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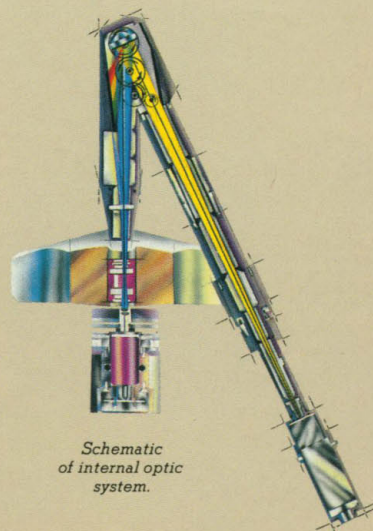




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COVER Primary sensory areas of rat neocortex, revealed by computer-enhanced acetylcholinesterase histochemistry. Somatosensory cortex (center) is organized into discrete "barrels," functional units of thalamic axons and cortical neurons, arranged in a pattern isomorphic to specialized sensory hairs on the rat's skin. Visual cortex (lower right), which normally has a more uniform pattern, develops barrels when transplanted to somatosensory cortex, indicating that these diverse cortical areas have the potential to form similar structures. See page 1556. [Photograph by B. L. Schlaggar, D. D. M. O'Leary, and J. Plotkin]

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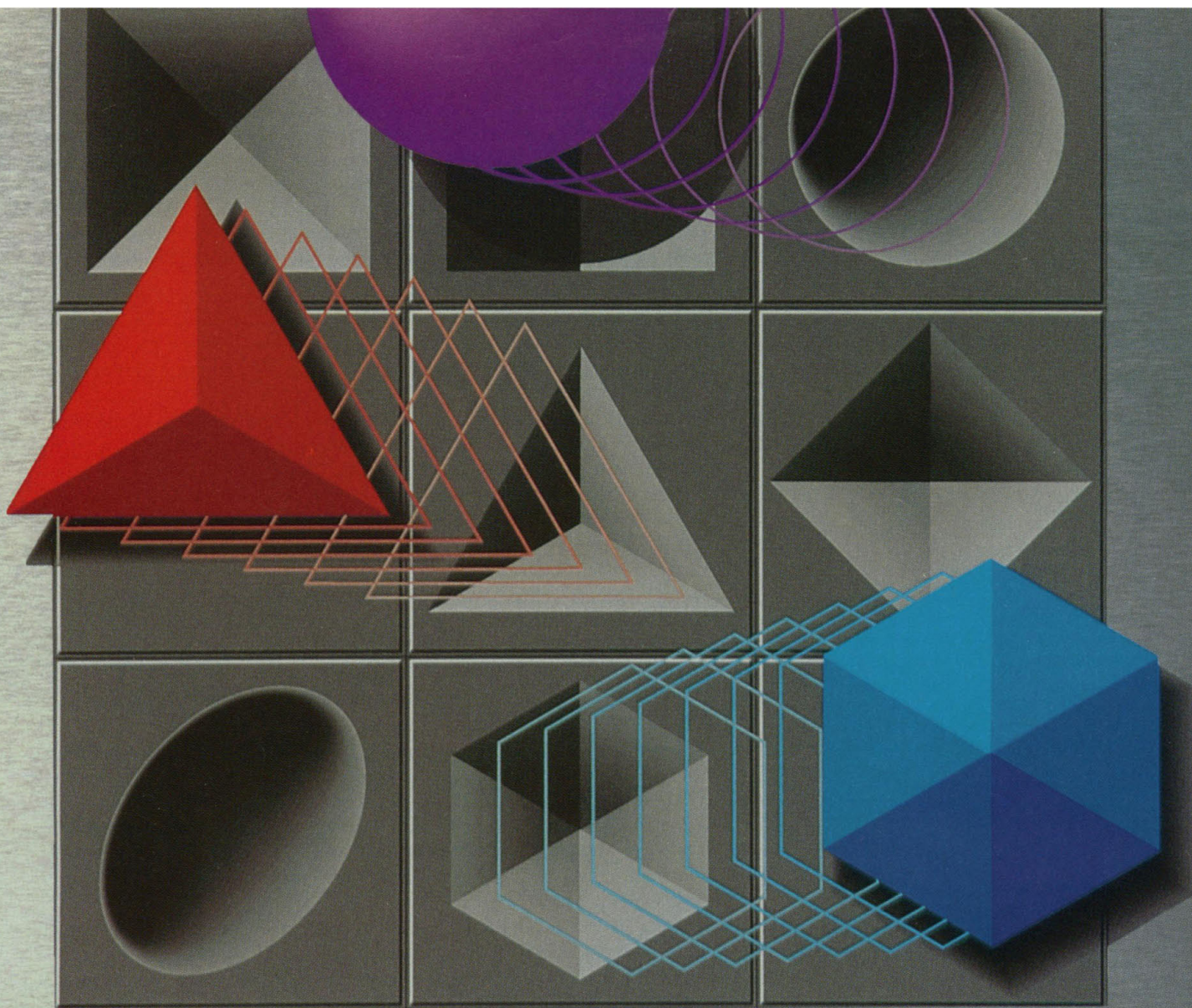
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This Week in SCIENCE

Organic superconductors

ORGANIC compounds—called organic metals or synthetic metals—can be superconducting. In 1979 the first organic superconductors were discovered. The initial transition temperatures were low (1 K), and high pressures were required to suppress the transition to an insulating phase. Now there are about 40 examples of organic superconductors, and the highest transition temperature achieved has risen an order of magnitude to about 13 K. Some but not most of the organic superconductors have metal constituents, but the metals are not responsible for electric conduction. Rather, the organic superconductors resemble metals in exhibiting electrical conductivity that increases with decreasing temperature. Two review articles describe these materials: Williams and colleagues discuss synthesis of the ET materials (those based on bis(ethylenedithio)-tetrathiafulvalene), their chemical compositions and the structural features of the crystals, and their similarities to and differences from ceramic copper oxide superconductors (page 1501); Jérôme's review focuses on the physical characteristics of these materials (page 1509).

Prion diseases

PRIONS are enigmatic infectious agents that cause fatal neurodegenerative diseases in humans and animals; at the present time, there are no known treatments for any of these diseases. The prion diseases of humans are kuru (which is thought to be transmitted orally through ritualistic cannibalism), Creutzfeldt-Jakob disease, and Gerstmann-Sträussler-Scheinker syndrome; the 4 animal diseases are scrapie (the most common), bovine spongiform encephalopathy or "mad cow disease," transmissible mink encephalopathy, and chronic wasting disease of mule deer and elk. The only "component" of the prion that has been identified is an abnormal form (PrP^{Sc}) of a cellular protein (PrP^C) that is encoded by a chromosomal gene of the host; the function of (PrP^C) is not

known. In some of the prion diseases, PrP^C is produced, and only after its synthesis is it altered to the pathologic form; in addition, point mutations or inserts have been identified in PrP^C genes of patients with familial prion diseases. Prusiner discusses these and other features of prion diseases and recent experimental work that could lead to a better understanding of prions and disease pathogenesis (page 1515).

Oil fires in Kuwait

EARLY in 1991 Saddam Hussein's army set fire to hundreds of oil wells in 6 oil fields in Kuwait; the fires are still burning. Orbiting weather satellites have been able to observe the dark smoke plumes from these fires. Are the plumes only polluting the atmosphere locally or are they also causing more widespread effects? Limaye *et al.* present a number of the satellite images and discuss some of the variables that affect the extent of smoke spread, such as the size of the particles, the height to which particles are injected into the atmosphere (which depends on the intensity of the heat source), the speed and direction of winds, and the atmospheric temperature and humidity (page 1536). Because smoke blocks sunlight, a major concern is that, by inhibiting heating of the earth's surface during the day and enhancing cooling at night, the fires could also cause climate changes. It is still too soon to determine whether the fires will affect climate; so far, the smoke does not seem to be lofted high enough to have a global climate impact.

Impact tektites

TEKTITES are glassy droplets that are thought to form by melting of rocks during very high-speed impact events. A variety of shapes—teardrops, dumbbells, spheroids, and others—form as the melt droplets are ejected upward. Tektites have been found in marine sedimentary rocks at the Cretaceous-Tertiary (K-T) boundary in Haiti.

There they are associated with an anomalously high abundance of iridium and shock-metamorphosed quartz grains, both of which are also indicative of an asteroid or comet impact event. Izett *et al.* have now directly dated these tektites using ⁴⁰Ar/³⁹Ar dating procedures and compared them with K-T boundary standards from coal-bearing rocks from Montana (page 1539). The Haitian tektites date back 64.5 ± 0.1 million years and those from Montana date back 64.6 ± 0.2 million years; the 2 dates are statistically indistinguishable. These tektites are the first K-T boundary objects that could be dated directly; their association with the K-T boundary stratigraphic layer adds strength to the hypothesis that an impact event marked the end of the Cretaceous period. These tektites are the oldest ones that have been discovered on the earth, outdating all other known tektites by some 30 million years.

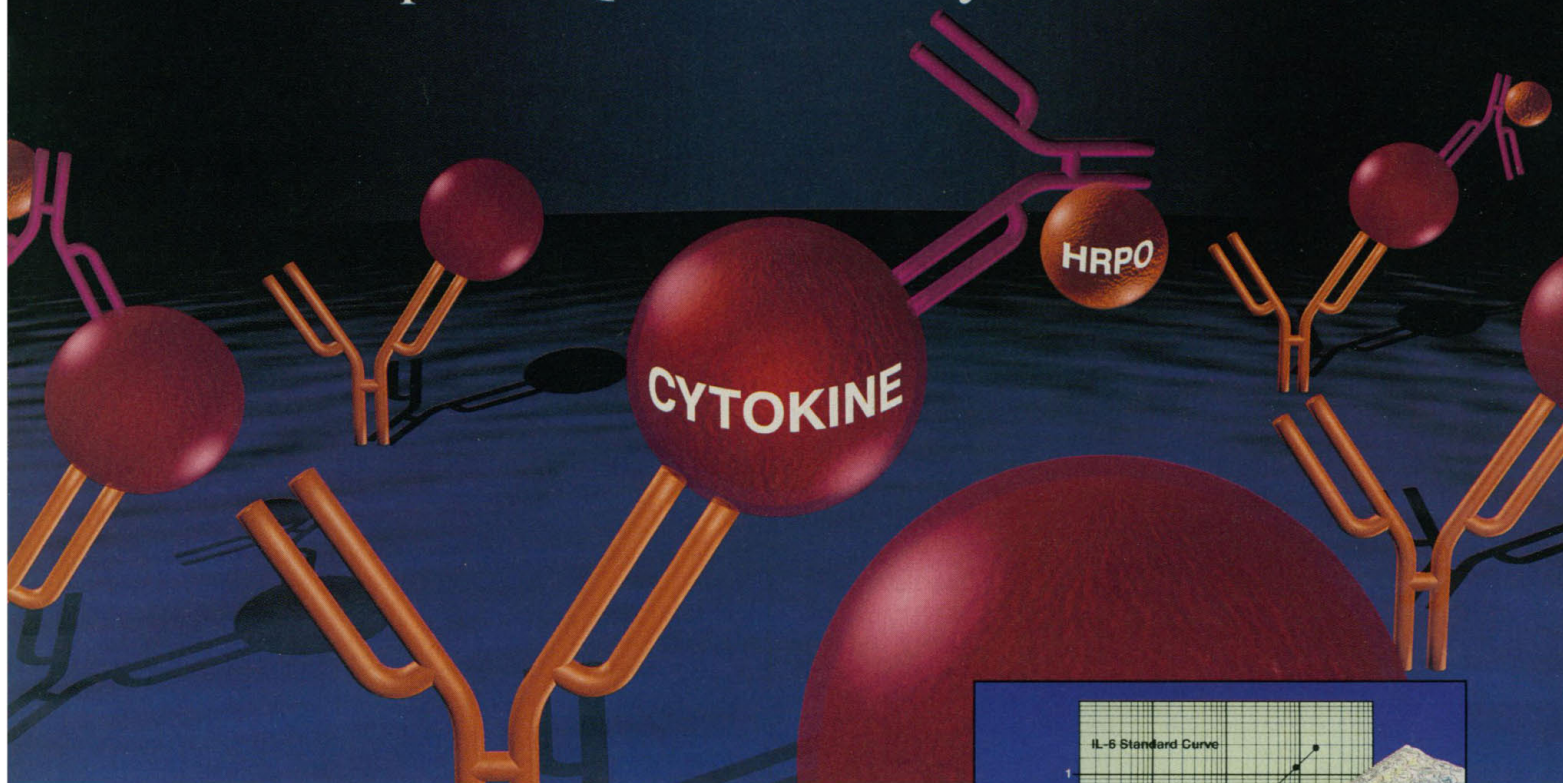
Cross signaling

TWO signal transduction pathways that were thought to be unrelated to each other now appear to be functionally linked (page 1546). Dopamine, a catecholamine neurotransmitter that works through the adenylyl cyclase pathway, has been shown to be an activator of the steroid receptor family member COUP-TF, which is a transcription factor that participates in regulation of a number of known genes. COUP-TF had been classified as an "orphan" receptor, because its activator was not known. Power *et al.* found that dopamine can set off a series of events that result in the expression of a COUP-TF-dependent gene. They suggest that dopamine does not interact directly with COUP-TF but works by stimulating cell surface receptors; phosphorylations are then induced that activate COUP-TF, which turns on the COUP-TF-dependent genes. Steroid hormone-like receptors like COUP-TF are thought to bind ligands intracellularly; it is therefore a surprise that they can be activated by a cell surface receptor.

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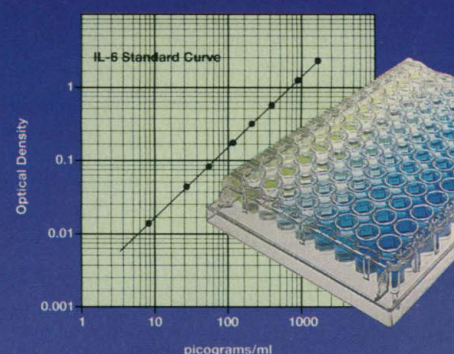
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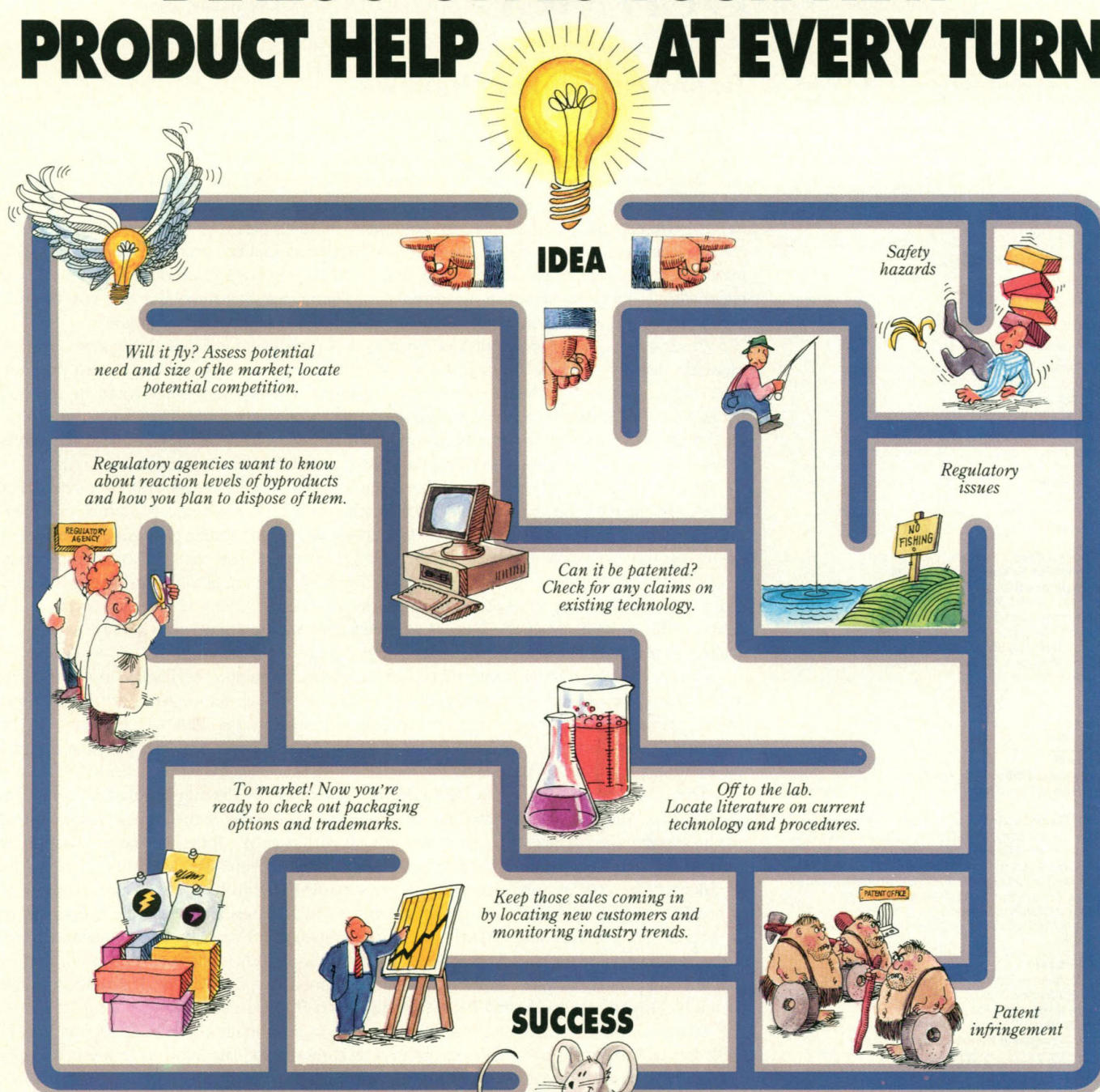
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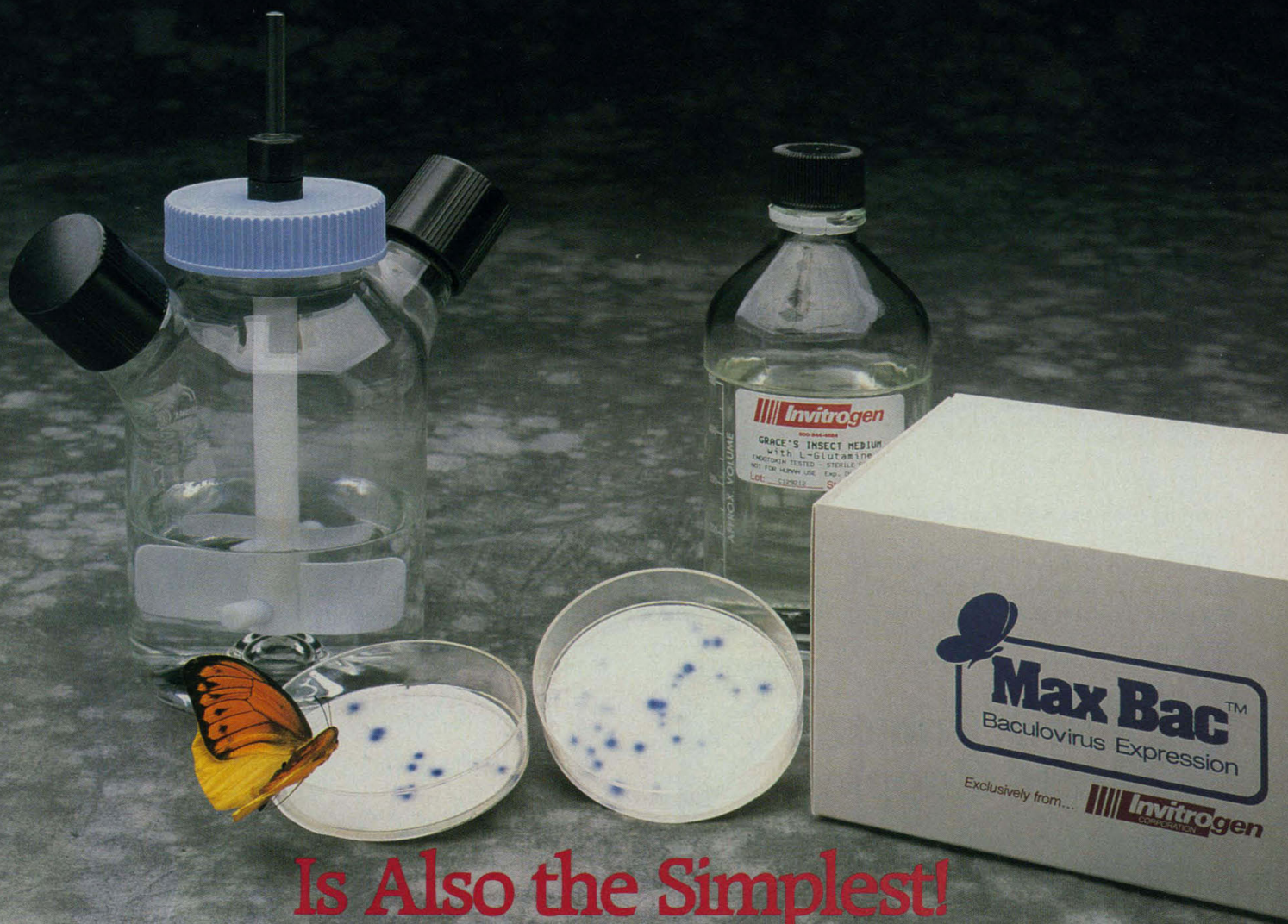
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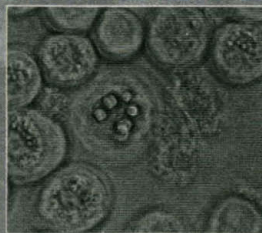


Figure 1. Infected Sf9 insect cells showing viral occlusions.

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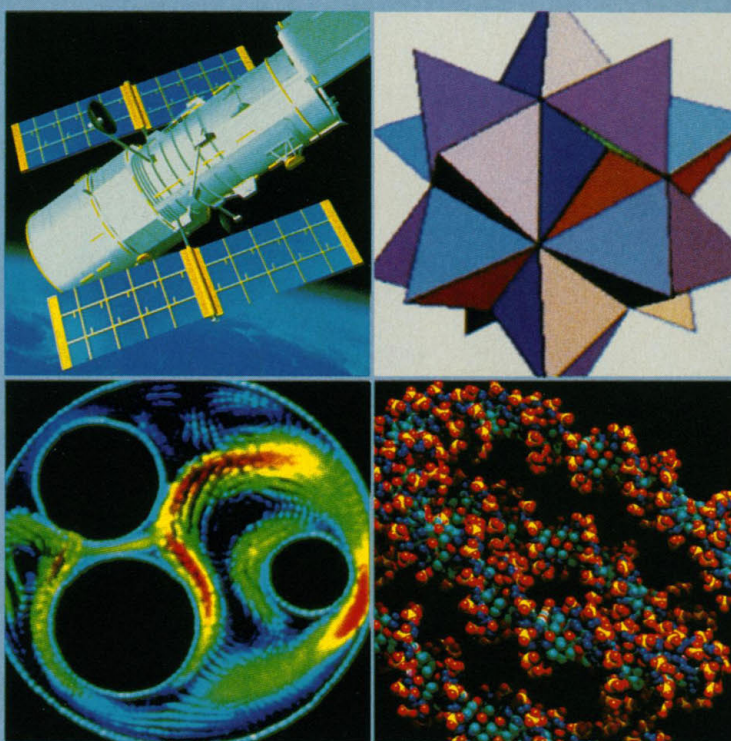
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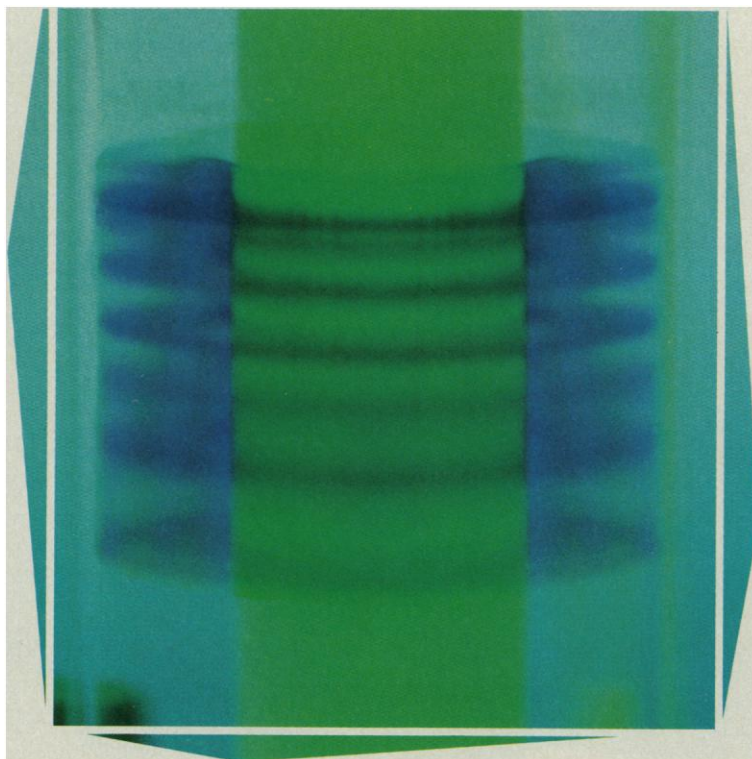
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