American Association for the Advancement of Science

# SCIENCE

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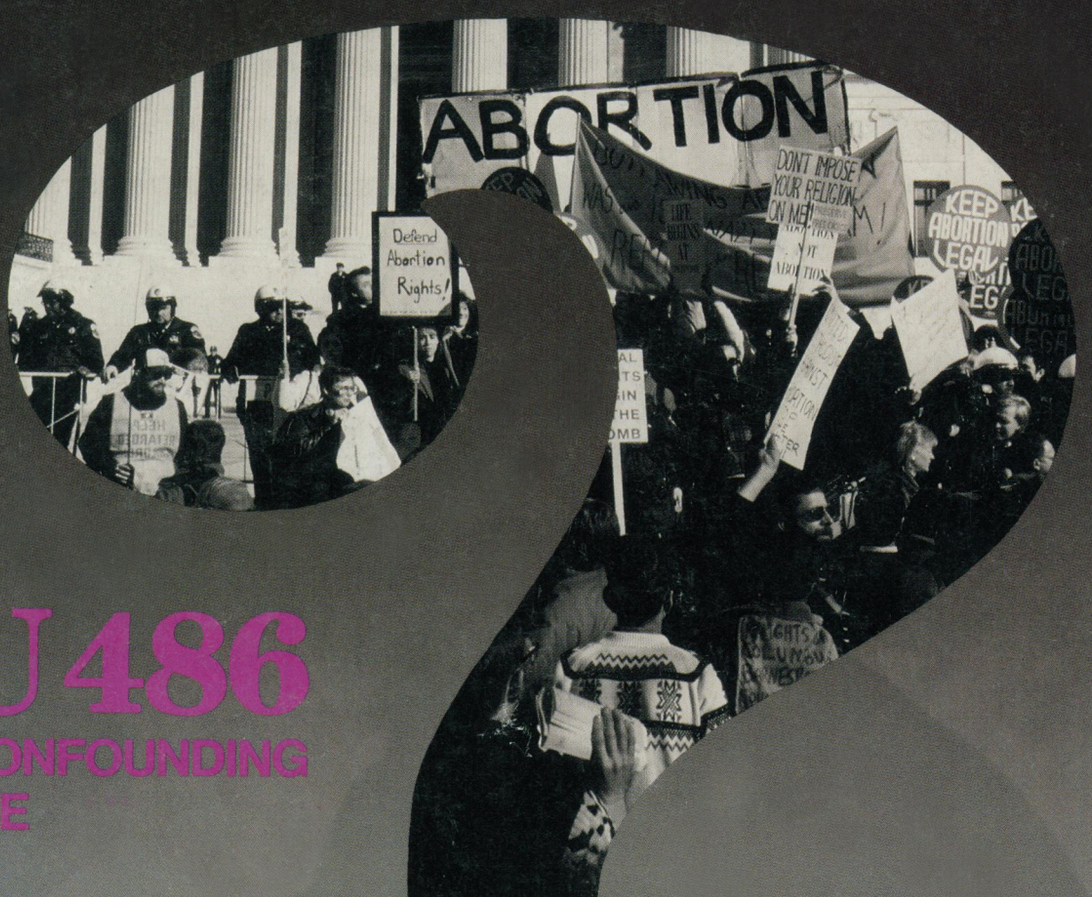


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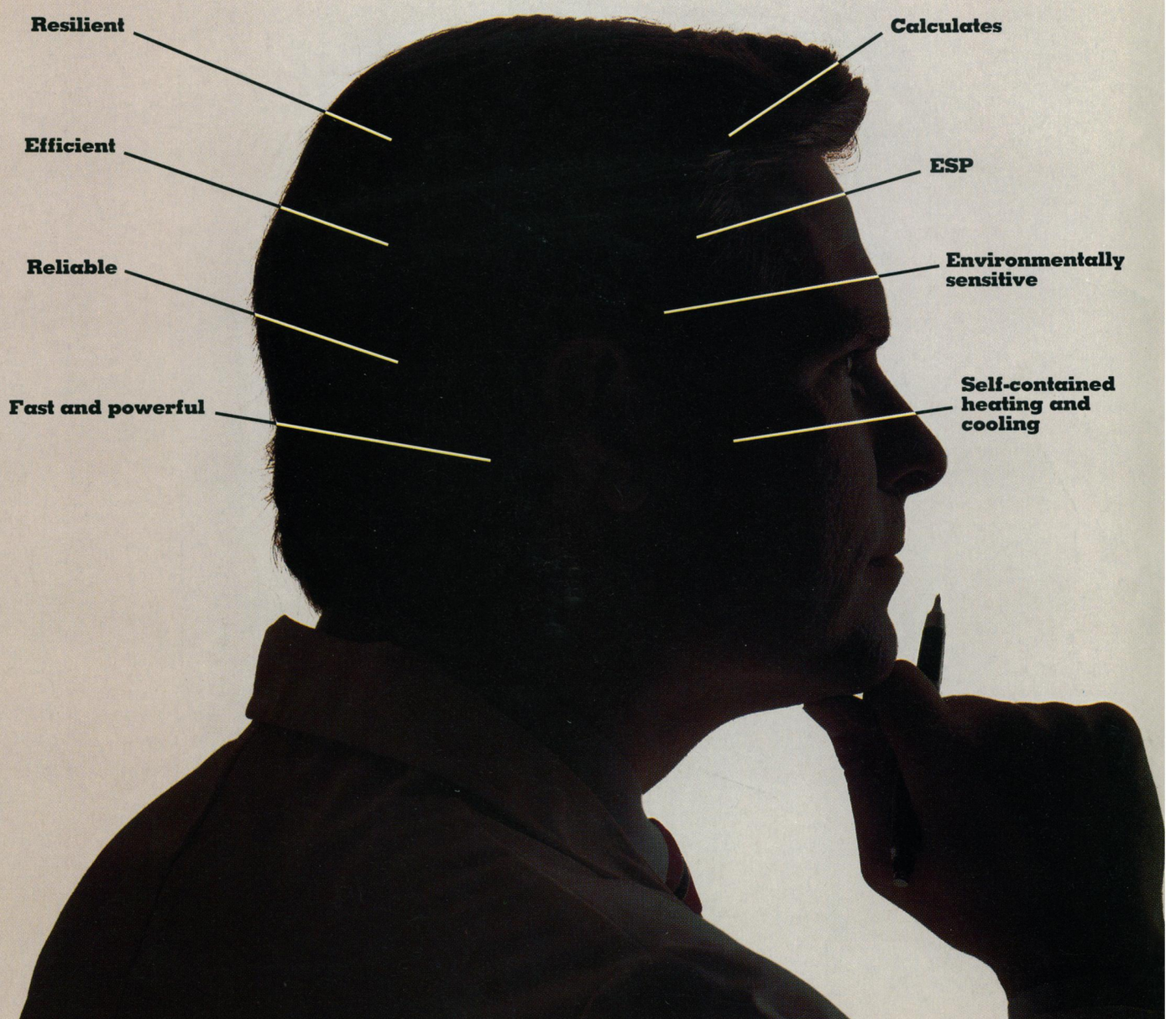

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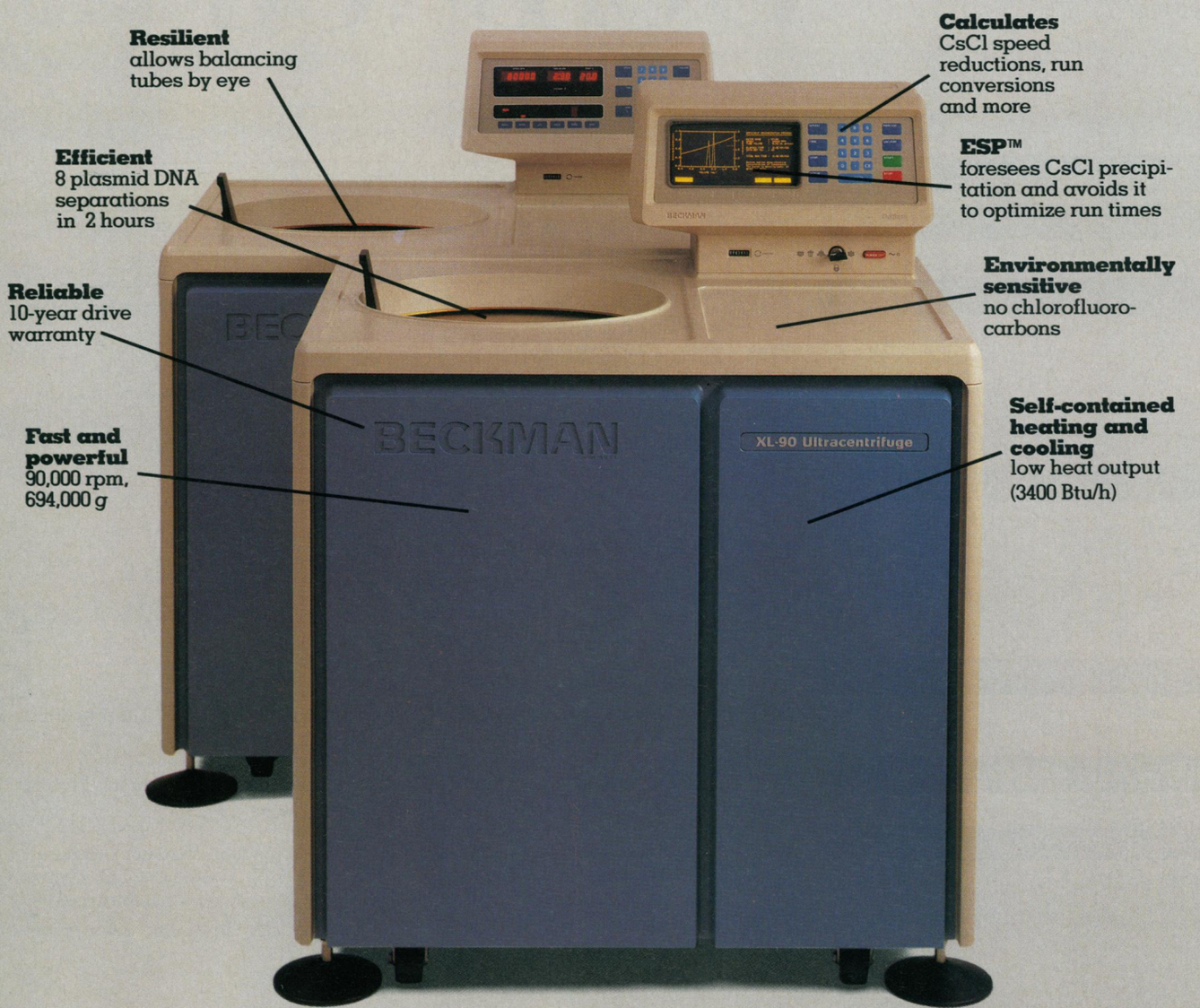


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COVER RU 486, a pill that counteracts the actions of the pregnancy hormone progesterone, can be used to terminate early pregnancies. It has been the subject of great controversy in the United States and in France (and Europe). See pages 1319 and 1351. [Photograph of RU 486 by Peter Krough. Photograph of a demonstration in front of the U.S. Supreme Court Building by Arthur Grace/ Sygma]

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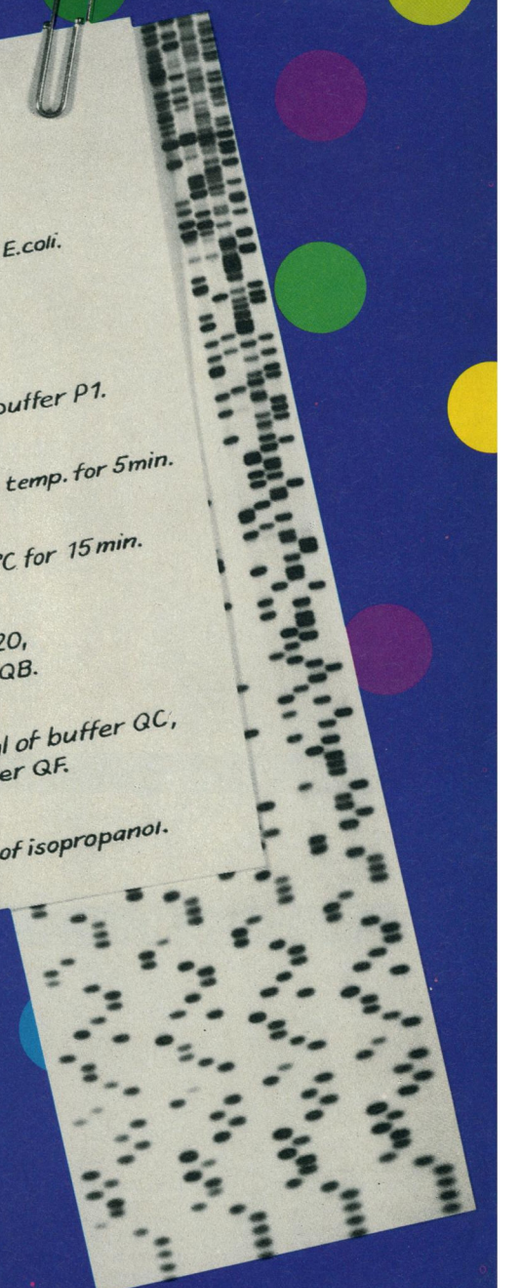

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# This Week in SCIENCE

## Antigestation pill

In France, since the beginning of this year, the new antigestation pill RU 486 (cover) has been used to successfully terminate more than 2000 pregnancies each month (page 1351). The pill is a steroid hormone that interferes with the interaction of progesterone with progesterone receptors inside cells; progesterone is crucial both for establishing a pregnancy and for sustaining it. The rationale for developing an antiprogesterone pill, the experimental steps that went into the production of RU 486, and the likely modes of action of this drug are reviewed by Baulieu. Some of the anticipated uses of RU 486, besides terminating pregnancies, are discussed; these include both clinical applications—such as aiding in difficult deliveries—and uses in basic endocrine research. RU 486 may be especially helpful in developing countries where surgical procedures are not readily available. Palca and Cherfas elaborate on these and other issues—the prospect of a black market in RU 486 distribution, the bureaucratic delays, and the complex societal issues—that are raised by the availability of an antigestation pill (page 1319).

## Neptune's winds

Starting more than 2 months before its flyby of Neptune, the Voyager spacecraft began tracking large-scale cloud features and their movements in Neptune's southern hemisphere (page 1367). From the images made with Voyager's narrow-angle camera during a 65-day period and from ground-based telescopic observations, Hammel *et al.* have calculated the wind speeds in southern hemisphere zones of the planet. Four large distinctive cloud features were followed: the Great Dark Spot at about −22° latitude (which resembles Jupiter's Great Red Spot in shape, size, and position), the "Scooter" at −42°, a second dark feature at −54°, and the south polar streak at −71°. Neptune's wind velocities have proved to be similar to those of Jupiter and Uranus, exceeding speeds of 200 meters per second; this is slower than Saturn's equatorial winds, which have been clocked at 500 meters per second. The overall similarity of winds associated with all the planets points out one of the enigmas of the solar system: the planetary winds are similar even though solar energy inputs to the planets vary by a factor of 1000.

## Spontaneous vesicles

A simple mechanical procedure, the gentle mixing of two aqueous solutions, has led to the formation of exceptionally stable vesicles that may be useful as delivery systems for encapsulated drugs, as models of membranes, and as substrates for enzymes (page 1371). Kaler *et al.* propose that the mixtures of anionic (sodium dodecylbenzene sulfonate) and cationic (cetyl trimethylammonium tosylate) surfactants form vesicles by pairing into what are effectively double-tailed zwitterions, ions that carry both positive and negative charges. Unpaired surfactants promote the fluidity of the membrane and also account for the vesicle's net charge, which can be positive or negative depending on the mix of the two constituents. Because the sizes, charges, and permeabilities of the vesicles can be controlled by different mixes, opportunities are now at hand for the preparation of an array of vesicles with diverse applications in chemistry and biology.

## Bacterial blight of soybeans

The "gene-for-gene" relationship of blight-resistant soybean plants with blight-causing bacteria works in the following manner. Bacteria invade host tissues and begin to multiply. A hypersensitivity reaction occurs: infected leaf cells collapse, a dried-out necrotic lesion develops, and the bacteria spread no farther in the plant. The hypersensitivity reaction is the outcome of some interaction between the products—either direct ones or those in downstream pathways—of the bacterium's avirulence gene and the plant's resistance gene. (In contrast, bacteria multiply and spread in susceptible soybean plants and produce water-soaked yellowish lesions on the leaves.) Huynh *et al.* found that the avirulence gene is expressed in bacteria present not only in resistant soybean plants but also in susceptible ones (which do not have the appropriate resistance gene), in nonhost plants, and in defined media (page 1374). Activation of the avirulence gene is thus independent of the presence of its "partner" resistance gene; several carbon sources and two genetic regions in the bacterium that participate in the induction of the avirulence gene were identified. The gene-for-gene interaction occurs rapidly, suggesting that, in a resistant plant, even before the bacterial gene is expressed, plant components may be primed for action.

## Neurotransmitter receptor subtypes

The major inhibitor of neural excitement in the brain is the modified amino acid γ-aminobutyric acid A ($GABA_A$), which binds in the central nervous system to heterogeneous receptors that are composed of three (α, β, and γ) subunits. In pharmacologic studies, two subtypes of receptors—I and II—have been distinguished. Pritchett *et al.* show, using recombinant $GABA_A$ receptors expressed and assembled in cultured cells, that differences between the subtypes are caused by the presence in the receptors of homologous yet distinctive α subunits (page 1389). The type I receptors have $\alpha_1$ subunits; the type II receptors have $\alpha_2$ or $\alpha_3$ subunits. Studies of how well benzodiazepine (a mild tranquilizing substance) could bind to $GABA_A$ receptors and potentiate $GABA_A$ effects showed that type II receptors with an $\alpha_3$ substituent were most responsive. The heterogeneity of the $GABA_A$ receptors explains in part how benzodiazepines, acting in different parts of the brain where different α subunits predominate, might induce diverse physiologic and pharmacologic effects. ■ RUTH LEVY GUYER


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# The War? Program? Experiment? on Drugs

After reading the headlines and editorial columns of newspapers on the President's new drug program, the average Martian visiting this planet would conclude that people are very indignant about the drug problem. No amount of money, no amount of discipline, no amount of sacrifice is too much to require for the successful waging of this war. On the platitudes, everyone is marching in step.

When it comes to the specifics, however, it is quite clear that no one is willing to give up a single prerogative, or even worse, a single preconception, in order to attack drugs. But because no one admits to such provincialism, it becomes necessary to create criticisms that will effectively compromise the program into nothingness and thereby save face. How is this done?

Easy. First of all, you announce that you are vigorously for the program, whatever it is, but that it does not go nearly far enough. Heroic person that you are, you are willing to sacrifice untold millions of other people's money to fight drugs. There is, of course, no intention of coupling the demand for money with increased taxes. When this is clarified it is necessary to come up with the proposal that all "discretionary" money in the budget be cut across the board and diverted to the new program. If increasing taxes is unlikely, then the notion that farmers, scientists, environmentalists, and lawyers would willingly cut their programs to contribute to a dubious war on drugs is even more unlikely.

The second way you undermine a program is to demand that certain massive and impossibly utopian ideals must be accomplished first. Drug use, you say, comes out of poverty, lack of education, and unhappy personalities, and these underlying ills must be addressed. Concentrate first on improving education and second on eliminating poverty. Finally, suggest a massive subsidy of psychiatry so that we can understand human nature. Improving education, eliminating poverty, and understanding human nature are certainly desirable goals. To imply, however, that they are preconditions to starting a drug program is a misdirection that helps none of them.

The drug program recently unveiled by the Executive Branch is far from perfect. It could use more money and it could use more boldness, but it is at least a useful experiment, and should be labeled as such. A program implies one knows the answer. An experiment suggests that this is one of several possible approaches. A program invites self-defeating compromise. An experiment should be designed to help the problem while at the same time producing data that are useful and convincing.

The program's emphasis on street crime is a direction that has been suggested by capable social scientists. It is a law and order approach and may be the last such attempt that has a chance of making a dent in the drug problem before the country reluctantly decides that prohibition for drugs is no more effective than it was for alcohol. If the country were mature enough for social experiments, we might institute tough laws for 5 years and then try legalization for another 5 years, collect the data on the two outcomes, and base a final policy on the results. Because that is politically impossible, then the best approach in the current climate seems to be to try punishment plus directed education as an experiment of the "get tough" category.

The proposed program has a certain amount of consistency, and it is a plan for which the Executive Branch, which must direct it, has enthusiasm. A minimal requirement would seem to be ongoing analysis of the program's degree of success, to decide whether to continue in the same direction or to seek new directions if the program is not succeeding. The appropriate time to expand the program would be when that feedback starts coming in. The program should contain an educational component on drug use and evaluate the problems of poverty, minorities, and civil rights in relation to drug use, but it should not be compromised by ancillary requirements relating to the general ambience of society.

The experiment will be acceptable only if accompanied by a scientific detachment that says, "The get-tough experiment is under way. If it fails, legalization is next." The country is faced today with a situation similar to prohibition. Those who read history know well how ineffective the law was in that case. But many say drugs are different from alcohol, so let's do the experiment and collect the data.—DANIEL E. KOSHLAND, JR.

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ume, including the fuselage, to the wing volume. It was intended to indicate the *feasibility* of proving analytically the aerodynamic desirability of the flying wing. Joseph Foa in 1947 uncovered a calculational error in the appendix, and Sears immediately, 42 years ago, acknowledged the error. The error appeared in only a technical aside and did not bear on the conclusions of the study.

The 1945 Sears-Ashkenas analysis was so simplistic that it would not have been very significant even if the arithmetic had been correct. In 1945 little was known about optimal jet flight paths, and the cruise altitude was assumed to be constant. We now know that an optimal solution depends critically on the appropriate altitude being chosen for each configuration studied. Furthermore, a meaningful airplane design study must include the effects of structural weight and engine size requirements.

The fundamental advantage of a flying wing is that the lift-to-drag ratio of an airplane, a major measure of aerodynamic efficiency, is much improved by omitting the drag of the fuselage and the tail. Obviously the weight empty is also reduced. If the wing area required to carry the weight efficiently is so large that all the fuel and payload will fit within it, a flying wing is clearly a winner from a performance standpoint. If, on the other hand, the wing area must be greatly increased beyond the aerodynamically desirable area in order to provide the necessary wing volume, then the increases in the wing weight, surface-area drag, and drag due to flying at an inefficient angle-of-attack–altitude combination more than negate the gains due to omitting the fuselage and tail. Even aircraft as heavy as an 800,000-pound Boeing 747 have neither the volume nor the wing thickness to accommodate its passenger load. When aircraft become so large that the flying weight justifies a wing area and associated aerodynamically permissible thickness that allows passengers to stand up in the aisles in the wing, we may see flying wing passenger aircraft. With bombers, which carry concentrated loads requiring small volumes, a flying wing may be the desirable choice, especially when radar reflection is a significant factor.

Studies of flying wings have been conducted dozens of times during the last 40 years. Certainly many different configurations were studied before the design of the B-2 was chosen. A minor appendix in 1945 could not have had anything to do with the B-2 design.

RICHARD S. SHEVELL
*Department of Aeronautics and Astronautics, Stanford University, Stanford, CA 94305*

*Erratum*: In her Research News article "NCI team remodels key AIDS virus enzyme" (11 Aug., p. 598), Jean L. Marx wrote that Tom Blundell and his colleagues at Birkbeck College in London determined the three-dimensional structure of a recombinant AIDS virus protease. She neglected to mention that researchers from Pfizer Central Research in Groton, Connecticut, and Sandwich, England, made the recombinant enzyme and collaborated in the structural analysis.

*Erratum*: On page 1362 of the report "Phylogenetic stains: Ribosomal RNA–based probes for the identification of single cells" (10 Mar., p. 1360) by Edward F. DeLong, Gene S. Wickham, and Norman R. Pace, note 4 contained an error in the sequence given on lines 6 and 7. The sequence should have read, "5′-TTGYAGCC/ICGCGTGYM/IGCCCSGSM/ISA/ITTCGGGGC-3′." (The additional base T—indicated in bold-faced type—was omitted).

*Erratum*: In Joseph Palca's News & Comment article "New round in *Dingell* v. *NIH*" (28 July, p. 349), the Baylor College of Medicine in Houston, Texas, was incorrectly referred to as "Baylor University." Baylor University is in Waco, Texas.

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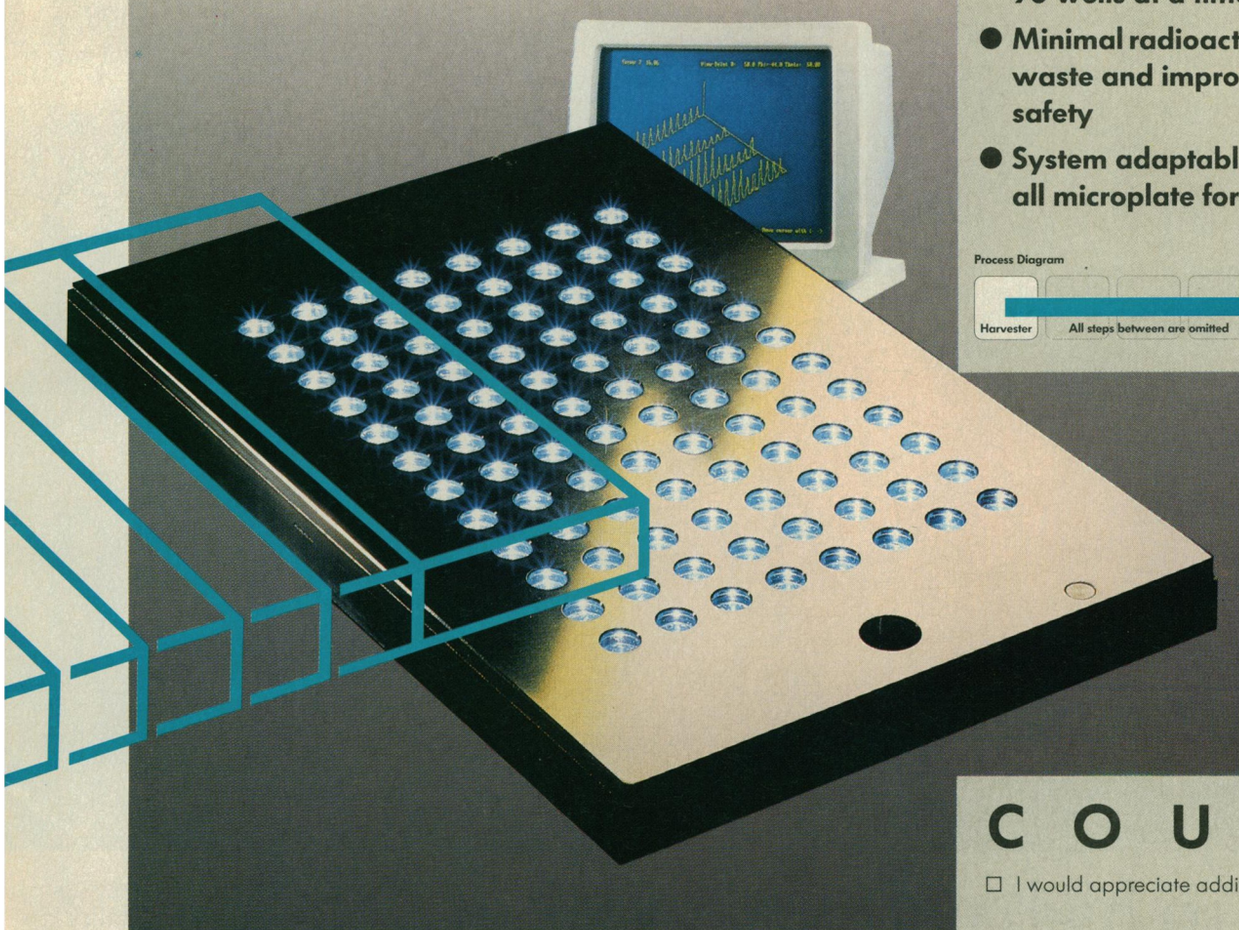

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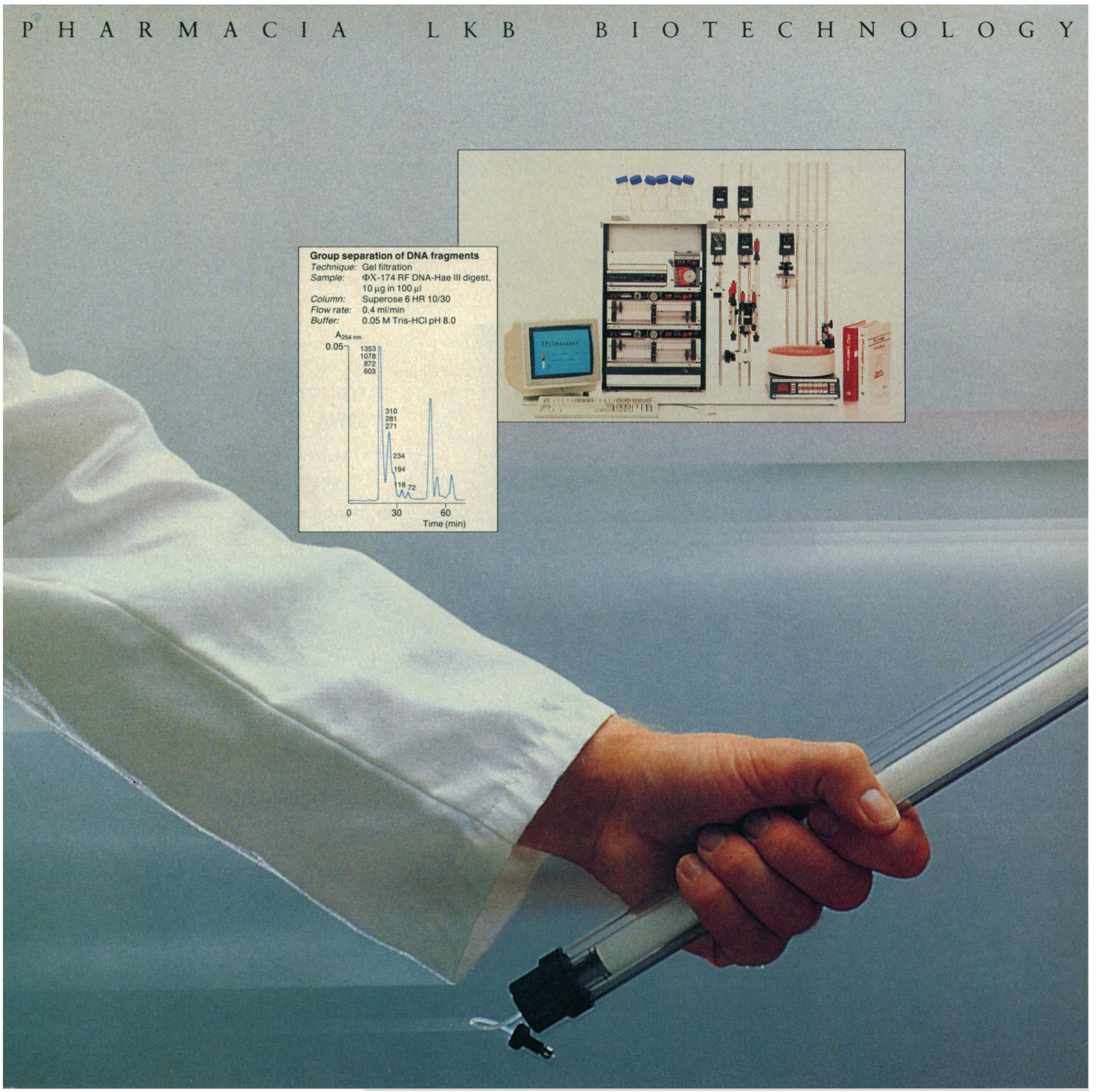


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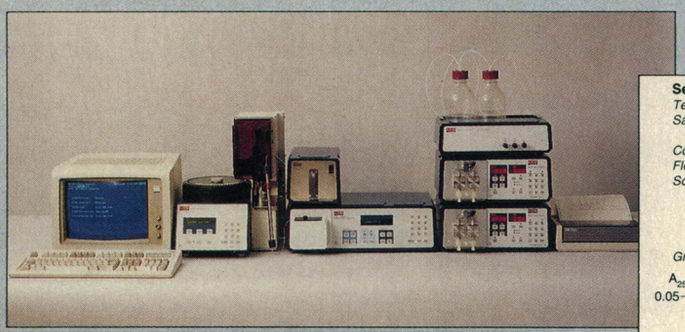

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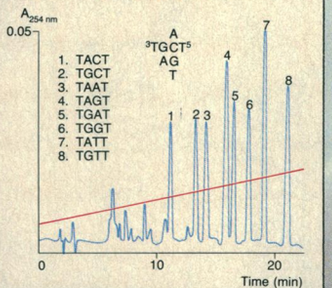



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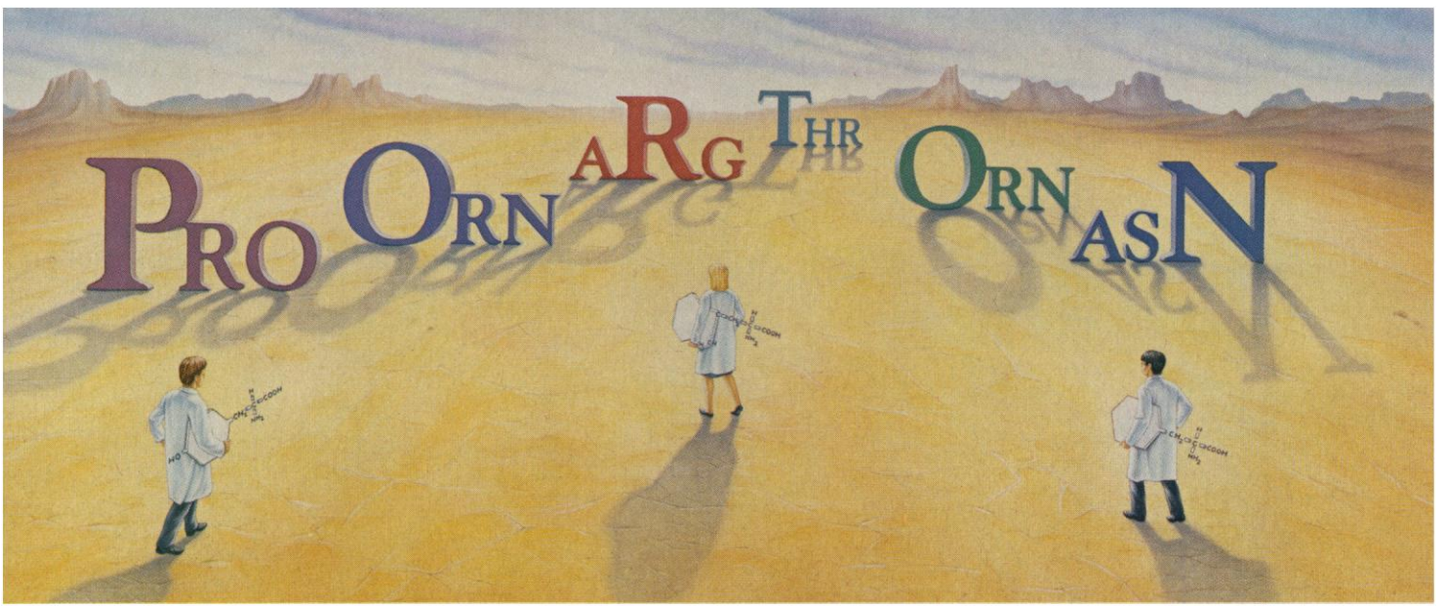


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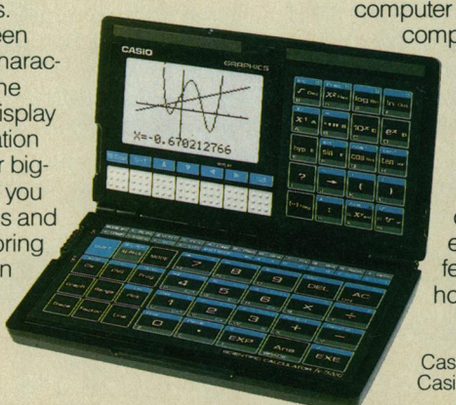


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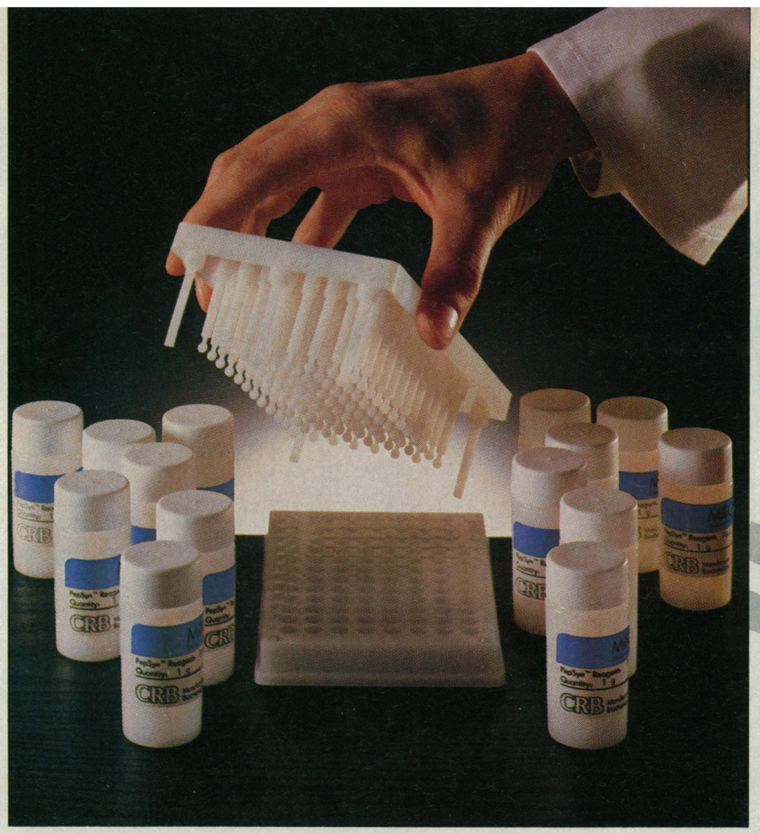

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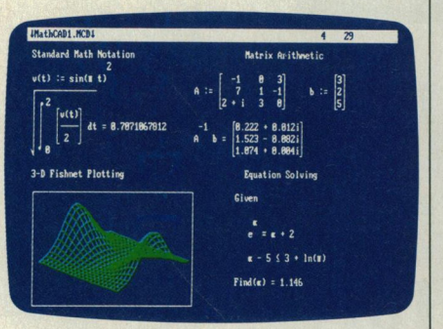


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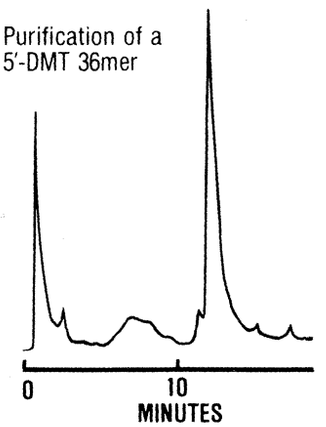


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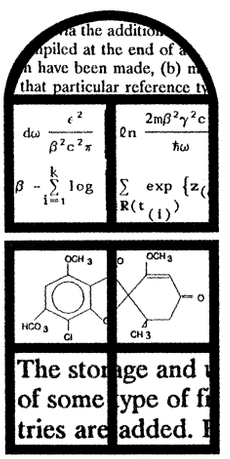

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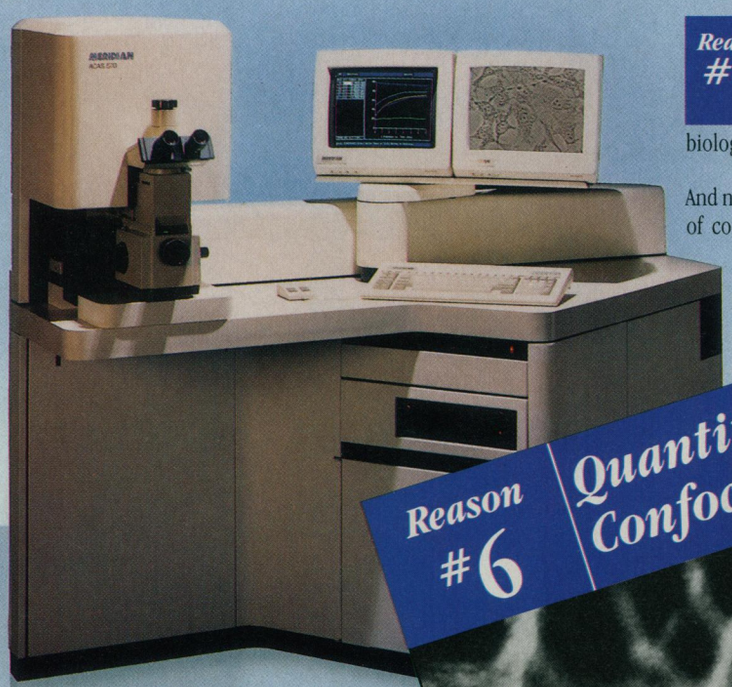

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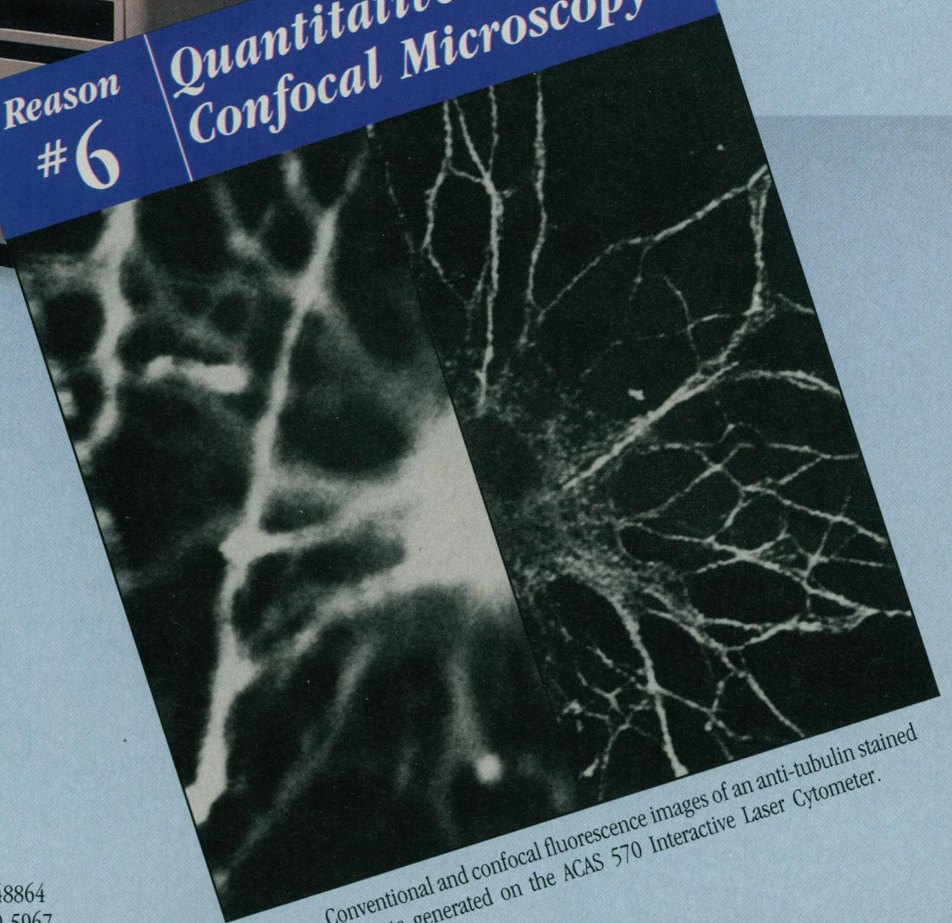

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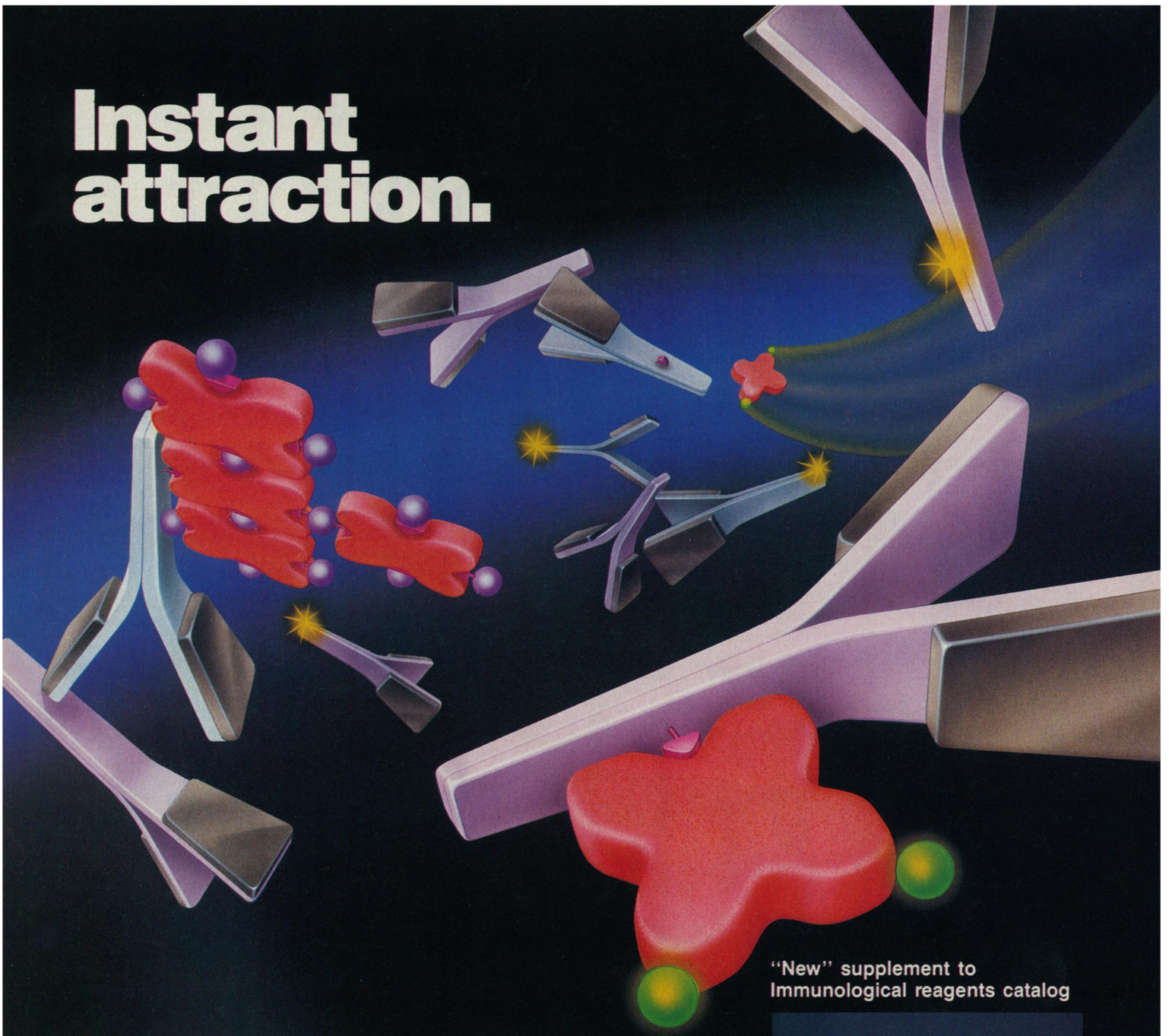

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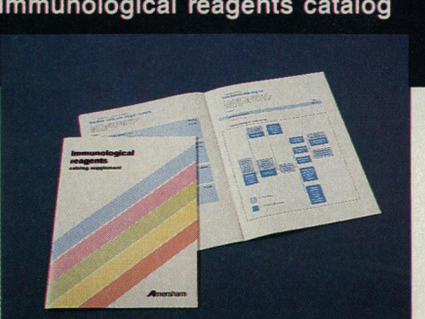

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