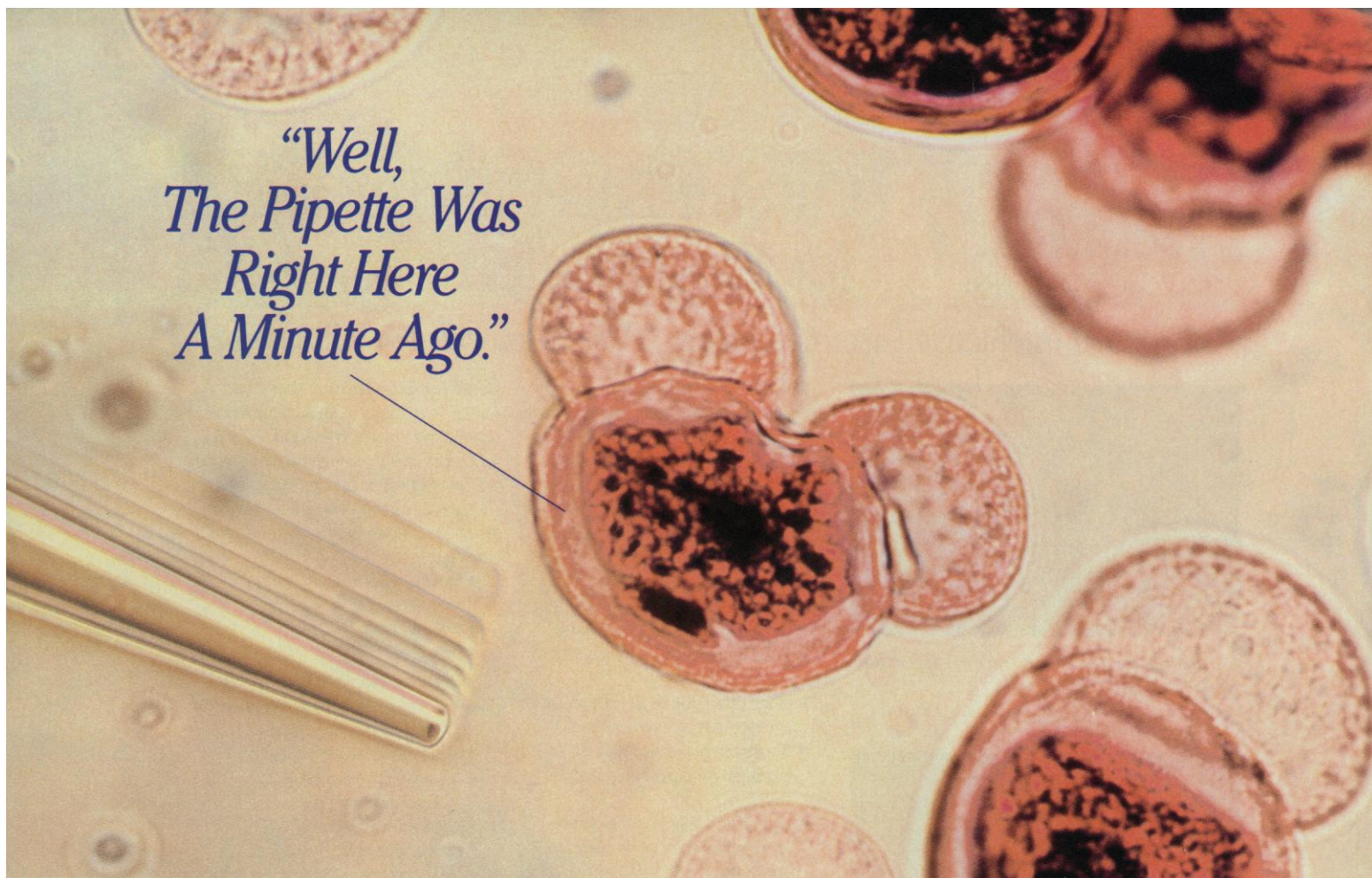
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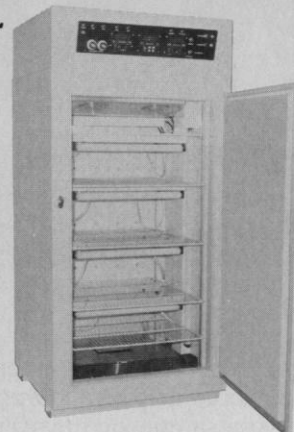
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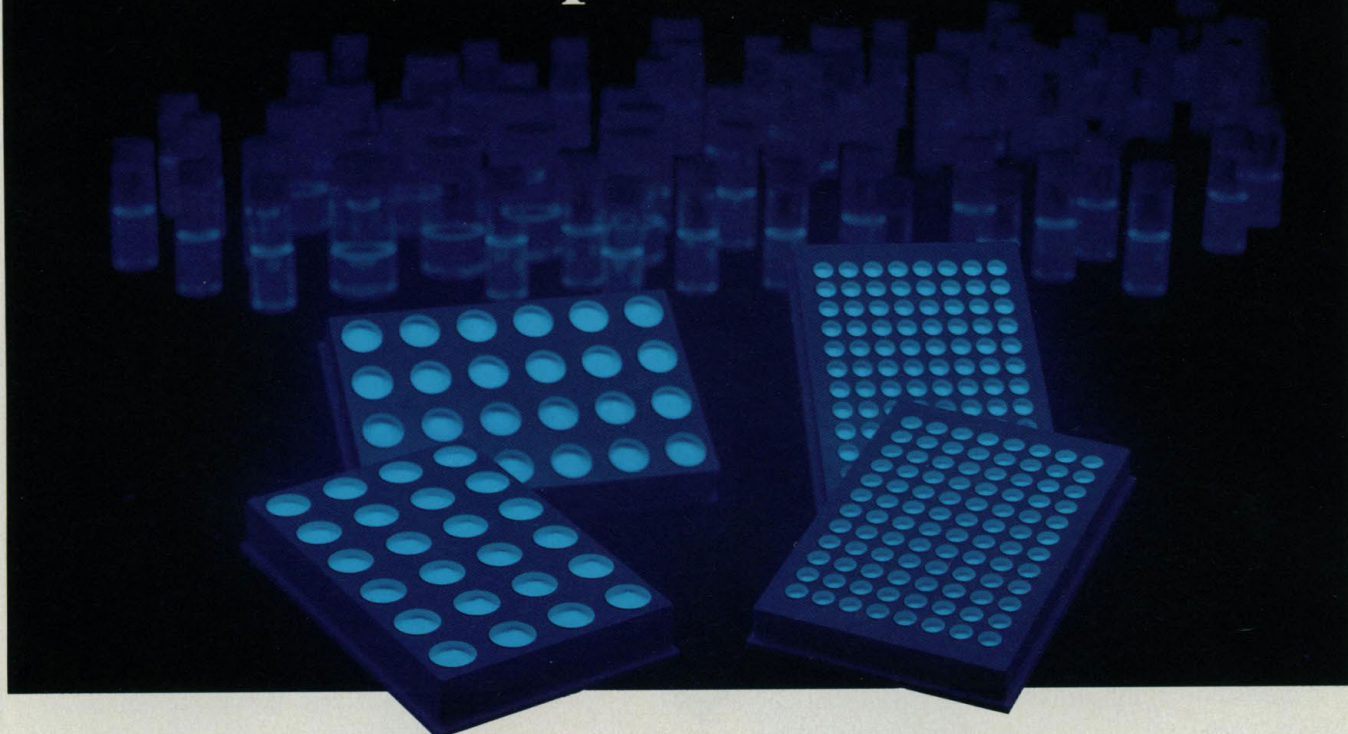
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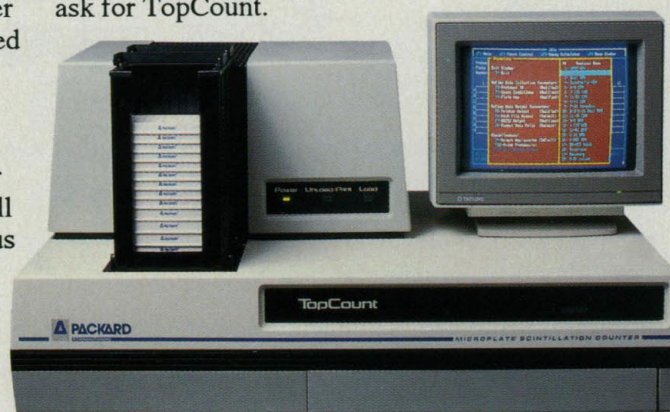
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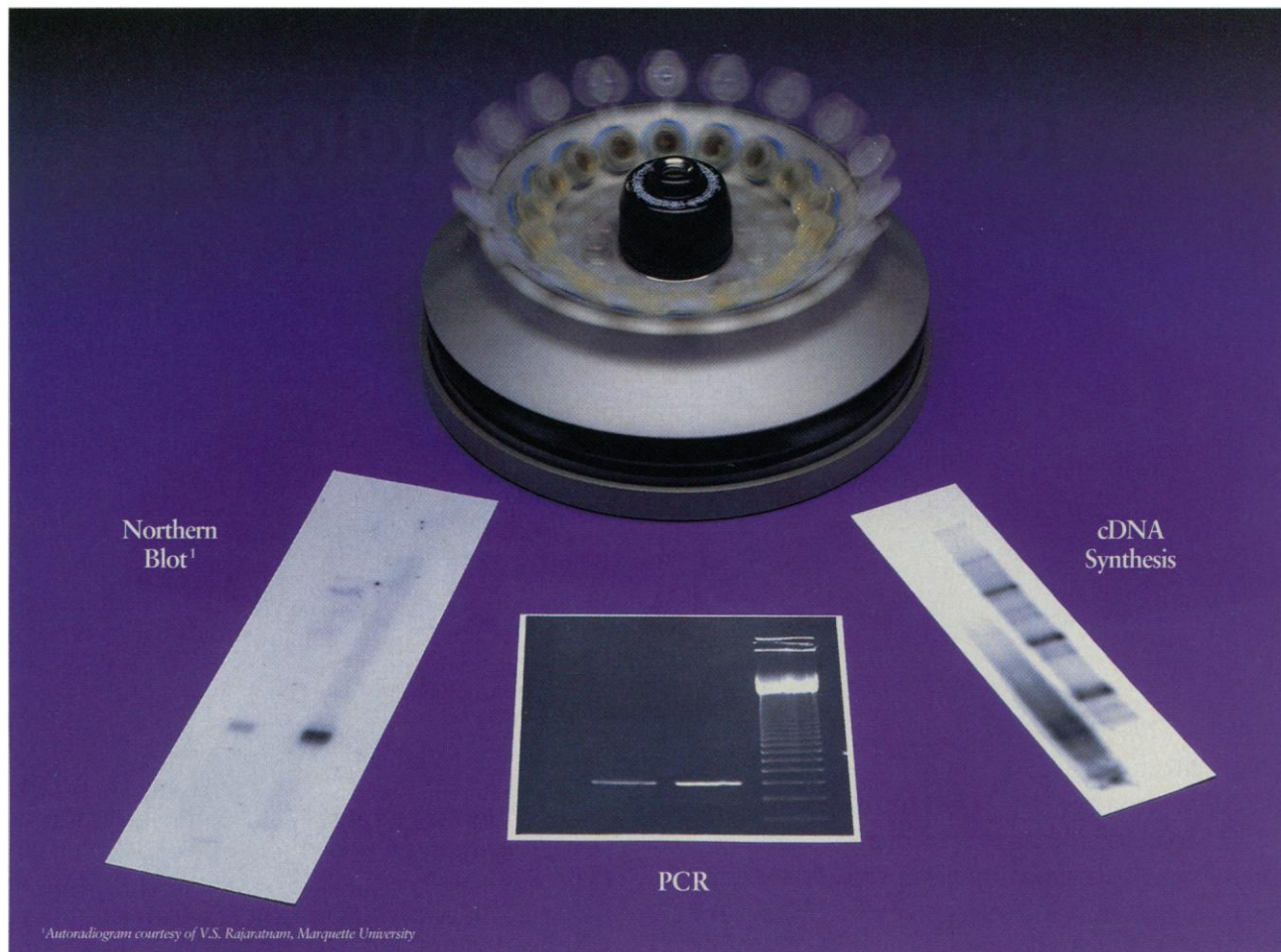
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Science in Europe

This year the first great milestone will be passed on the road toward a Europe without frontiers: the completion of the European Community's Single Market—the largest economic grouping on Earth. With growing economic clout, could Europe once again take the lead in science? Are the long decades when no European researcher felt educated without completing several years in a U.S. lab gradually coming to an end? Ten of *Science's* correspondents traveled around Europe to ask how Europeans see the future and the current state of their discipline or their nation. Collectively, we interviewed 300 scientists and science administrators from 15 European nations. The collective answer, of course, is that there is no simple answer.

In big science, where collaboration is essential if anything is to be achieved at all, Europe is already showing what it can achieve when it pools its collective might. In both particle physics (p. 466) and ground-based astronomy (p. 465), Europe is now fully a match for the United States and expects to be ahead by the turn of the century. But it's a different story in the diverse "small science" areas. In molecular biology, many senior researchers feel that Europe is not proving capable of matching U.S. muscle and are calling for a more unified effort (p. 460 & 478). The picture is similar in the neurosciences: a dominant America and a divided Europe, with many neuroscientists lamenting the lack of a clear focus for Europe's diverse nations (p. 468).

Despite that diversity, European nations fall into four groups when their scientific quality and productivity is assessed (p. 472). To capture the different problems faced by different parts of Europe, *Science's* correspondents looked at nations from each grouping (pp. 473-477): Italy (struggling to match the top scientific powers), the set of nations comprising Central Europe (battling to join the world scientific community), Switzerland (where the problem is how to remain at the pinnacle of excellence), and Britain (in decline but still Europe's leading scientific power).

Science also asked eight leading figures in European science for their views on where Europe is headed. Their perspectives appear on pages 478 to 488.

We make no claims to be comprehensive in our coverage, either of disciplines or geographical areas. Please take a moment to fill out the reader response questionnaire on page 488 to let us know what you would like to see included in future European surveys.

—Alun Anderson

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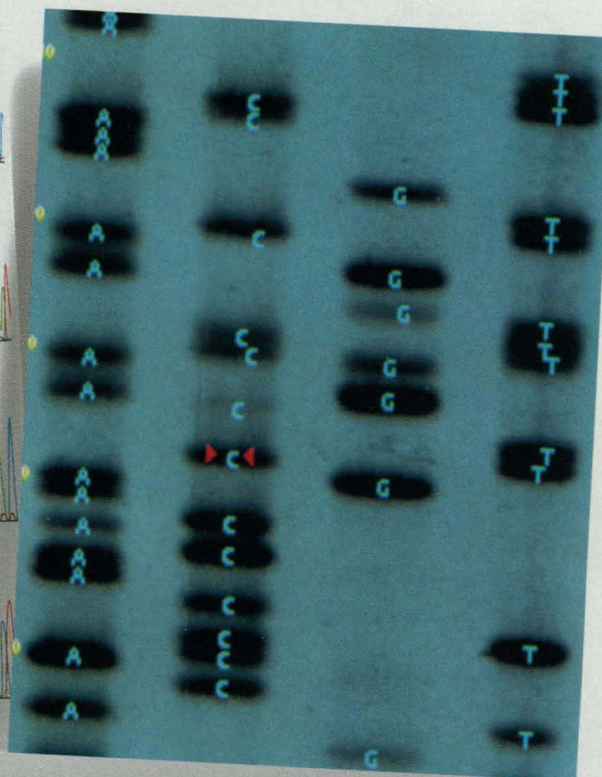
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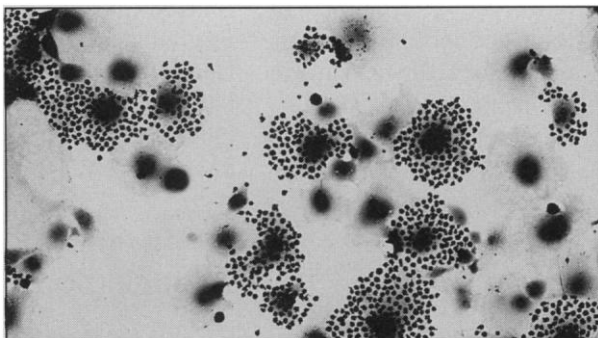
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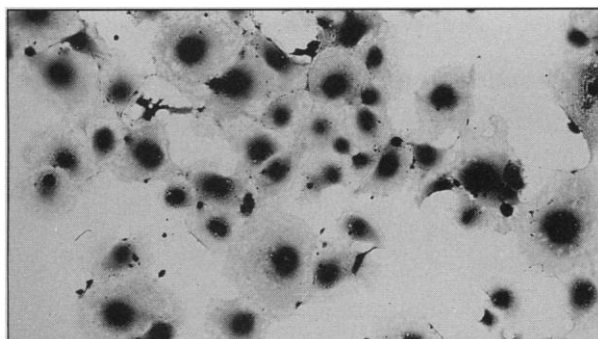
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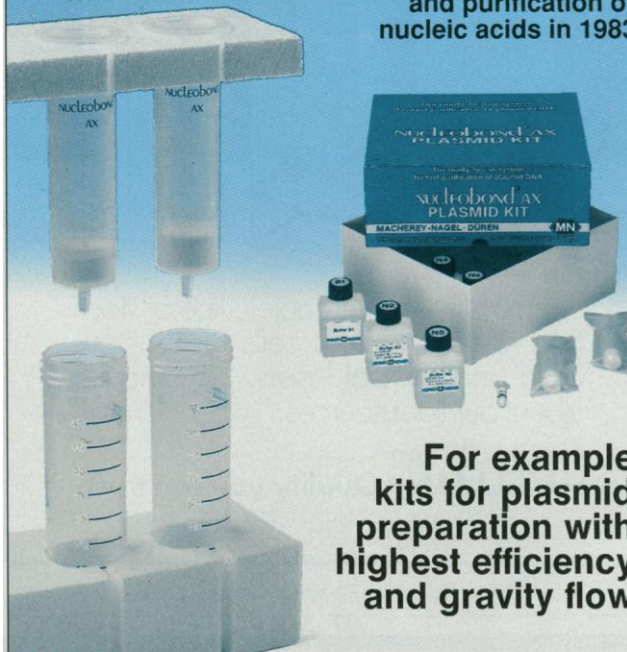
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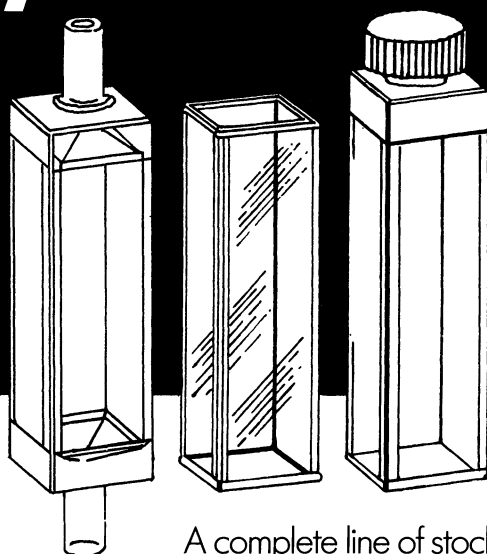


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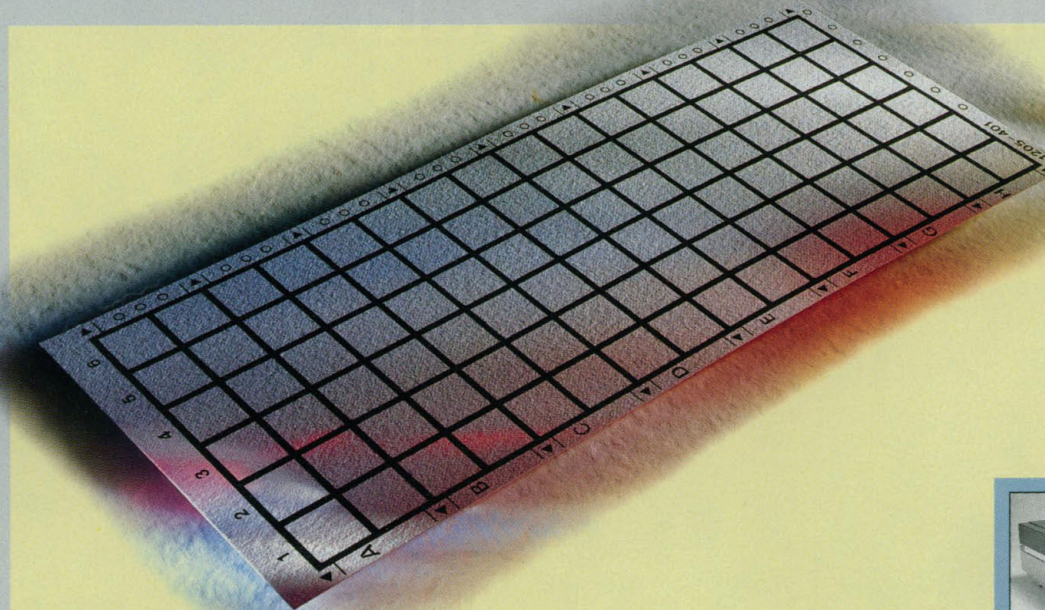
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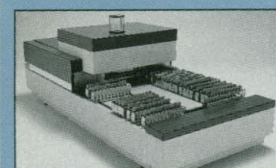
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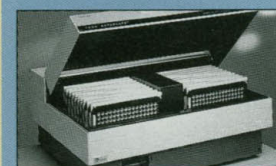
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The DoD and DoD contractors acted pursuant to a regulation that became effective on January 2, 1987. Although DoD rescinded the regulation on February 12, 1988, it may have been applied after that date. The United States District Court for the District of Columbia has declared the regulation unconstitutional and perma-

nently enjoined the DoD from enforcing it. Huynh v. Cheney, 87-3436 TFH (D.D.C. March 14, 1991).

If you are a naturalized citizen and you believe you have been adversely affected by the enforcement of the regulation on or after January 2, 1987, you may have certain legal rights. For further information, you should contact the United States Department of Justice Office of Special Counsel for Immigration Related Unfair Employment Practices (OSC), by calling 1-800-255-7688 or (202) 653-8121; 1-800-237-2515 or (202) 296-0168 (TDD device for the hearing impaired); or by writing to OSC, P.O. Box 65490, Washington, D.C. 20035-5490. The OSC will provide information and help you process a claim free of charge. The opportunity to pursue these rights is subject to certain time limits, so if you believe the regulation was applied to you, contact the Office of Special Counsel as soon as possible.

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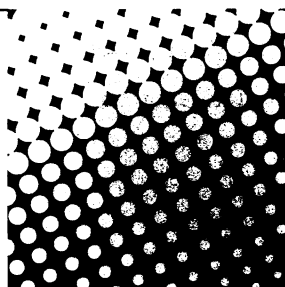


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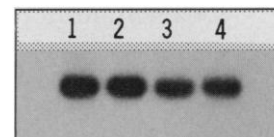
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