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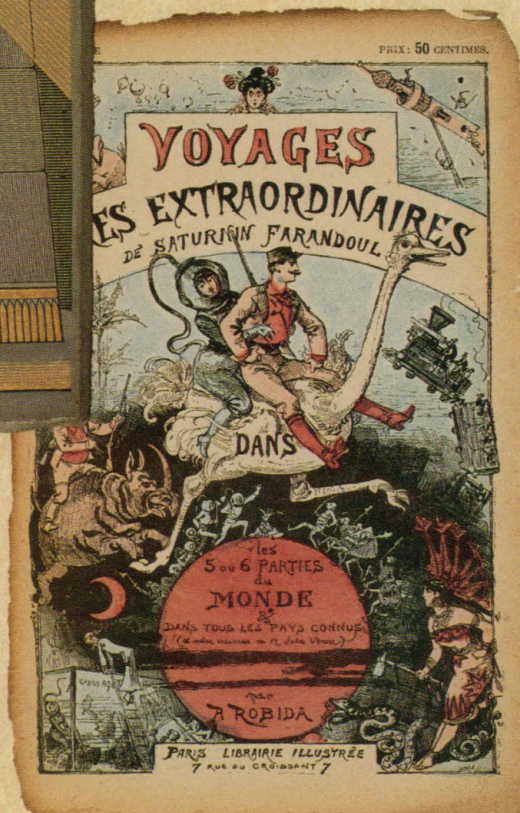
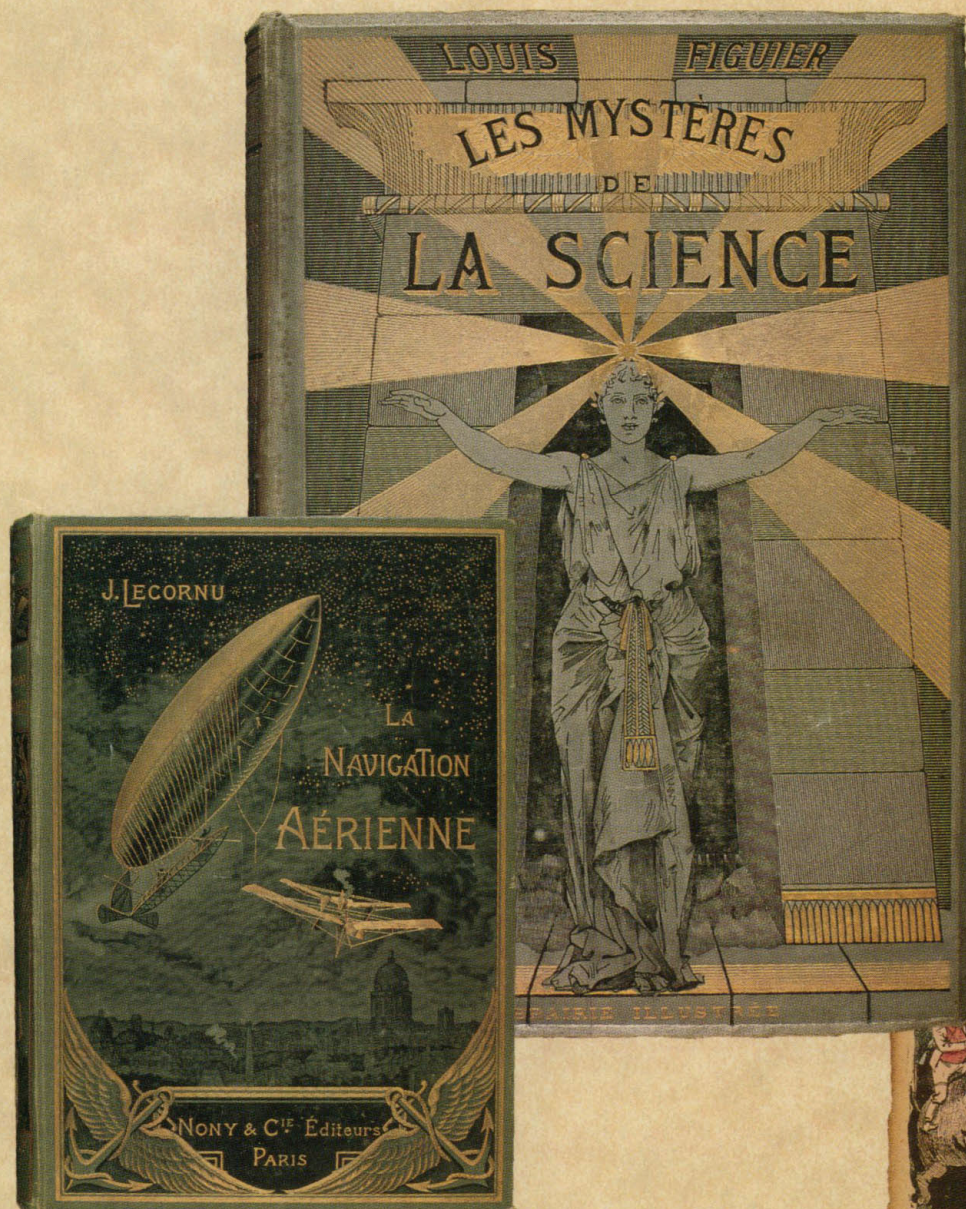
SCIENCE

17 MAY 1991

\$6.00

VOL. 252 ■ PAGES 889-1036

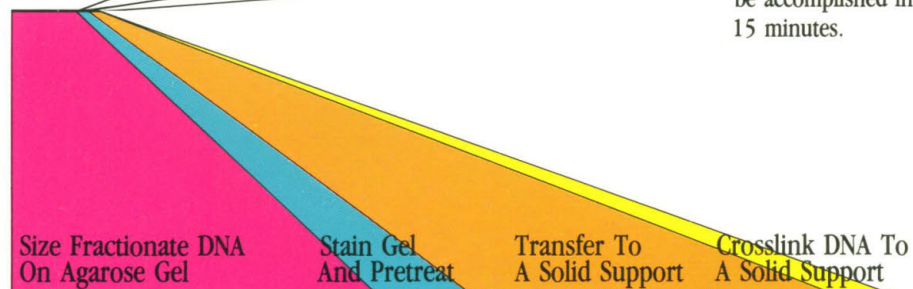
Book Issue



Southerns/Northerns: Electrophoresis, Blotting, and Crosslinking in 2.5 Hours Instead of 30.

Stratagene has streamlined agarose gel electrophoresis and blotting. The system decreases the time required, from sample loading to prehybridization ten fold.

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The VAGE™ vertical agarose/acrylamide gel electrophoresis system allows the casting of agarose or acrylamide gels in the unit. Nucleic acids can be electrophoresed through a 3 mm, 0.8 % vertical agarose gel in less than two hours with excellent resolution (Figure 1).

Because the gels are thin, staining, depurination, and denaturation can be accomplished in 15 minutes.

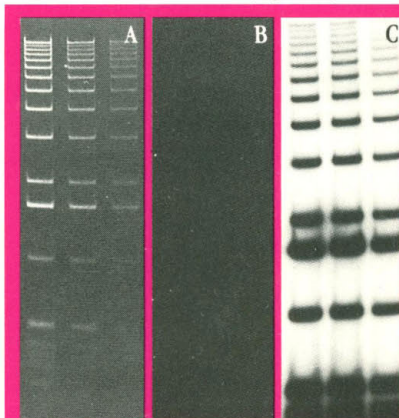
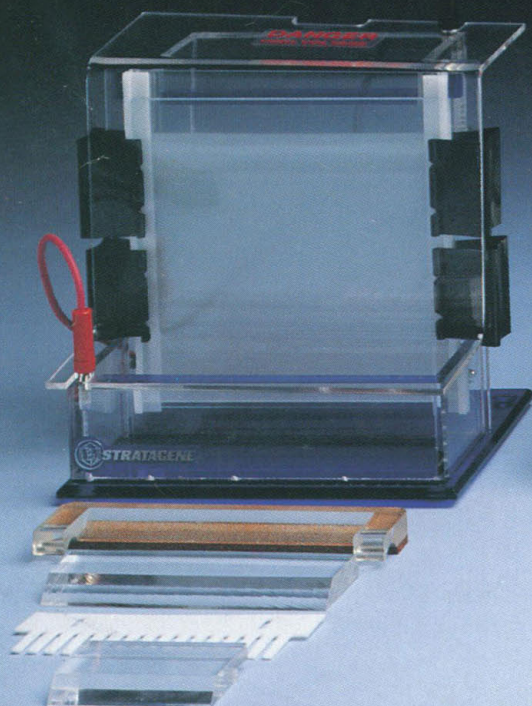


FIGURE 1:

Figure Legend: Fractionation of end labeled DNA markers on 3mm thick 0.8 % agarose by the VAGE apparatus and transfer to Duralon—UV™ membranes using the PosiBlot pressure blotter.
A. Ethidium stained gel showing high resolution.
B. Same gel after pressure blotting.
C. Autoradiogram of membrane after pressure transfer.



PosiBlot™ Pressure Blotter

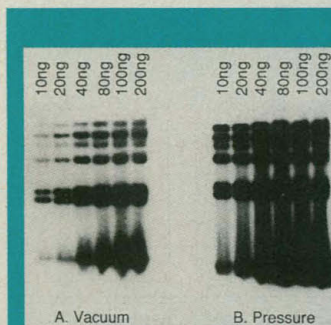


FIGURE 2:

Figure Legend: 32 P end-labeled lambda Hind III markers were electrophoresed in 0.8% agarose. The DNA was then transferred to a nylon membrane with a vacuum blotter at 30mm Hg below atmospheric or with the PosiBlot pressure blotter at 100mm Hg above atmospheric. Both transfers were carried out for 15 minutes. As can be seen, pressure blotting transferred significantly more DNA in the same period of time, especially in the higher molecular weight range (largest band is 23 kilobases).

The PosiBlot™ positive pressure blotter permits the transfer of nucleic acids in 1/3 the time of vacuum blotters and 1/50 the time of capillary blotting (Figure 2). Pressure blotting does not dehydrate gels as do other methods. This allows the use of substantially higher pressure differentials, compared with vacuum blotting, without gel collapse. The PosiBlot apparatus reduces blotting time to 15 minutes.

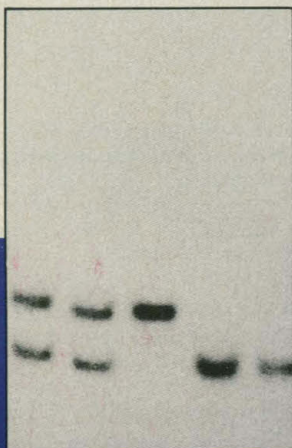


FIGURE 3:

Figure Legend: Autoradiogram showing the resolution of 2.8 and 1.3 Kb Msp I RFLP alleles revealed by a cystic fibrosis human DNA probe using the VAGE, PosiBlot and Stratalinker all in 2.5 hours.

Stratalinker™ UV Crosslinker

The Stratalinker™ UV Crosslinker fixes nucleic acids to solid supports such as nitrocellulose or nylon membranes, in less than one minute. This compares favorably to vacuum baking, which requires 2 hours. The Stratalinker actually monitors the ultra violet energy flux and deactivates the light source upon reaching the user-programmed energy level (Figure 4). Figure 3 shows an autoradiogram of a human genomic Southern blot performed using the VAGE, PosiBlot and Stratalinker all in 2.5 hours.

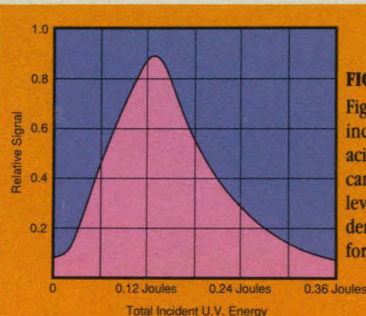


FIGURE 4:

Figure Legend: The effects of altering the incident energy for crosslinking nucleic acids to nylon membranes. The significant drop in signal intensity at energy levels below and above 0.12 Joules demonstrates the limited optimal range for UV treatment.

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* Patent Pending

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COVER Cover pages from three French popular works of (from left) 1903, 1860, and 1893. The illustrations are from *La Science pour tous* (reviewed on page 980), an account of French efforts to bring science to a popular audience in the period 1850 to 1914. Our expanded book review section also includes reviews on topics ranging from Darwin's illnesses to cold fusion, Halley's comet to urban archeology, and macromolecular thermodynamics to endangered ecosystems. For a complete listing, see page 977.

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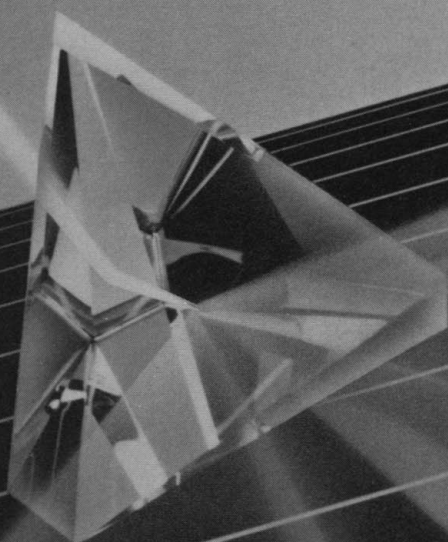
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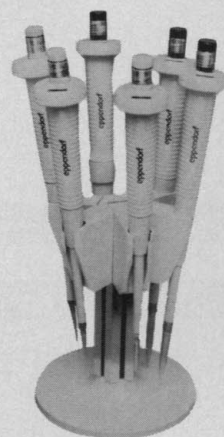


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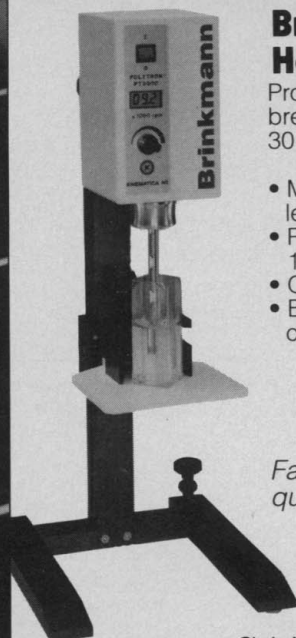
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This Week in SCIENCE

Core issues

THE earth's metal core consists of iron, nickel, and light alloying elements and accounts for one-third of the earth's mass. Its inner portion is solid but its outer portion is molten. What processes were involved in the core's formation? Newsom and Sims discuss available geochemical data and recent laboratory experiments that test and constrain various theories of core formation and the accretion of the earth (page 926). The earth and the other planets of the solar system are thought to have formed from common material in the early solar nebula, for which chondritic meteorites serve as proxies. Comparisons of the abundances of elements in these meteorites and in the earth's mantle, core, and atmosphere provide clues to the chemical, thermal, and physical conditions that brought about the partitioning of metals and silicates between core and mantle. Because the earth's moon may have been chipped off the earth at the time of core formation as a result of a large impact by an object the size of a planet, an understanding of core formation might also help explain the formation of the moon.

Ferroelectric heterostructures

FERROELECTRIC materials have yet to realize their full potential in digital memory systems. Several features of available ferroelectric random access memory devices—such as their polycrystalline nature, the requirement for high voltage inputs (a feature that is incompatible with other components of the device), and the tendency of the materials to show fatigue and age—in part account for their limited use. Ramesh *et al.* now report procedures for fabricating single-crystal thin-film ferroelectric materials on superconducting substrates (page 944). A high-temperature, single crystalline superconducting material (the prototype was $\text{Bi}_2\text{Sr}_2\text{CuO}_{6+x}$ but other copper oxide superconductors also work) served as the bottom electrode. With pulsed laser dep-

osition, a ferroelectric layer ($\text{Bi}_4\text{Ti}_3\text{O}_{12}$) was grown epitaxially (that is, its crystal orientation matched that of the underlying layer) on the metallic substrate. Various functional tests established that the single crystalline film had ferroelectric properties.

Dioxin

DIOXIN is one of the most puzzling toxins known, and studies of its effects have often been inconclusive. Dioxin's damaging effects come about only after dioxin binds to the aryl hydrocarbon (Ah) receptor inside cells. Once binding has occurred, the receptor-dioxin complex can be detected in the nucleus of the cell, where gene expression is altered and enzymes that metabolize foreign compounds are produced. A study carried out by Hoffman *et al.* identifies another piece of the dioxin-receptor puzzle (page 954). They have cloned a gene that encodes the protein Arnt, without which the dioxin-receptor complex does not find its way to the nucleus. Arnt does not directly bind to dioxin; in fact, the gene that encodes Arnt is on a different chromosome from the gene that encodes the receptor's dioxin-binding domain. In a Perspective, Johnson discusses possible roles for Arnt (part of the receptor? a facilitator of translocation?), its structural relations with other known DNA-binding molecules, and differences between the dioxin receptor and receptors for steroids (page 924). The Environmental Protection Agency is beginning to develop a new mechanistic model with which to more accurately assess the risks associated with dioxin exposure; their task and goals are described on page 911 by Roberts.

AIDS virus mystery

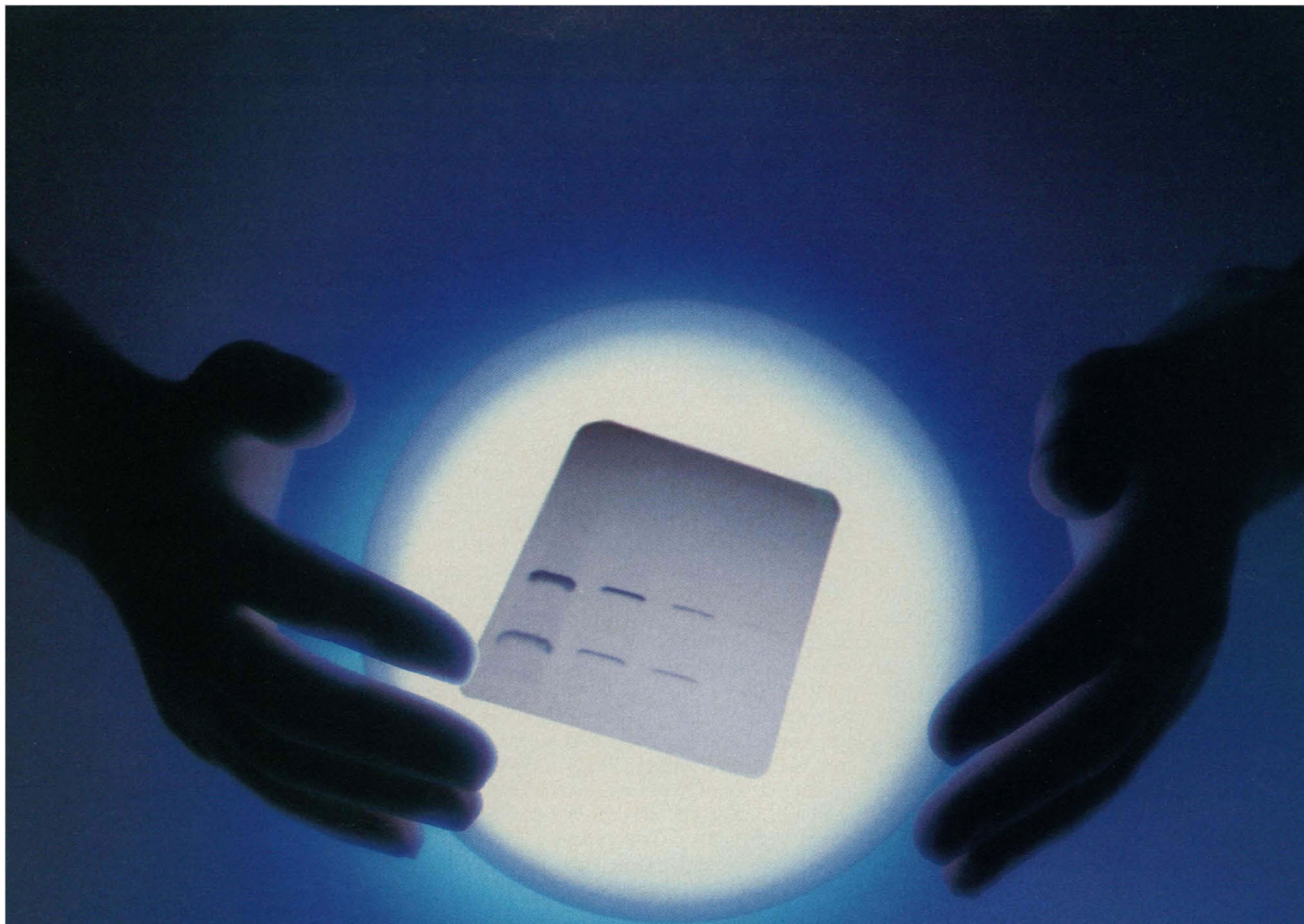
MOST isolates of the AIDS virus HIV-1 have distinctive sequences; so, when analyses of the first two strains of HIV-1 isolated in 1983 and 1984 showed them to be essentially identical, an international brouhaha ensued that involved re-

searchers in France and the United States and that has continued to the present time. (See News and Comment story by Palca on page 771 of last week's *Science*). In a paper by Wain-Hobson *et al.* (page 961), the French researchers now report that their Bru cultures became contaminated with a different HIV-1 strain, Lai, in late July or early August 1983; Lai is a rapidly growing virus that has a distinctive insert of two amino acids in one of its proteins. When cultures of Bru were sent to the United States in late 1983, Lai apparently traveled along as a not-so-innocent bystander. It may then have gone on to contaminate cultures of the U.S. HIV-1 virus HTLV-3B, explaining the presence of the telltale pair of amino acids in the published sequence of this viral strain. These data may be necessary and sufficient to put an end to the years of confusion and wrangling.

Retronphage

RETRONS are pieces of DNA that contain genes for an enzyme that is similar to reverse transcriptase and regions that encode branched multicopy single-stranded DNA (msDNA). They have been found in some clinical isolates of *Escherichia coli* but are not found in the normal laboratory strain. How did *Escherichia coli* isolates acquire their retrons? Studies reported by Inouye *et al.* indicate that retrons can be passed between bacteria as part of a bacteriophage (bacterial virus) package (page 969). The retron is excised from the bacterial genome in which it is integrated, is then transmitted horizontally to another bacterial cell, and is subsequently integrated into the genome of the second host at a site in the same gene from which it had been removed. In the new host, new molecules of msDNA are produced, new phage particles are packaged, and the host is split open to release infectious phages. Although the retron can only move from host to host when a helper phage is present, there exists the possibility that at one time it may have been an infectious bacteriophage itself.

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INTERNATIONAL HUMAN FRONTIER SCIENCE PROGRAM

REQUEST FOR APPLICATIONS

Research Grants/Fellowships/Workshops
for awards in 1992

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 for research aimed at the elucidation of biological functions at the molecular level and brain functions. The program distributed about \$ 12 m on new awards this year and aims to spend a similar amount in 1992.

Research Areas of the HFSP

(A) Basic research for the elucidation of brain functions

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

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

1. Expression of Genetic Information
2. Morphogenesis
3. Molecular Recognition and Responses
4. Energy Conversion

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*

Long-term (3 months-2 years) and short-term fellowships (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 : Subsidies 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, 1991

For research grants and long-term fellowships , the awards will be announced in April 1992. *Applications for short-term fellowships and workshops can be submitted throughout the year.*

Guidebooks and Application Forms may be obtained upon **written** request from the address given below. Please indicate which program activity (Research Grant/Long-Term Fellowship/Short-Term Fellowship/Workshop) you are interested in.

No guidebooks and Application Forms for Research Grants and Long-Term Fellowships will be available after September 1, 1991

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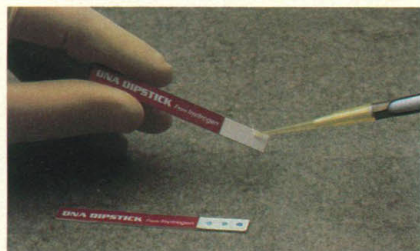
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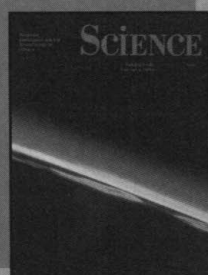
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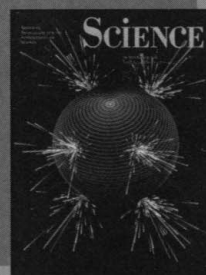
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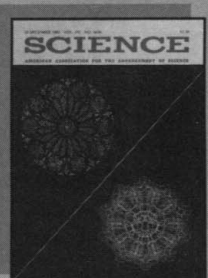
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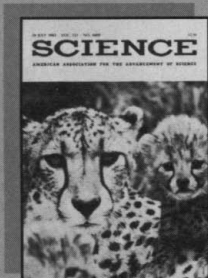
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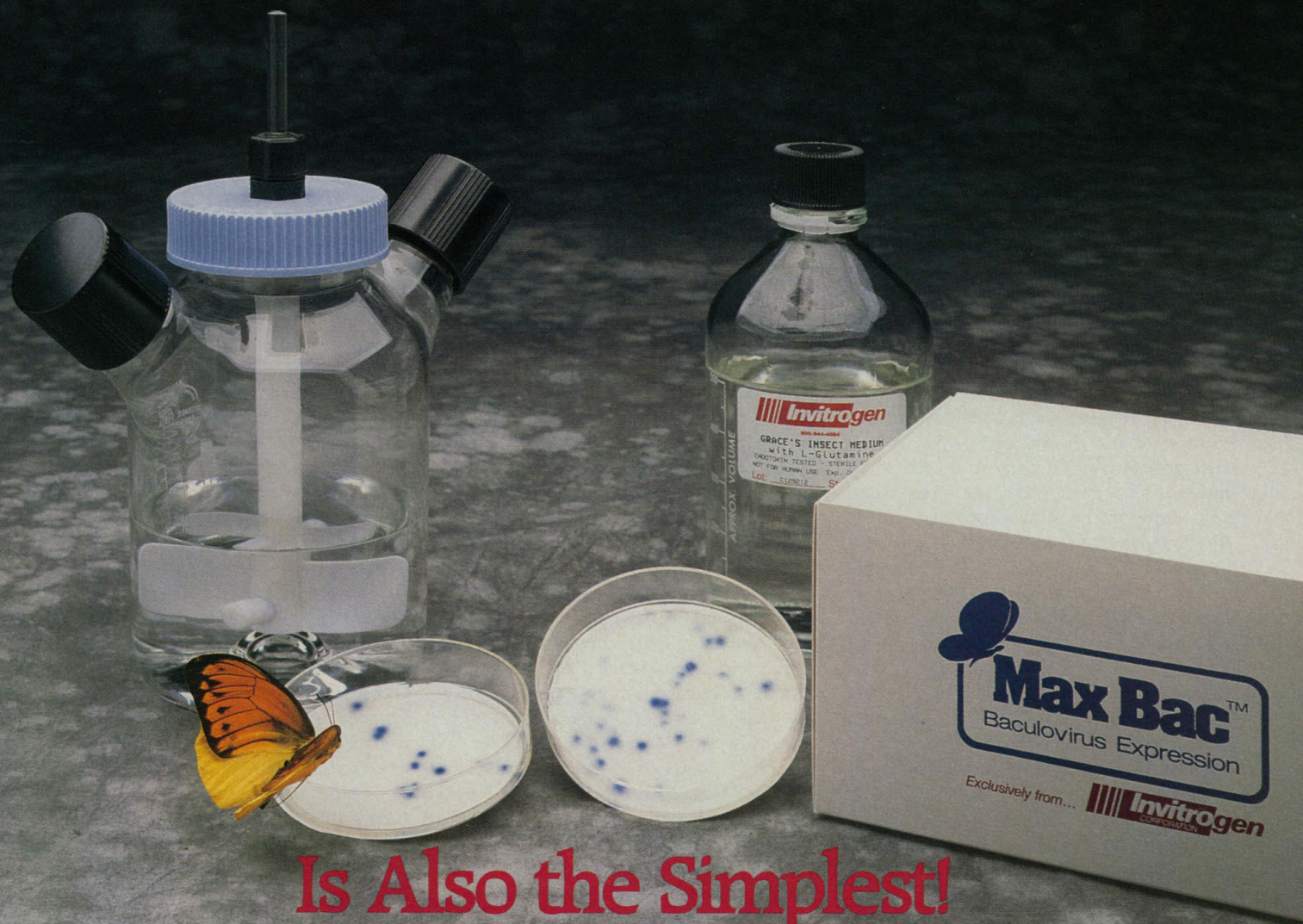
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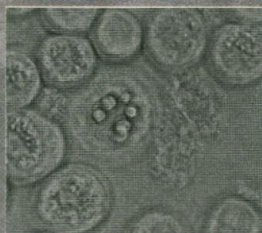


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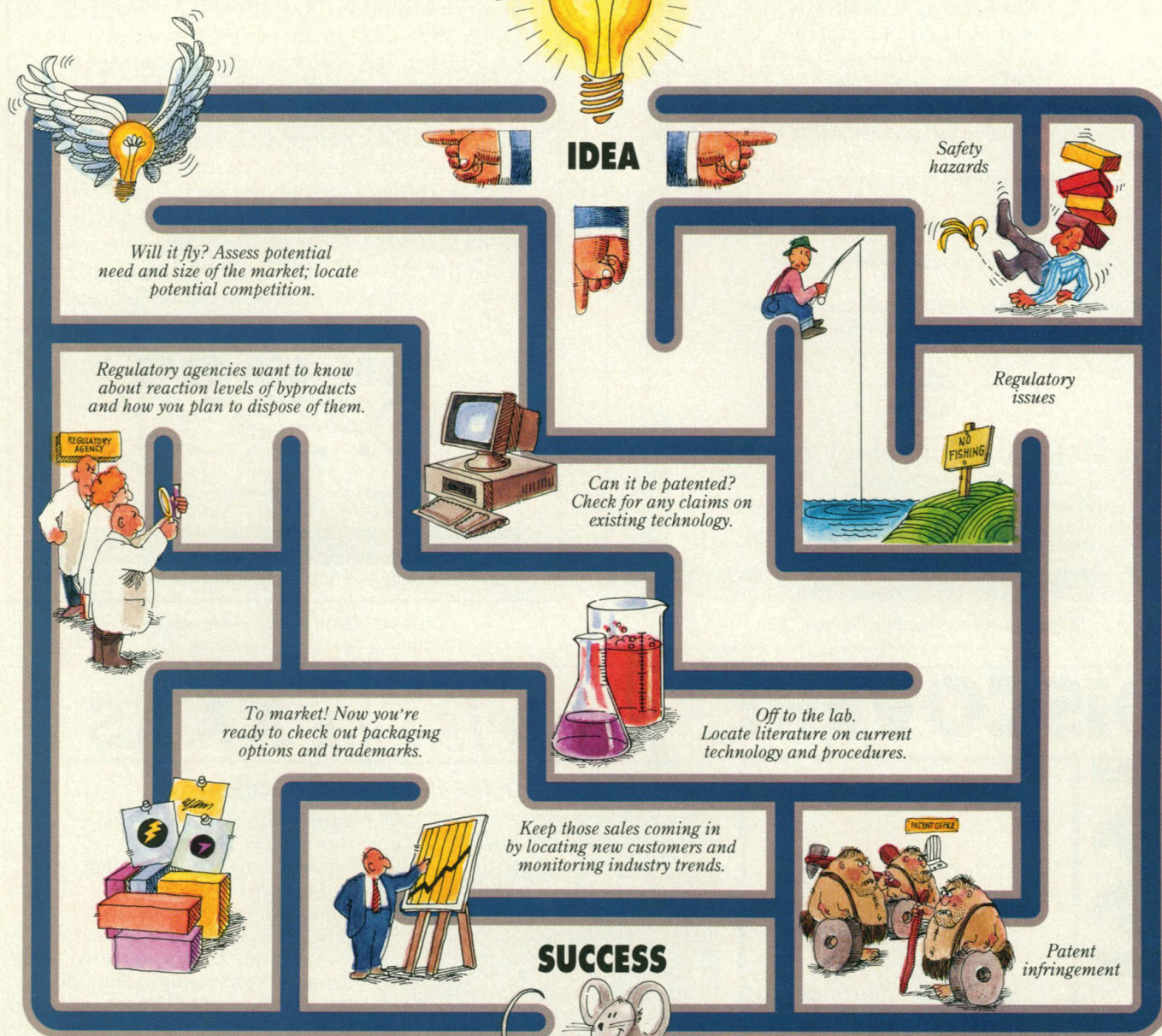
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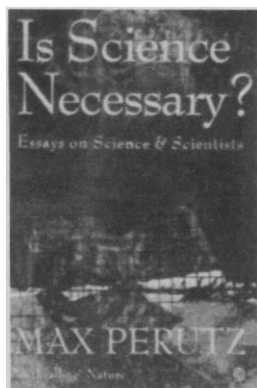
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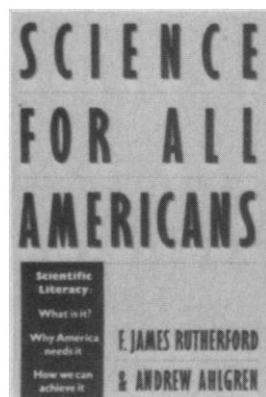
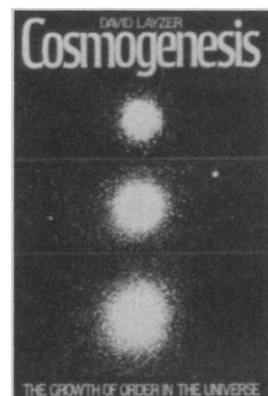
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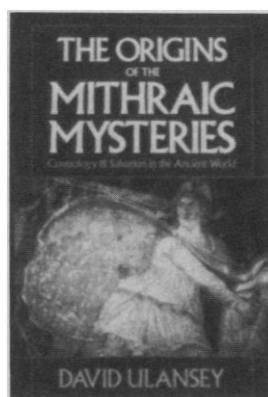
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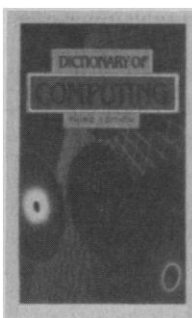
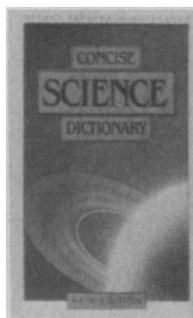
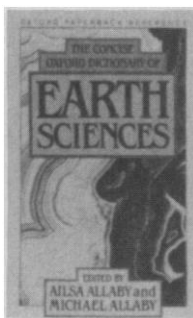
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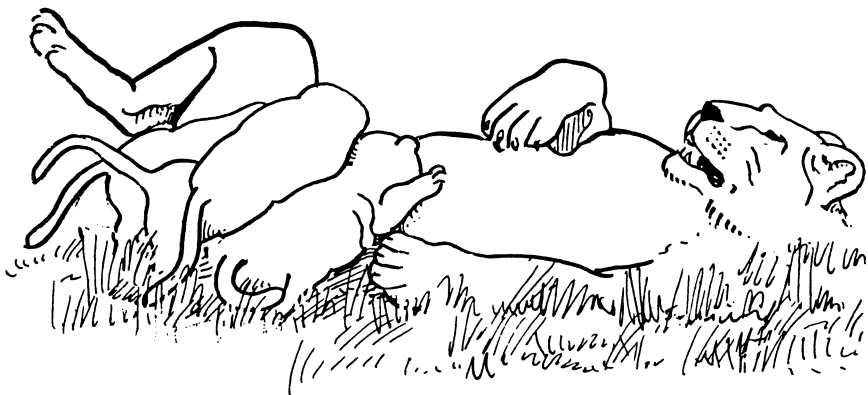
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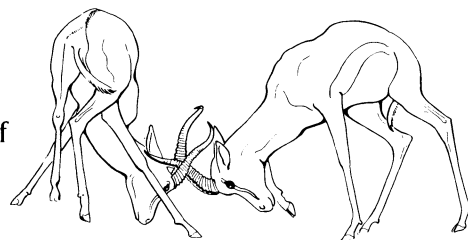
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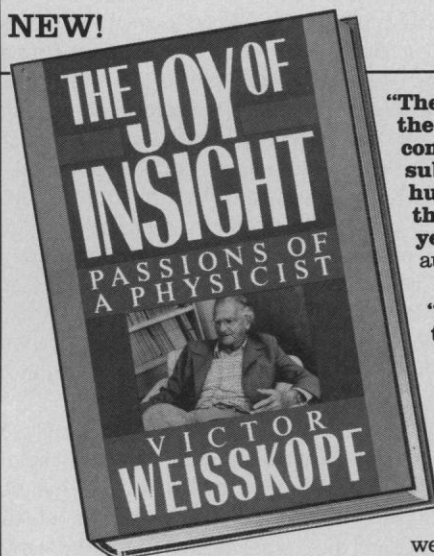
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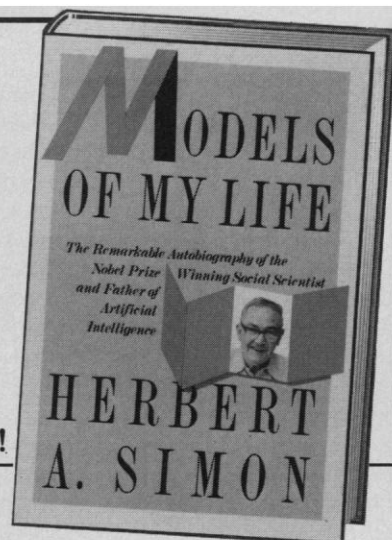
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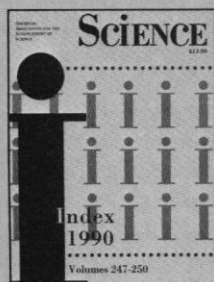
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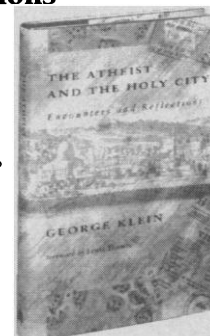
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