

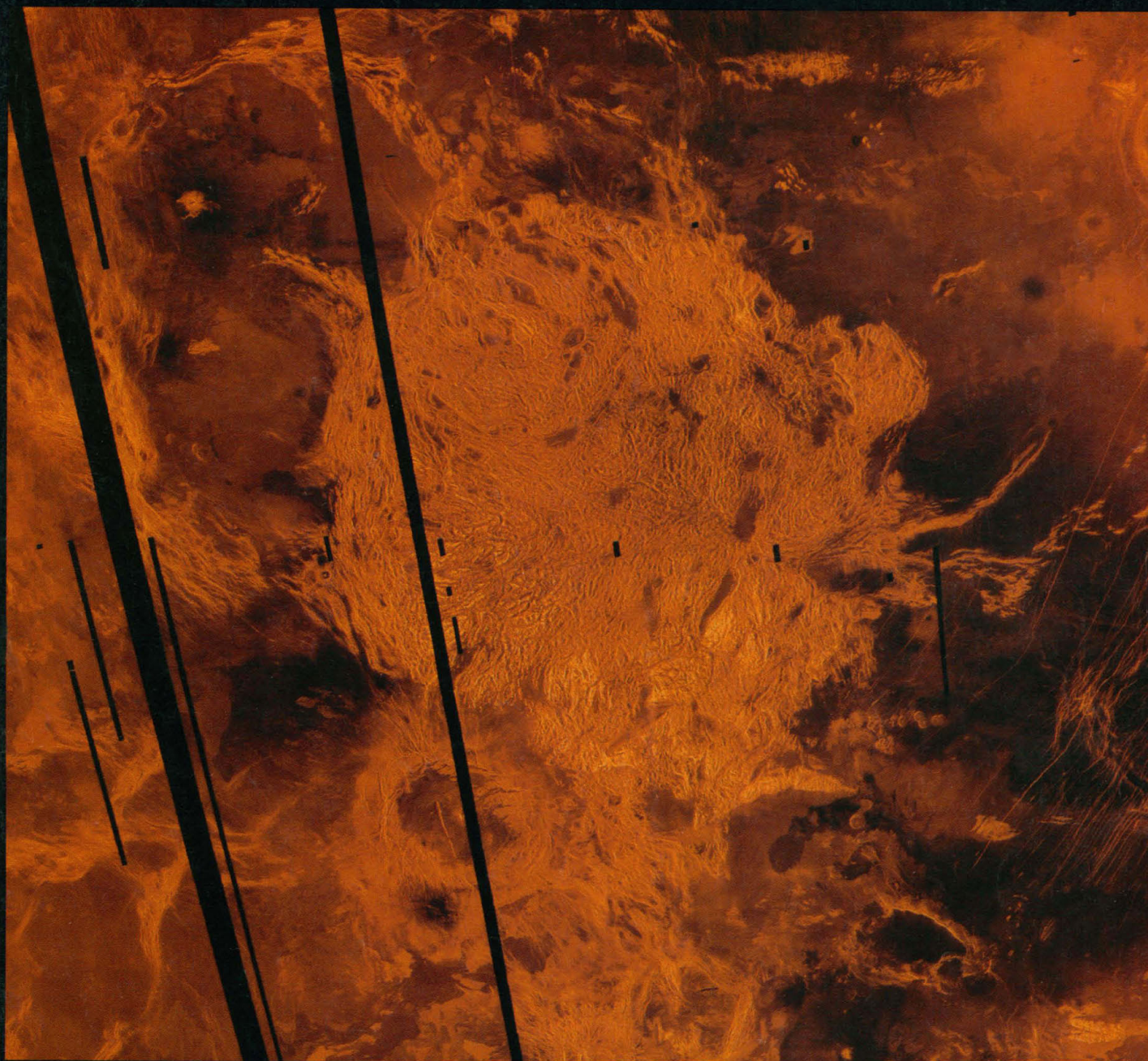
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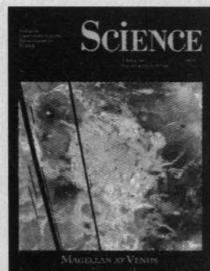
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COVER Magellan radar image of Alpha Regio (25°S, 4°E), an upland ~1300 kilometers across and the first feature on Venus identified from Earth-based radar. The bright area contains ridges, troughs, and valleys that intersect to form a polygonal pattern. Dark patches are low areas filled with lava. To the south is Eve, a large ovoid volcano-tectonic feature. Lava flows emanating from Eve embay the ridged terrain. See news page 213 and reports pages 247 to 312. [Image by Eric DeJong and Myche McAuley, Jet Propulsion Laboratory Multimission Image Processing Laboratory]

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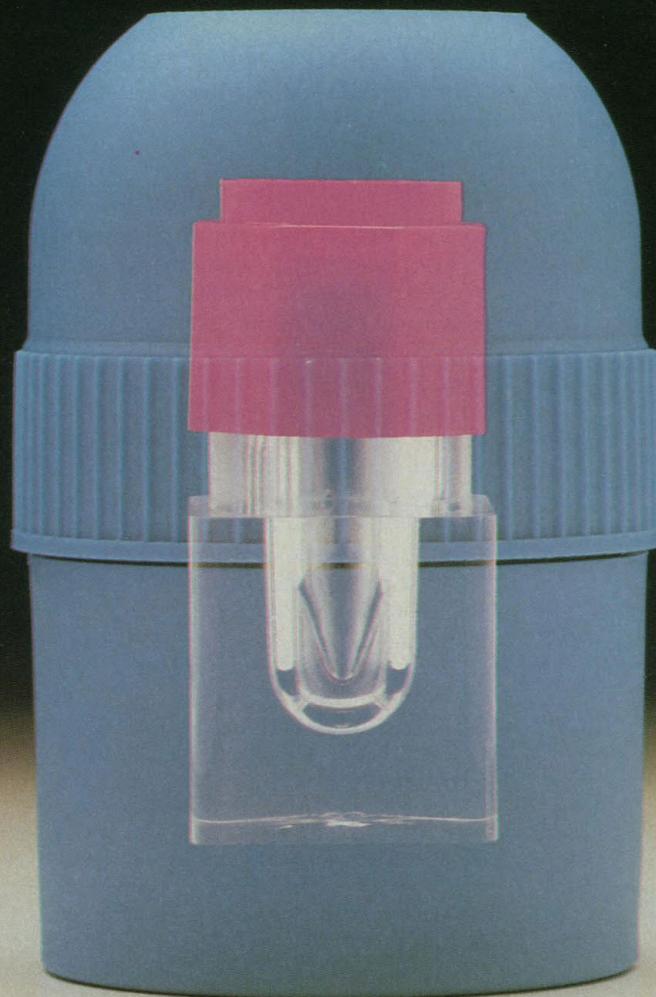
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This Week in SCIENCE

Close-ups of Venus

MUCH of this week's issue of *Science* focuses on the results of the Magellan mission to Venus (cover). Venus is the most Earth-like of the planets, so knowledge of how it formed and evolved will provide important constraints for models of the evolution of Earth. Since September, Venus has been under direct radar scrutiny by the Magellan spacecraft, which was launched by the Space Shuttle in May 1989 and went into orbit around Venus in August 1990. The radar images along with altimetry and gravity data will make possible the construction of high-resolution topographic maps of the planet that will help to answer questions about the interplay of volcanism, tectonism, impacts, weathering, and other processes in the shaping and resurfacing of the crust; in turn, this information will provide clues to underlying mantle dynamics. The 9 Reports describe the goals of the mission and some early setbacks, the radar instrument, and issues of concern in Venus geology and geophysics. They include dazzling images from Venus that were obtained during the first few weeks of observation, provide overviews and interpretations of these early results, and discuss the impacts of these data on hypotheses regarding the formation and evolution of the planet (pages 247 to 312). An analysis of some of the more recent data back from Venus is provided by Kerr (page 213).

Kumakhov lens

DOCTORS and dentists might be able to use them to target x-rays—both in therapy and in diagnosis—more accurately and safely than they can today. Device manufacturers might be able to use them to produce higher density microelectronic chips. The new Kumakhov lenses, whose design, development, and proposed applications are described by Amato on page 208, are thought capable of delivering x-rays or neutrons to a target with extraordinary accuracy and intensity. The lenses are being promot-

ed through a joint effort of American and Soviet scientists. Each lens consists of a bundle of thousands of gently curving thin glass capillaries that channel x-rays or neutrons into a tightly focused or reshaped beam at the tapered end. For some applications, the Kumakhov lens may turn out to be a cheap replacement for the synchrotron, now the most effective but a very costly method for generating powerful x-rays.

Pattern formation

HOW does a fertilized egg generate the diverse, differentiated, and functioning cells and tissues of an individual? Some of the factors that affect pattern formation during development have now been identified, but this puzzling phenomenon remains the central issue of developmental biology. Signal molecules as varied as proteins, messenger RNAs, and retinoic acid help transmit vital information within and between differentiating cells. Related molecules have been observed in diverse organs and organisms, apparently performing analogous functions and producing at times the same and at other times disparate results. Keys to how diversity can be achieved with a single type of signal molecule may lie in the location of the molecule, its pattern of expression, its concentration, or the affinity with which it binds to a receptor. Melton evaluates the molecules and the mechanisms that have been found to contribute to cell fate determination and the establishment of body axes (polarity) in developing organisms (page 234). The establishment of a slight but meaningful asymmetry during development of the egg can serve as a first step in pattern formation.

Clocking streaming ice

A comprehensive and accurate assessment of the movement of an Antarctic ice stream—a rapidly flowing river of ice that drains the Antarctic ice sheet—has been made with satellite imagery data that rely on undu-

lations in the ice stream instead of protruding rocks as markers (page 242). In the method described by Bindshadler and Scambos, guides for the co-registration of sequential images were surface undulations. The undulations apparently serve as proxies for the rock topography beneath the glacier and thus are fixed in space. In the case of ice stream E (in West Antarctica), some of the marker undulations are thought to be produced by a large ridge that substantially slows the flow of the ice. Two images of ice stream E were compared; one was recorded in January 1987 and another in December 1988. The ice stream was found to flow unevenly rather than as a stable plug (an earlier model); the average velocity for this ice stream was 350 meters per year. The availability of higher resolution data and wide coverage of the ice stream permits more accurate assessments of the mass balance of the ice sheet and more certain predictions of its effects on sea level.

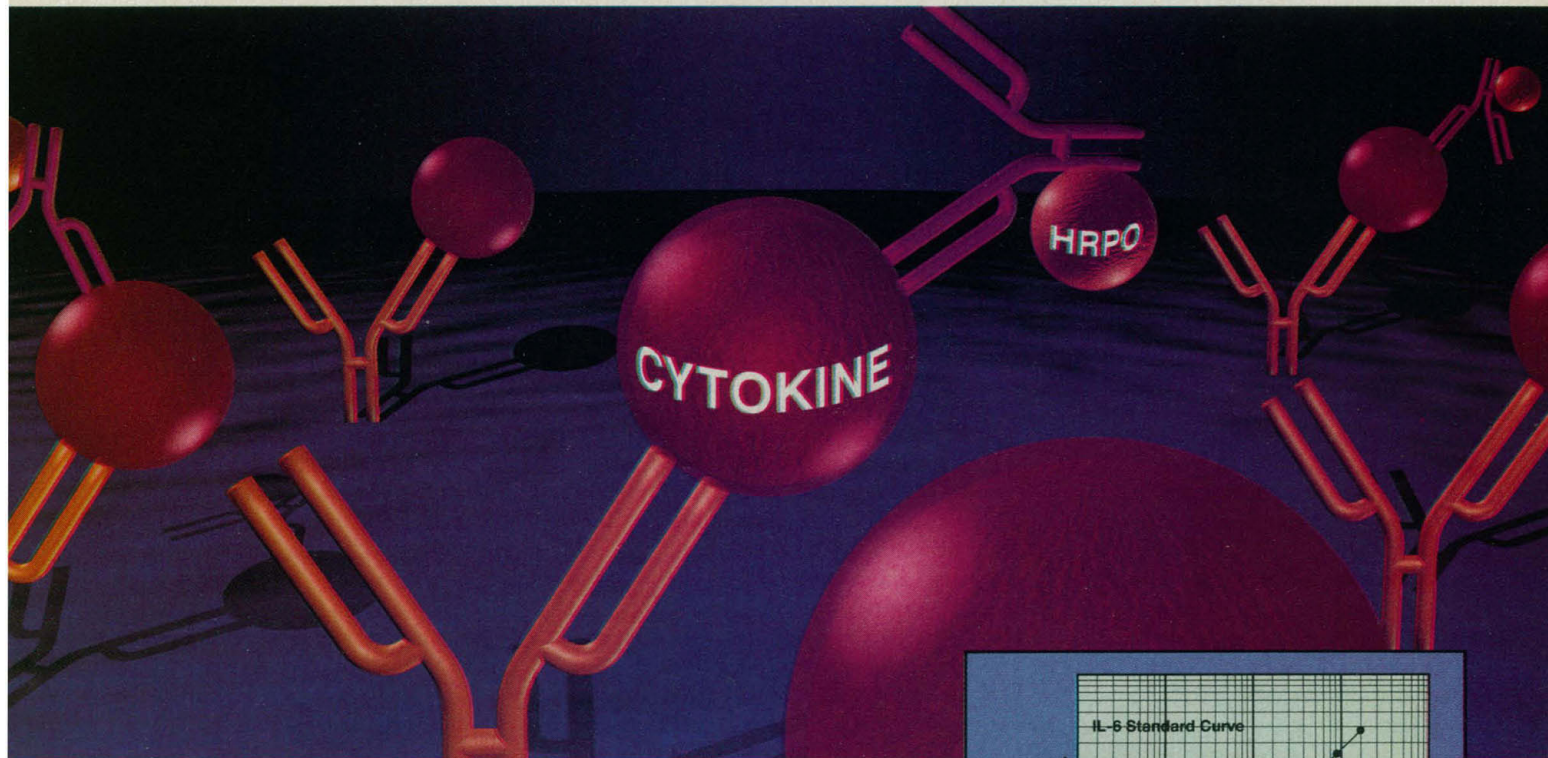
C₆₀ structure

BUCKMINSTERFULLERENE, C₆₀, was identified 6 years ago but was only synthesized in usable (macroscopic) quantities some months ago. It is thought to consist of 60 carbon atoms arranged in a truncated icosahedral framework, not unlike a soccer ball. Now the crystal structure for C₆₀ derivatized with osmyl groups has been determined by Hawkins *et al.* (page 312). The use of a C₆₀ derivative solved the problem that is posed by the un-derivatized molecule, whose near-spherical symmetry promotes orientational disorder and hampers crystallographic analysis. Derivatization broke the spherical symmetry but did not break up the carbon framework. Order was promoted and structural information about the C₆₀ molecule could be obtained. The crystal structure of osmylated C₆₀ confirms the proposed structure of C₆₀: it is a soccer ball-like molecule containing 12 five-member carbon rings, each surrounded by 5 six-member rings for a total of 32 faces in all.

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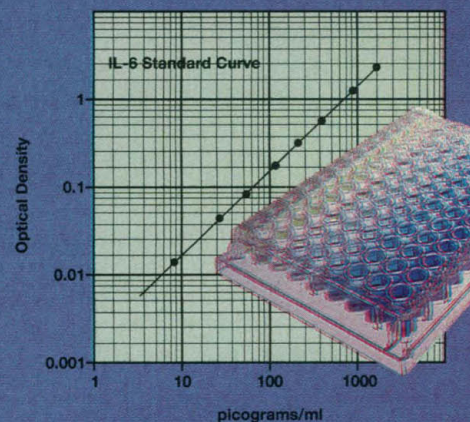
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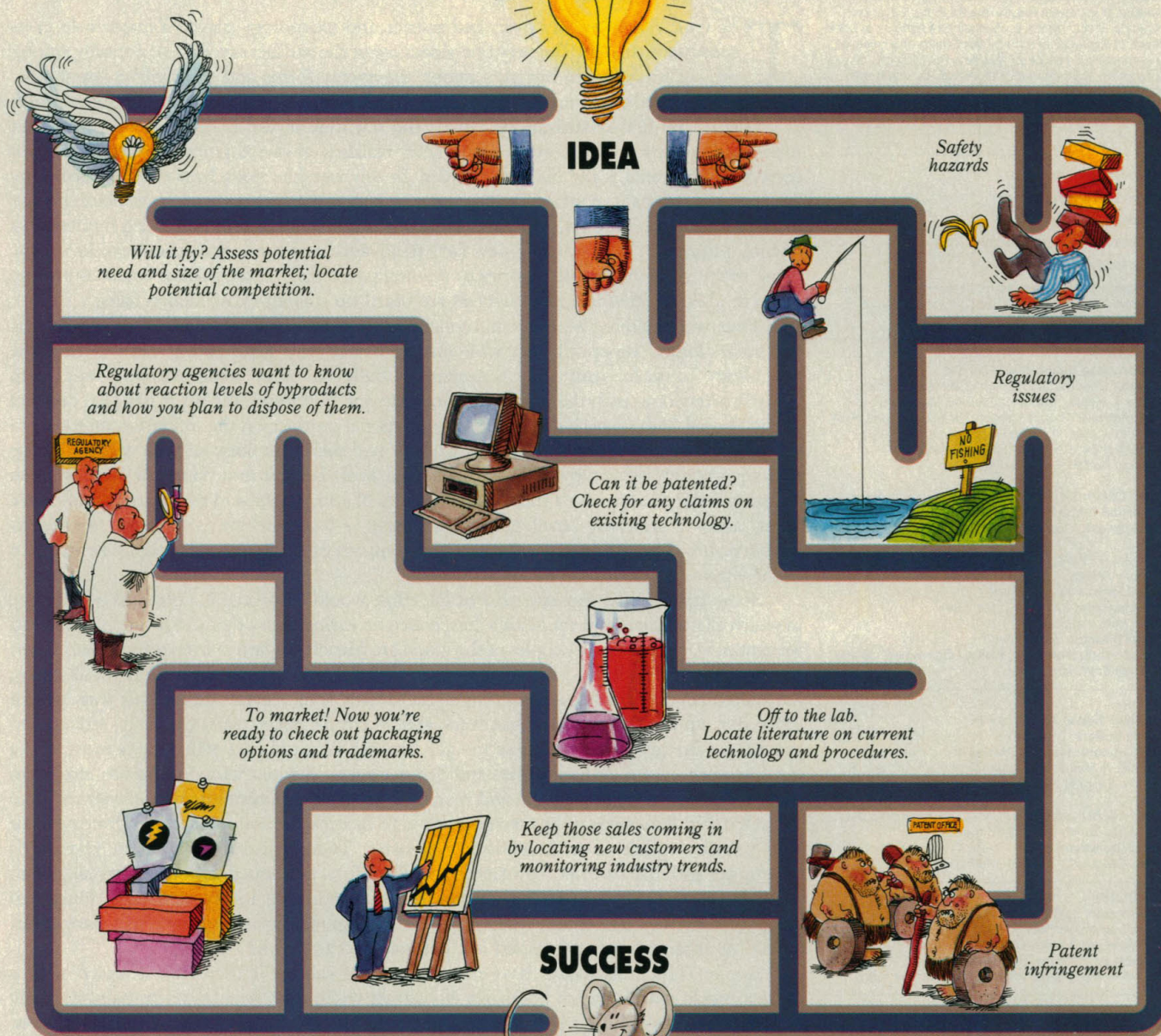
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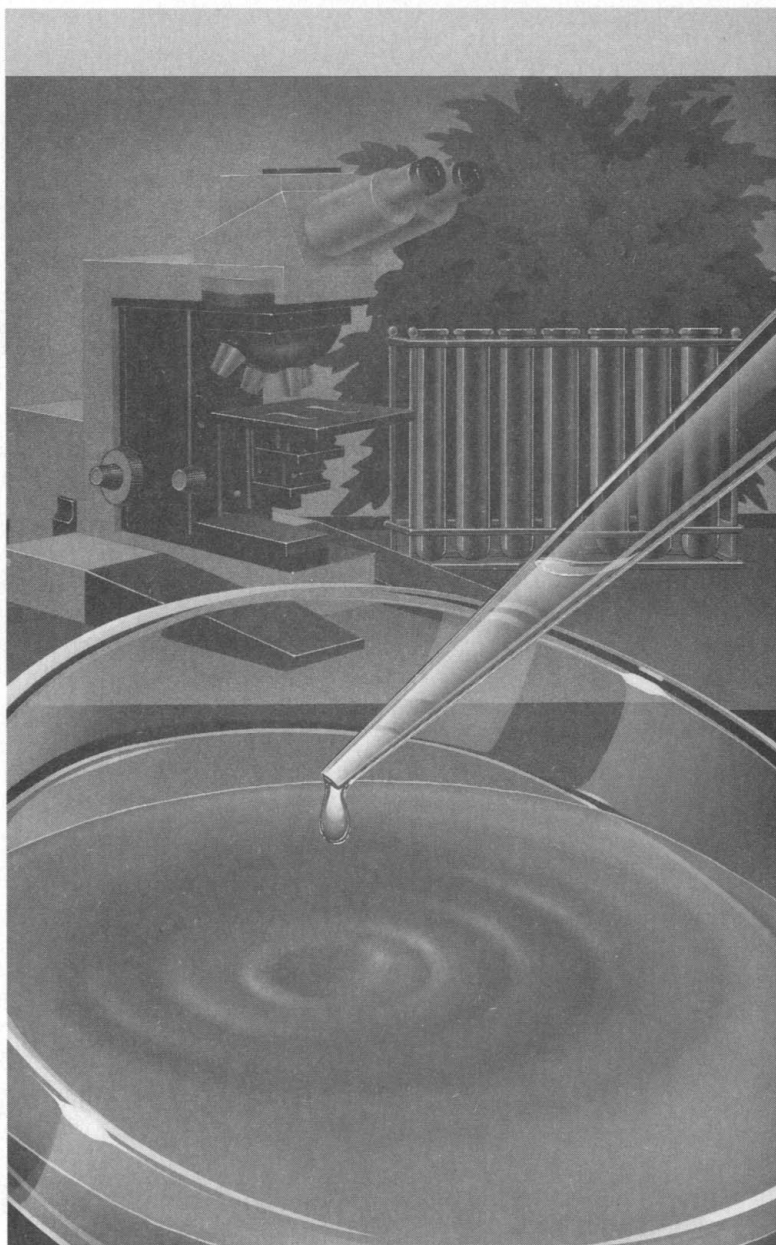
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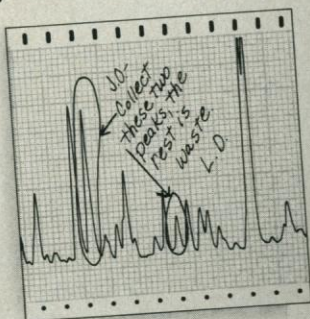
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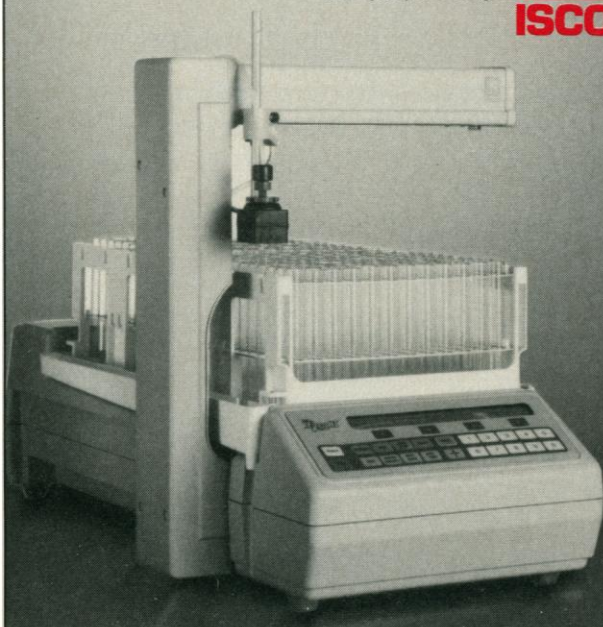
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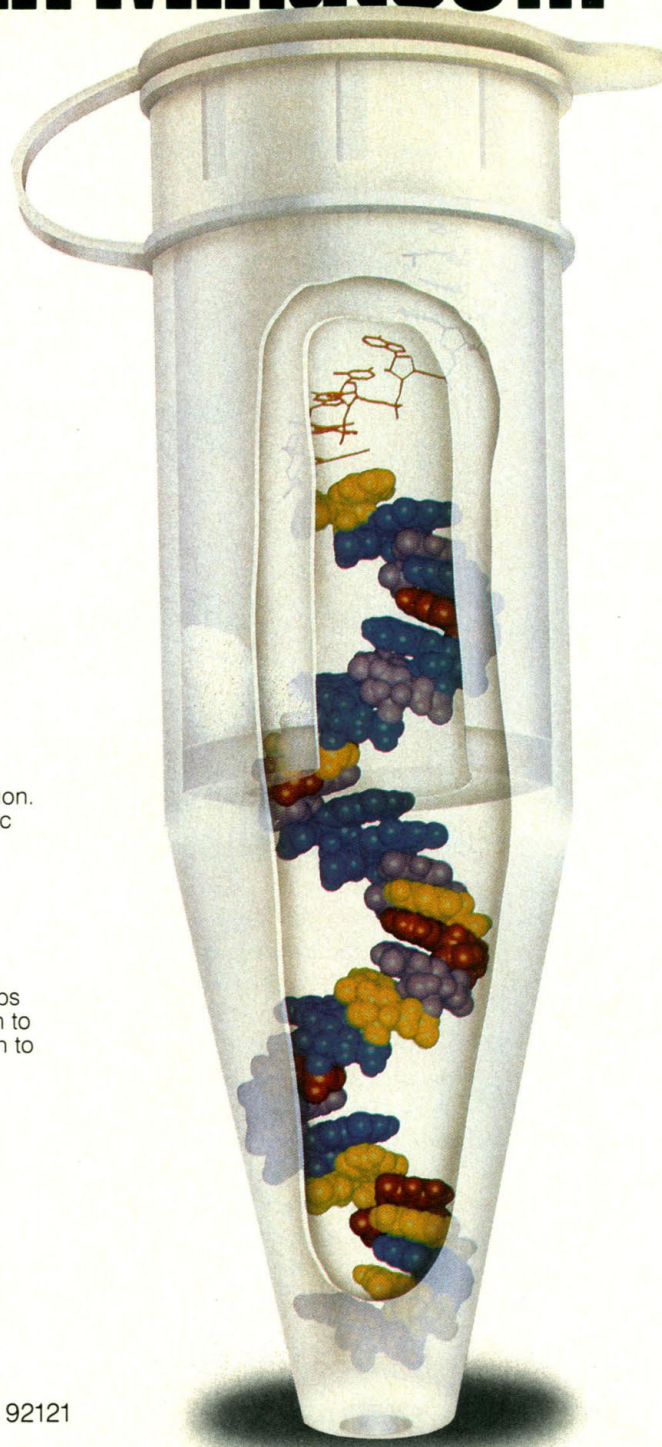


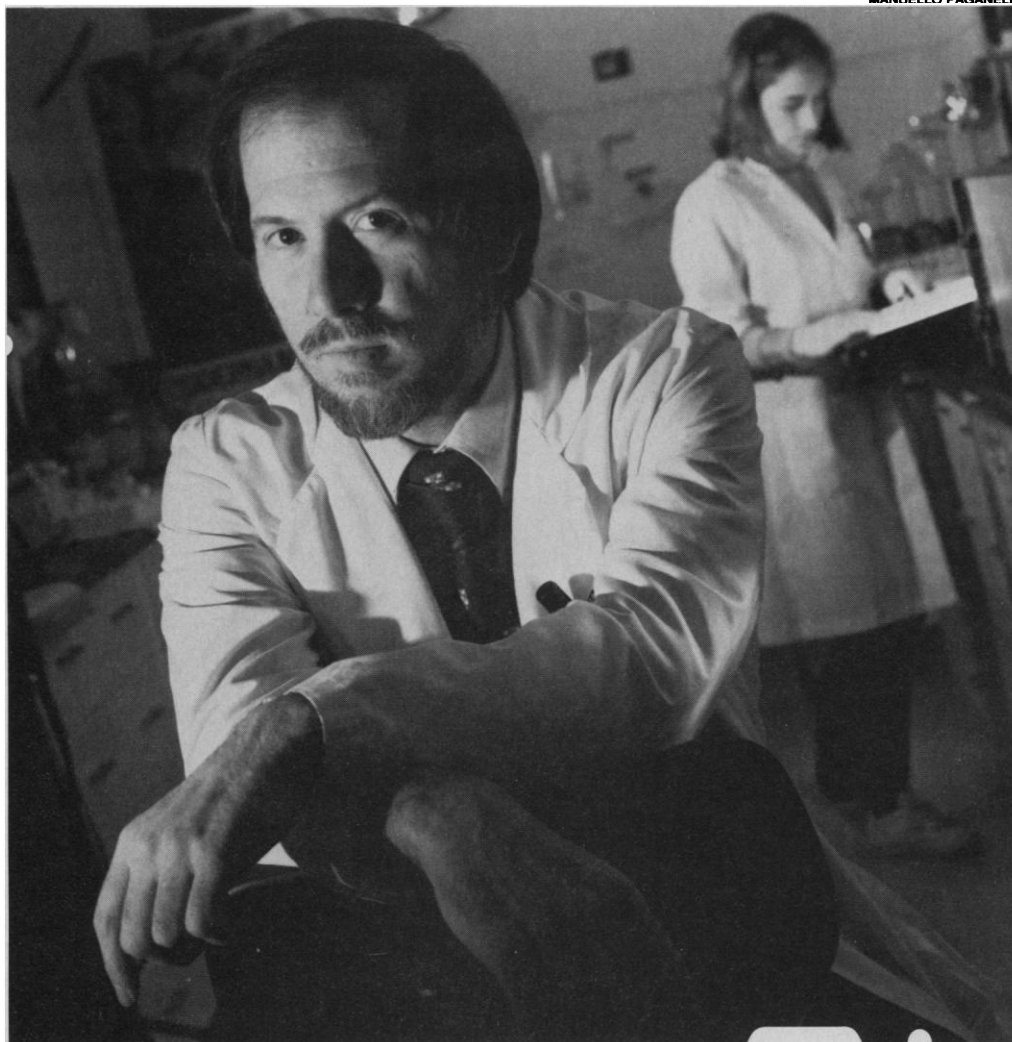
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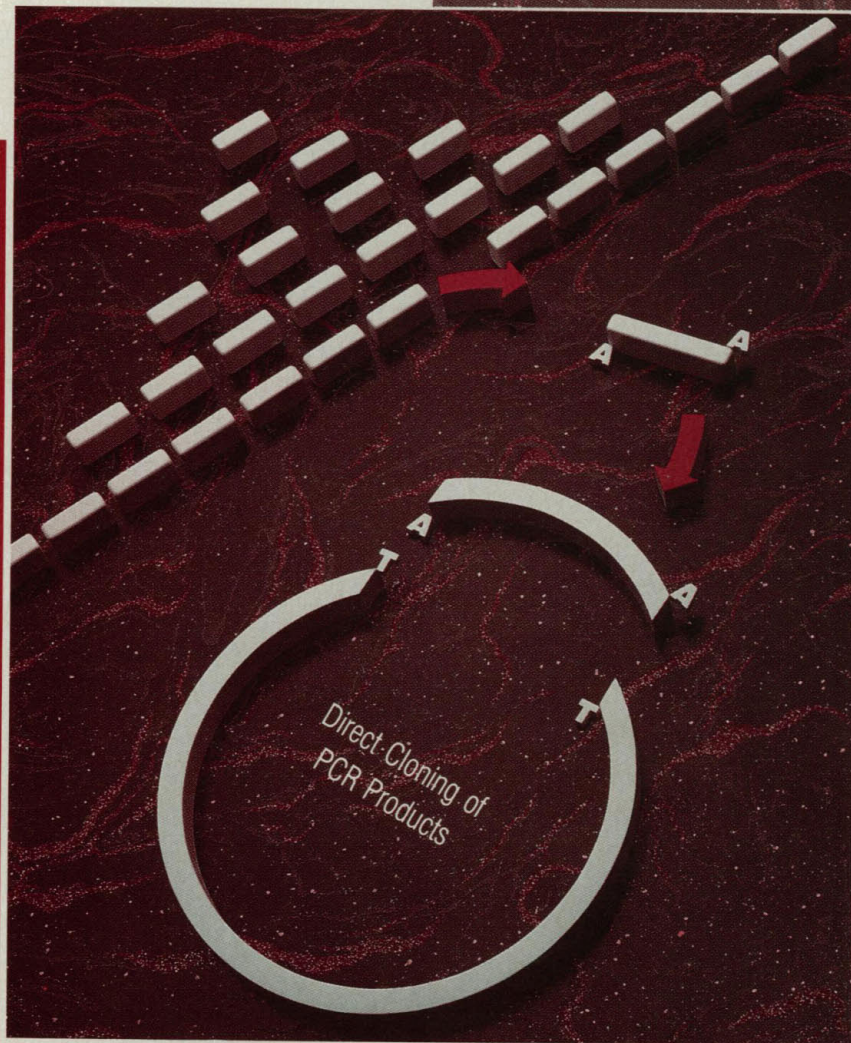
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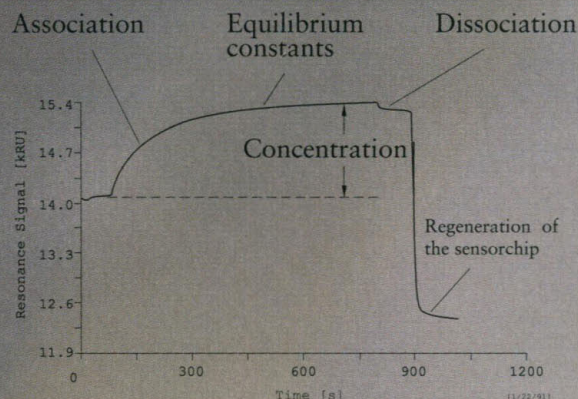
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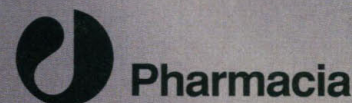
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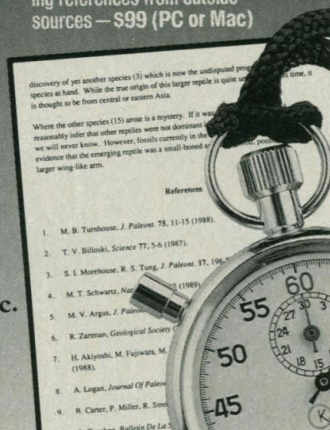
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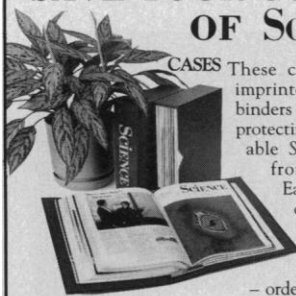
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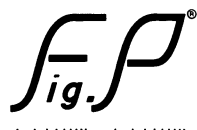


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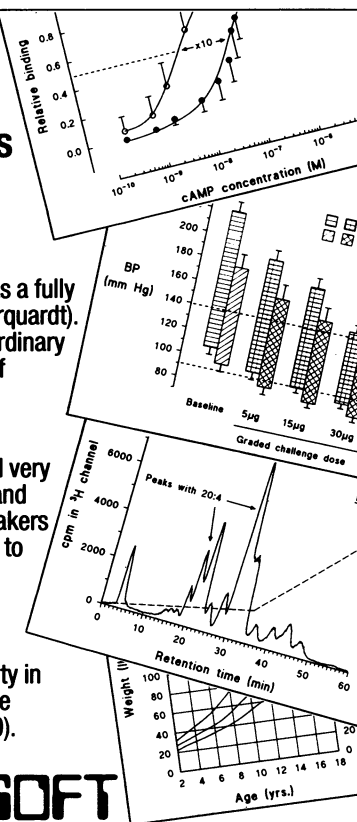
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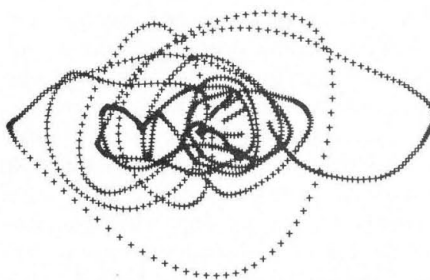
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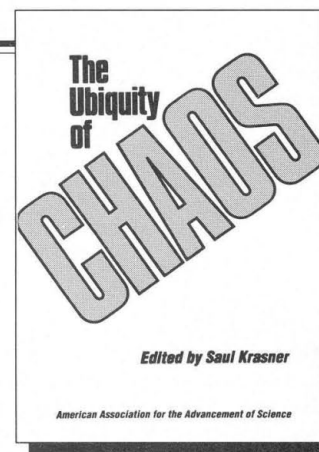
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