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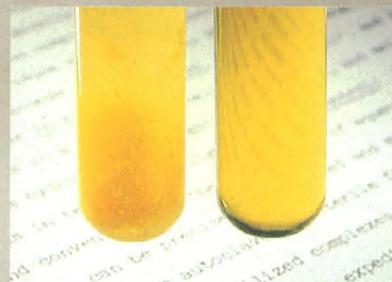


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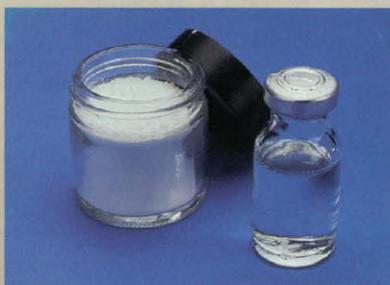
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343 This Week in *Science*

Editorial

345 Results and Discussion in an Election Year

Letters

347 Crystallographic Citations: W. A. HENDRICKSON; G. D. ROSE; F. M. RICHARDS
■ Energy Consumption: D. BODANSKY ■ Knot Really: D. N. BAKER ■ Relman on Maddox: A. S. RELMAN

News & Comment

363 Savannah River Blues
365 Security at Weapons Labs
366 EPA Sets New Policy on Pesticide Cancer Risks
367 Congress Passes First AIDS Bill
Supercomputer Centers Enter New Phase
368 USDA Fights to Repel African Bees' Invasion
370 Family Planning: A Growing Gap
Candidates' Heroes
371 Let 100 Million Trees Bloom
NSF Pauses to Assess Engineering Centers

Research News

372 HTLV-I: To Test or Not to Test
374 Mathematicians Reach Factoring Milestone
375 Discovery Gets a Clean Bill of Health
376 New Clues About Kaposi's Sarcoma
377 Does Earth Fill Its Own Magnetosphere with Ions?
378 Shroud of Turin Is Medieval
379 Microscopic Motor Is a First Step

Articles

385 Significance of "Tethyan" Fossils in the American Cordillera: C. R. NEWTON
391 Energy Loss Mechanisms of Superconductors Used in Alternating-Current Power Transmission Systems: E. B. FORSYTH
399 Phenotypic Diversity Mediated by the Maize Transposable Elements *Ac* and *Spm*: S. R. WESSLER

Research Articles

405 MyoD1: A Nuclear Phosphoprotein Requiring a Myc Homology Region to Convert Fibroblasts to Myoblasts: S. J. TAPSCOTT, R. L. DAVIS, M. J. THAYER, P.-F. CHENG, H. WEINTRAUB, A. B. LASSAR

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COVER Camera image overlaid with discontinuities in texture (yellow), motion (orange), and stereo depth (green). The discontinuities are computed from the output of early vision modules coupled with brightness gradient data using Markov random fields. The union of the discontinuities produces a "cartoon" which is used by a parallel recognition algorithm. See page 436. [T. Poggio *et al.*, Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cambridge, MA 02139]

Reports

- 412 Constraint of the Translational Diffusion of a Membrane Glycoprotein by Its External Domains: M. WIER AND M. EDIDIN
- 414 A Graph-Dynamic Model of the Power Law of Practice and the Problem-Solving Fan-Effect: J. SHRAGER, T. HOGG, B. A. HUBERMAN
- 417 Rapid Growth of Magnesium-Carbonate Weathering Products in a Stony Meteorite from Antarctica: A. J. T. JULL, S. CHENG J. L. GOODING, M. A. VELBEL
- 419 Herbicide Resistance in Transgenic Plants Expressing a Bacterial Detoxification Gene: D. M. STALKER, K. E. MCBRIDE, L. D. MALYJ
- 423 Single-Chain Antigen-Binding Proteins: R. E. BIRD, K. D. HARDMAN, J. W. JACOBSON, S. JOHNSON, B. M. KAUFMAN, S.-M. LEE, T. LEE, S. H. POPE, G. S. RIORDAN, M. WHITLOW
- 426 Kaposi's Sarcoma Cells: Long-Term Culture with Growth Factor from Retrovirus-Infected CD4⁺ T Cells: S. NAKAMURA, S. Z. SALAHUDDIN, P. BIBERFELD, B. ENSOLI, P. D. MARKHAM, F. WONG-STAAAL, R. C. GALLO
- 430 Angiogenic Properties of Kaposi's Sarcoma-Derived Cells After Long-Term Culture in Vitro: S. Z. SALAHUDDIN, S. NAKAMURA, P. BIBERFELD, M. H. KAPLAN, P. D. MARKHAM, L. LARSSON, R. C. GALLO
- 433 Heat Shock Is Lethal to Fibroblasts Microinjected with Antibodies Against hsp70: K. T. RIABOWOL, L. A. MIZZEN, W. J. WELCH
- 436 Parallel Integration of Vision Modules: T. POGGIO, E. B. GAMBLE, J. J. LITTLE
- 440 Earthquake-Caused Coastal Uplift and Its Effects on Rocky Intertidal Kelp Communities: J. C. CASTILLA
- 443 Activation of Muscarinic Potassium Currents by ATP γ S in Atrial Cells: A. S. OTERO, G. E. BREITWIESER, G. SZABO

Book Reviews

- 448 Uneasy Careers and Intimate Lives, reviewed by J. CONWAY ■ The American Census, R. V. WELLS ■ The Child's Construction of Economics, H. G. FURTH ■ Some Other Books of Interest ■ Books Received

Products & Materials

- 453 Theorem-Proving Software ■ Membrane Filtration by Rotary Separation ■ Scanning Electron Microscope ■ Protein G ■ DNA Gel Documentation System ■ Warming Stages ■ Automated HPLC System ■ Literature

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This Week in SCIENCE

Pantropic faunas

THE breakup of the supercontinent Pangea some 200 million years ago produced two land masses, Laurasia and Gondwanaland, and an enlarged Tethys, the sea that stretched from western Europe to southeastern Asia. Associated with this seaway was a rich assemblage of marine organisms. Surprisingly, far from Tethys in Mesozoic and Paleozoic deposits in western America, fossils of organisms much like or identical to the Tethyan faunas have also been identified. The occurrence of comparable organisms at these distant locales and nowhere else was explained by two theories: according to one, Tethyan faunas were transported to the American Cordillera on "suspect terranes" (tectonic blocks of uncertain paleogeographic relation to neighboring terranes and adjoining continental masses); in the other, the organisms migrated by way of marine corridors through Pangea to the continent's western edge. Newton describes a third model, namely that the Tethyan faunas were widely distributed in tropical regions, perhaps spread great distances by ocean currents (page 385). She points out that accumulating fossil evidence indicates that Tethyan faunas are not restricted to the Tethys and suspect terranes in the American Cordillera; furthermore, there is no sedimentologic or paleontologic evidence for the proposed marine corridors. Analyses of late Mesozoic, Cenozoic, and modern faunal occurrences and ocean circulation patterns suggest that a pantropic model for the distribution of Tethyan faunas is a reasonable one.

Understanding think links

A unified theory that accounts for learning is a long way off, but Shrager *et al.* present a theory and a model that account for two phenomena that are parts of the learning process (page 414). One phenomenon is the power law of practice according to which the speed at which a task is performed increases as a power of the

number of times the task is actually carried out—that is, practice makes perfect. The second is the problem-solving fan-effect: performance slows during learning as more is learned, because, although the correct path to the goal requires less searching, there are more ways to get off the path; a good decision procedure is needed to gradually offset this effect. In computer simulations of learning, the best path to take from origin to goal was sought through a directed graph that consisted of nodes (states of the problem) and edges (operators that move between states); performance was measured by the number of edges traversed. Both the power law and the fan-effect surfaced in the simulations and could be accounted for analytically.

Herbicide-resistant transgenic plants

GENETIC engineering of tobacco plants with a nonplant catabolic gene has made the plants resistant to a potent herbicide (page 419). The gene *bxn* from soil bacteria detoxified the herbicide bromoxynil by breaking it down to a nontoxic metabolite. In the experiments of Stalker *et al.*, tobacco plants were given a chimeric gene—*bxn* under the control of a light-inducible promoter that works only in photosynthetic tissues. Control plants were bleached by the herbicide, but such bleaching—a sign of inhibited photosynthesis—did not occur in the transgenic plants. Herbicide resistance was inherited by progeny transgenic plants. The approach of detoxification by degradation has caused no adverse effects in transgenic plants; such plants should be valuable agricultural resources.

Kaposi's sarcoma

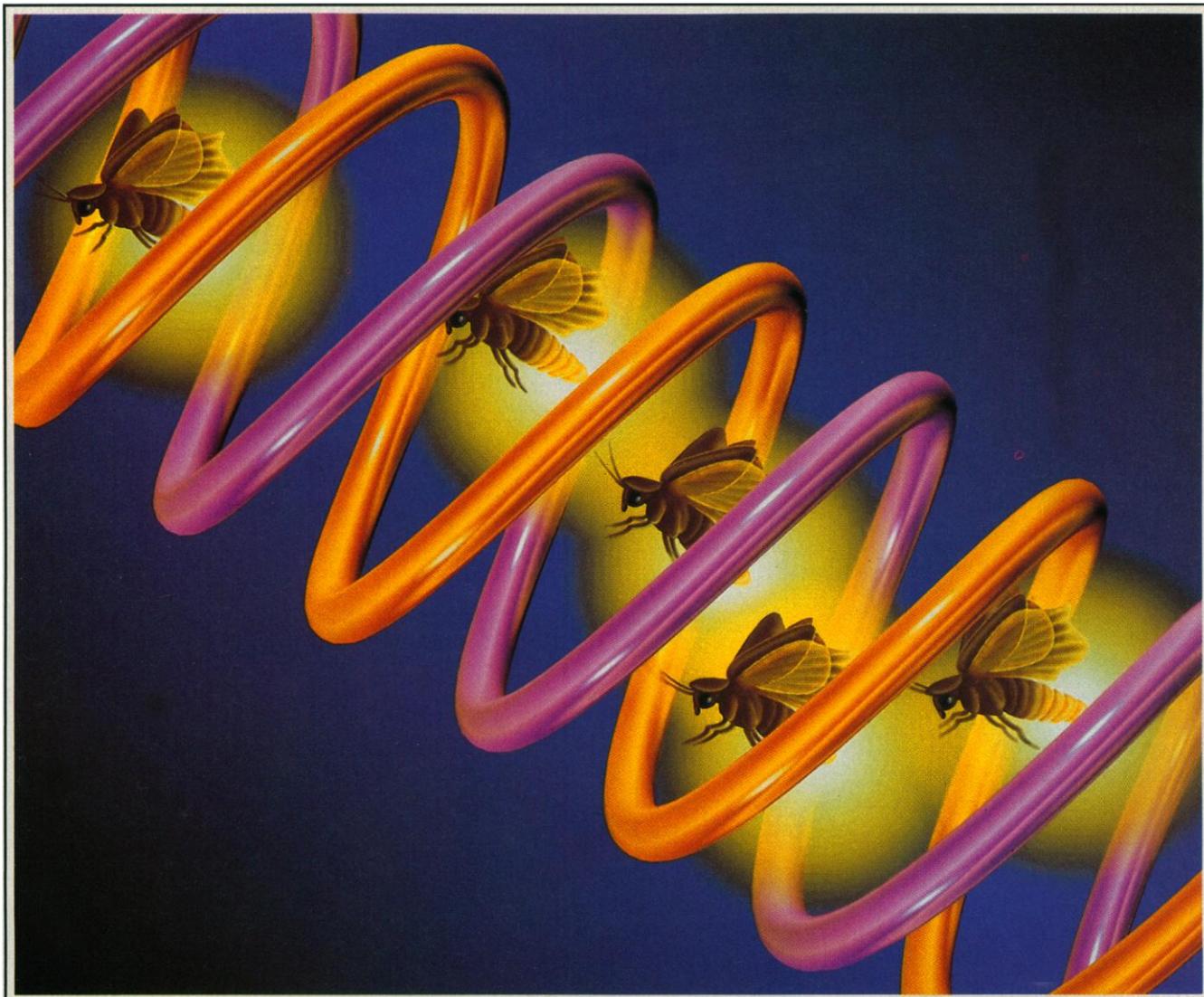
AGGRESSIVE forms of Kaposi's sarcoma (KS) can develop in AIDS patients, in immunosuppressed individuals, and in young Africans. KS lesions have a complex structure and appear to develop from several cell types rather than from a single

malignant cell. Study of KS has been difficult because conditions were not known that supported the growth of KS cells in longterm cultures. Nakamura *et al.* now report that KS cells survive many months in cultures supplemented with growth factors released by lymphocytes that had been infected with various human retroviruses, including the AIDS virus (page 426). The retroviruses apparently stimulate production of factors essential for the development of KS lesions. Using these culture conditions, Salahuddin *et al.* characterized, both morphologically and biochemically, the cells of lesions from patients with KS (page 430). The KS cells release angiogenic factors that promote blood vessel development and other factors that promote their own growth and growth of other lesion-associated cells. If, as these studies indicate, the spread of KS differs from the spread of "true" malignancies, KS might be controlled with milder treatments than cytotoxic chemotherapies (see also Barnes, page 376).

Surviving heat shock

WHEN subjected to the stress of heat, both prokaryotic and eukaryotic cells produce large amounts of heat shock proteins. Direct evidence that functional heat shock proteins (hsp70) are essential for survival of mammalian cells after heat shock is demonstrated in the experiments of Riabowol *et al.* (page 433). Human and rodent cells were exposed to high heat; cells that had been injected with antibodies to hsp70 developed leaky membranes and failed to survive the shock; cells that did not receive any antibodies or received antibodies that react with other types of cellular proteins (such as actin and tubulin) withstood the heat shock trauma. The antibodies that react with hsp70 prevented accumulation of hsp70 proteins in the nucleus and nucleolus where they are typically found after cells have been shocked; the rescue or protective activities of hsp70 proteins are not known but might involve stabilization or renaturation of stress-damaged proteins.

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Results and Discussion in an Election Year

The accusation of “negative campaigning” has been leveled by the press at the 1988 presidential candidates. That is like the boy who shot his parents and then pleaded for mercy on the grounds of being an orphan. The greater publicity given to the clever insult, the meretricious photo opportunity, and the public relations gimmick encourages candidates to use these devices instead of the dull delineation of position.

Policy statements are frequently boring, largely because everyone comes out for motherhood and virtue, and no sensible candidate dares mention the gruesome inevitabilities of taxes and budget choices. Nevertheless, policy statements have value as a glimpse at a candidate’s enthusiasms and priorities, even in the absence of desired specifics. Thus the willingness of Vice President George Bush and Governor Michael S. Dukakis to send answers to a series of questions presented by *Science* is, in itself, an extremely positive sign (*Science*, 14 October 1988, p. 173).

As expected, many of the answers were vague, but others were surprisingly specific. The candidates agreed on most matters of science policy, such as maintaining the tax credit for research and development, the need to double the National Science Foundation budget, and the need to increase scientific research and development in general. When they disagreed, it was mainly in emphasis, but there is considerable variation in the detail and commitment in the various areas. Bush advocated increasing the importance of the science adviser but did not specify how much the currently weakened office would be changed. Dukakis was more specific in detailing how he would enhance the importance and prestige of that office and added that the science adviser would have direct access to him. Bush is against subsidy for commercial space ventures and Dukakis is against the “Orient Express.” Both are in favor of “big science” and “little science” and an increased space effort. Both ducked the question of how big the National Institutes of Health budget should be, but both indicated understanding of the role of biotechnology in health care and competitiveness.

Overall, one can only conclude that both candidates will be strong supporters of science, and that they and their advisers recognize the intricacies of modern science policy. Increased funding for science does not cost as much as increased defense or Social Security funding, but science as a whole has become a sizable budget factor, and the candidates’ commitments have major significance.

The candidates and this journal are also supporting a larger principle: the need to see in print the actual positions of the major candidates. The standards of science publishing require presentation of the data as well as the conclusions. Too often in this campaign we have seen the “analysis” of candidates’ positions on the front page as a substitute for news. These analyses are all too often the opinions of the writer, appropriate for the editorial page, just as authors’ opinions are appropriate in the Discussion section of a scientific paper. But the front page of a newspaper or the lead story on the television news program should be analogous to the Results section of a scientific paper.

The reader deserves to see the raw data, not just speculation on the impression that a candidate made, or whether a statement was negative campaigning or positive campaigning. Clarification of previous positions of one’s opponents should be construed as positive if it is accurate and negative only if it is inaccurate. A clear discussion of the past record is more edifying than pompous promises of future utopias. Reproducing the candidate’s actual words allows the reader to decide whether the candidate was vague or specific, evasive or responsive, appealing or repulsive. A second reason for publishing actual statements is the tendency of observers to use colorful wording that obscures the data. The favored candidate is “aggressive”; the unfavored, “negative.” The favored is “well prepared”; the opposition is “packaged.” The favored is “relaxed”; the unfavored, “bumbling.” Democracy cannot flourish any more than science if the Results sections are turned into Discussion sections.

Policy statements, budget proposals, and responses to questions are primary data. We could hope that future candidates will be more specific in these areas, but we need to build a tradition in which the candidates will prepare and the public will have access to unfiltered policy statements. Once that is done, as in a scientific paper, we can have a Discussion of the Results; then our individual Conclusions will be based on accurate evidence.—DANIEL E. KOSHLAND, JR.



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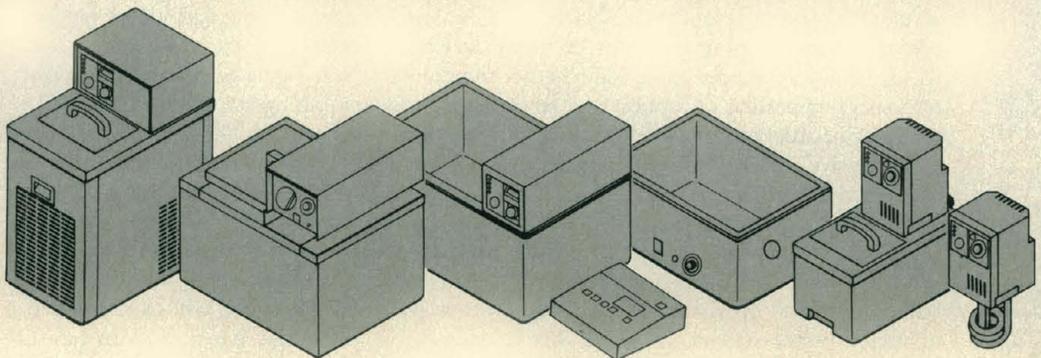
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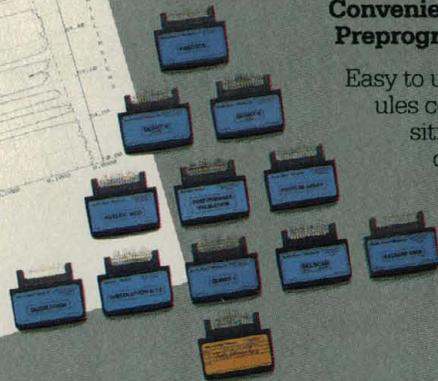
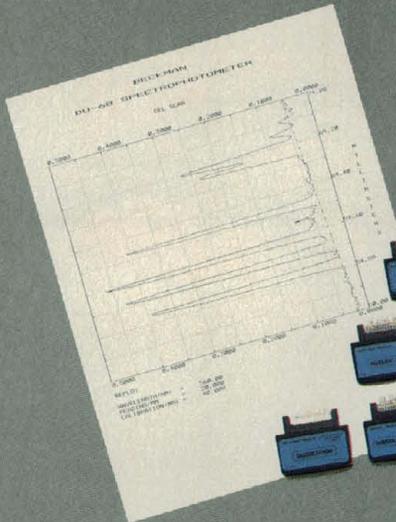
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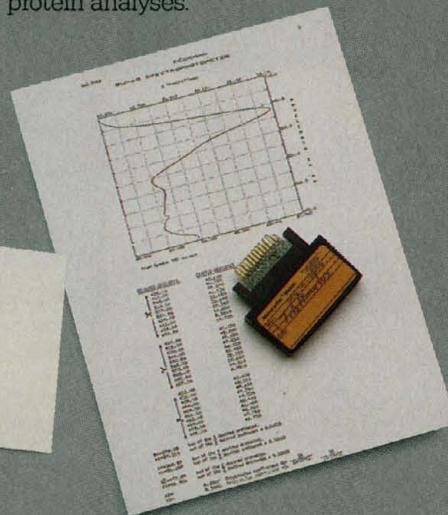
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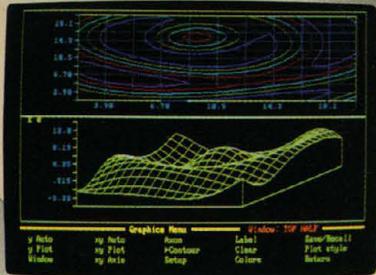
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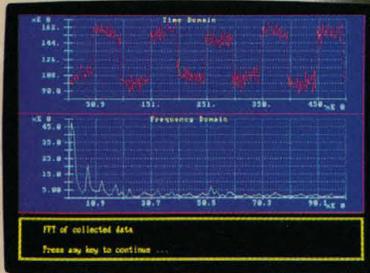
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1986

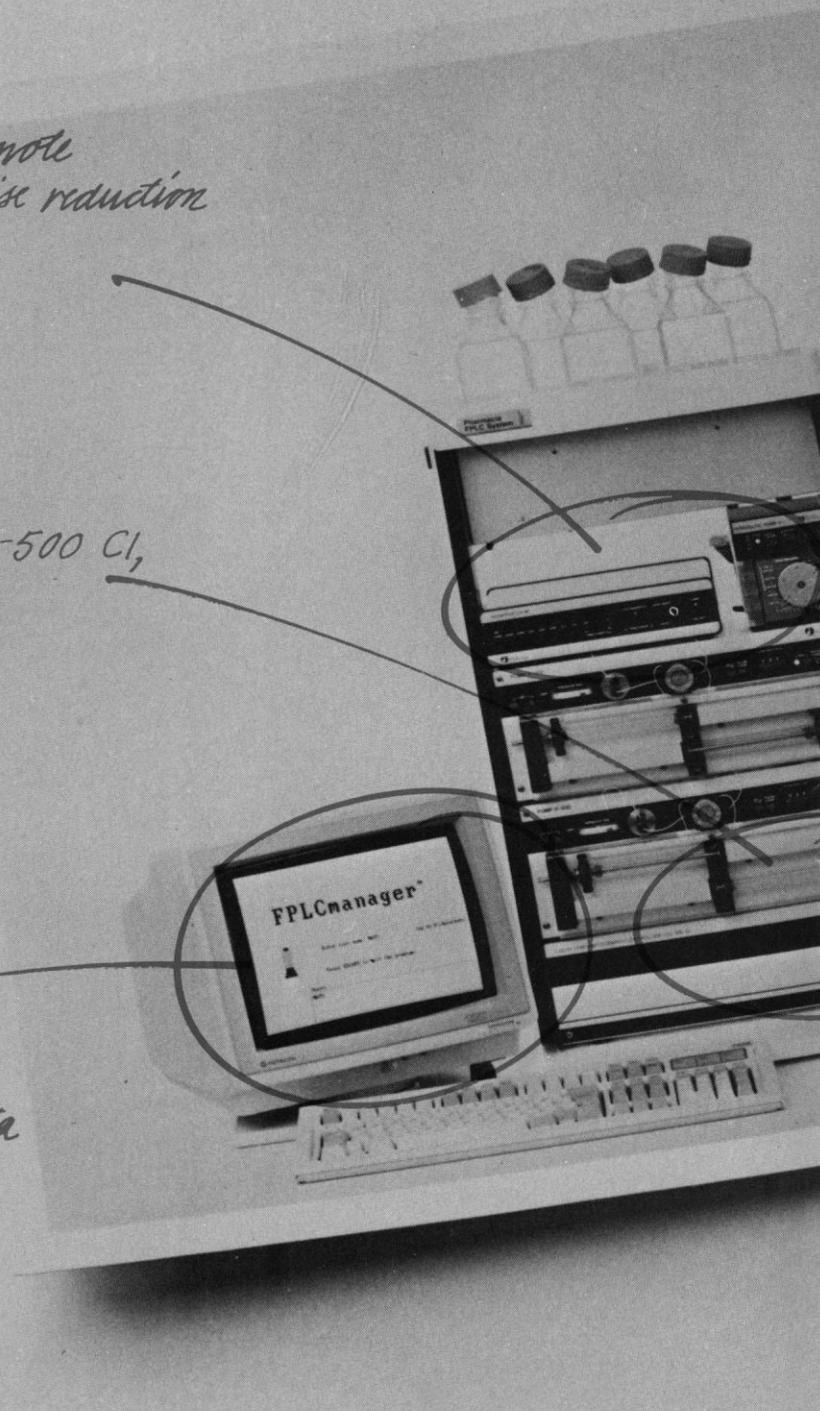
UV-M, the new detector with remote optical unit that provides noise reduction and increased sensitivity

1988

GP-250 PLUS, LCC-500 PLUS and LCC-500 CI, the new series of controllers that store up to 50 methods

1987

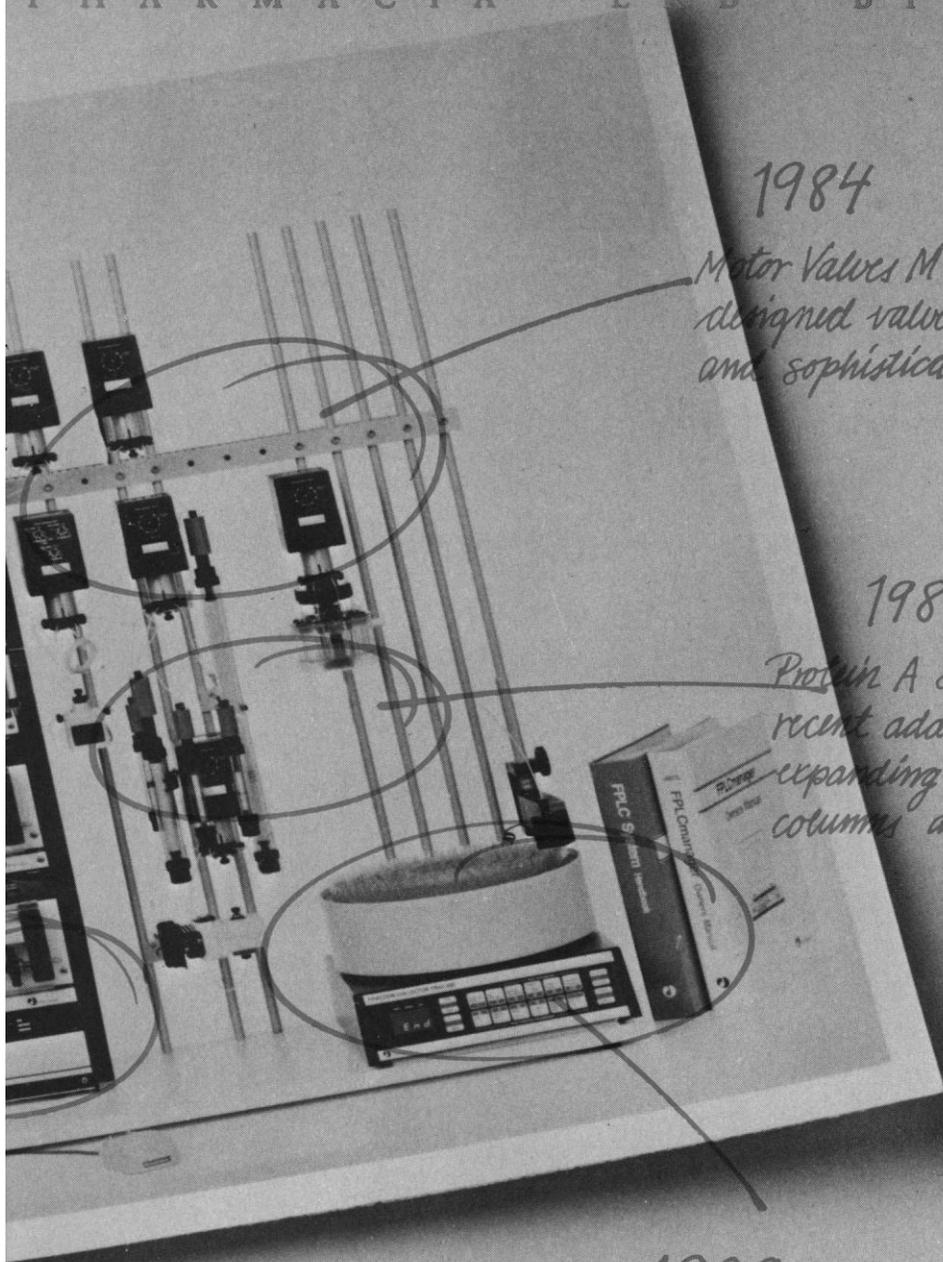
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1984

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1988

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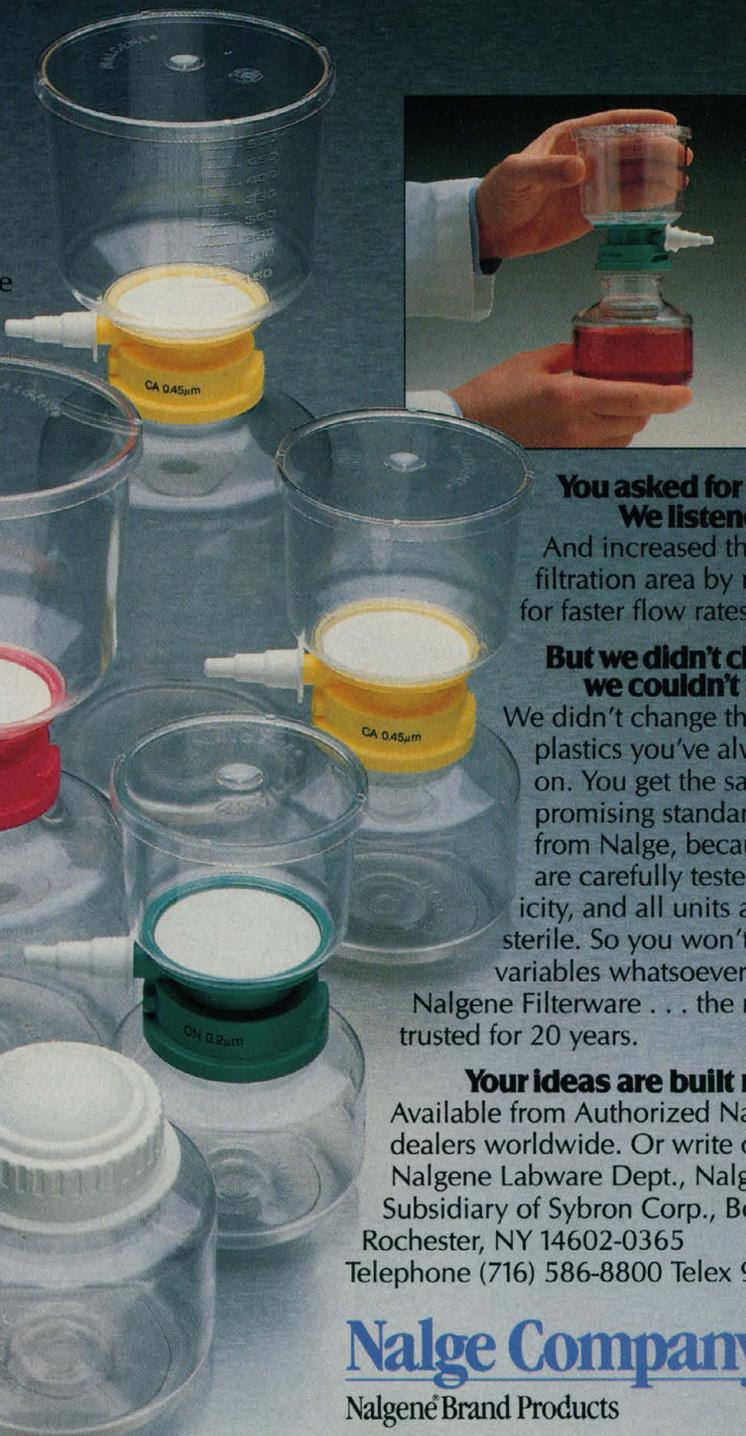
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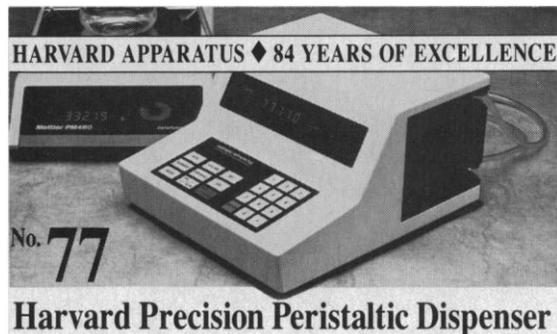
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The symposium is the eleventh in the series of "Frontiers in Basic Sciences That Relate to Heart, Lung, and Blood Diseases." The Frontiers in Basic Sciences symposia are conducted by NHLBI to capitalize on and transfer the progress in basic science disciplines to clinical research problems. Leading experts in the field will present their views on the state of the science, the problems facing current understanding, and anticipated future developments in the genetic basis of human disease.

The symposium will be cochaired by Drs. Ronald G. Crystal and Arthur W. Nienhuis of the National Heart, Lung, and Blood Institute. Presentations will be structured around the following topics: gene mutations and disease expression; molecular basis of cardiovascular disease; genetic diseases affecting the lungs; and gene transfer and regulation. Presentations by noted experts will be followed by open discussion.

The invited participants are F. Anderson, J. Breslow, B. Brewer, T. Caskey, F. Collins, R. Crystal, R. Lawn, R. Mulligan, B. Nadal-Ginard, A. Nienhuis, S. Orkin, R. Rosenberg, J. Scott, C. Sing, D. Weatherall, R. Weinberg, and R. Williamson.

For further information and registration materials, please contact: Dr. Elliott C. Kulakowski, Office of Program Planning and Evaluation, National Heart, Lung, and Blood Institute, National Institutes of Health, Building 31, Room 5A11, Bethesda, Maryland 20892, (301) 496-3620.



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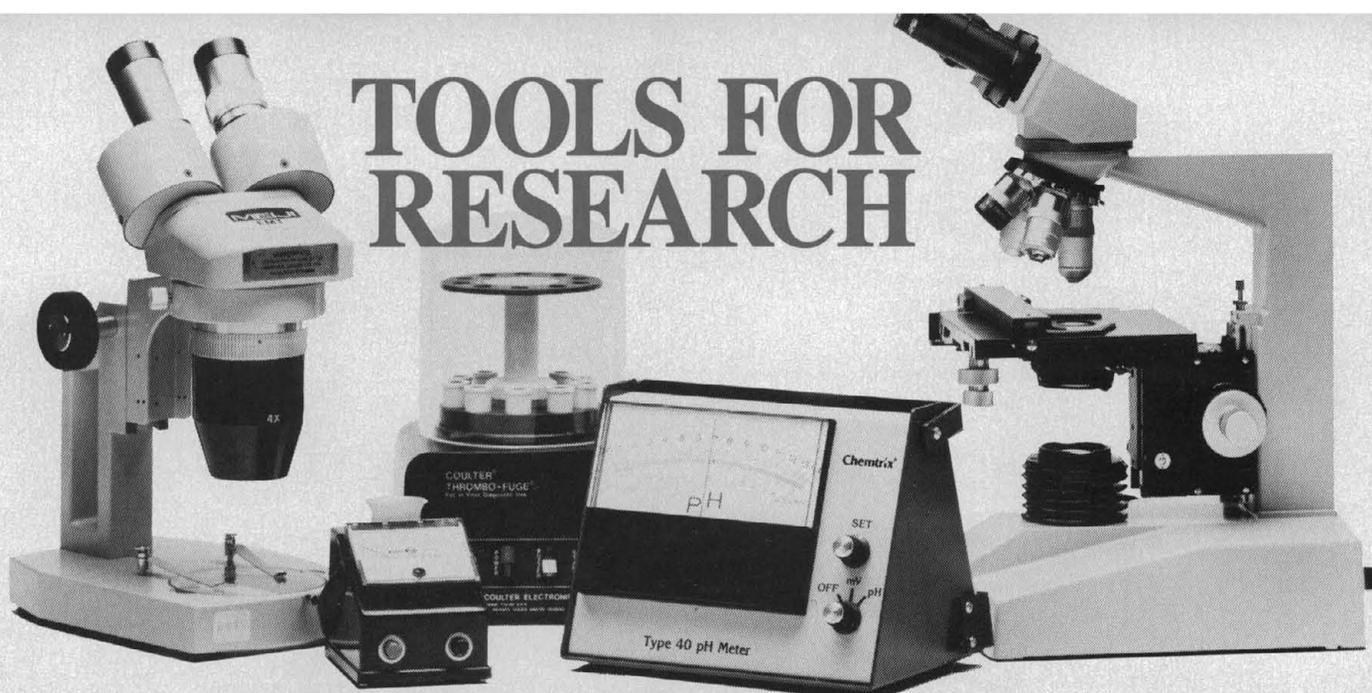
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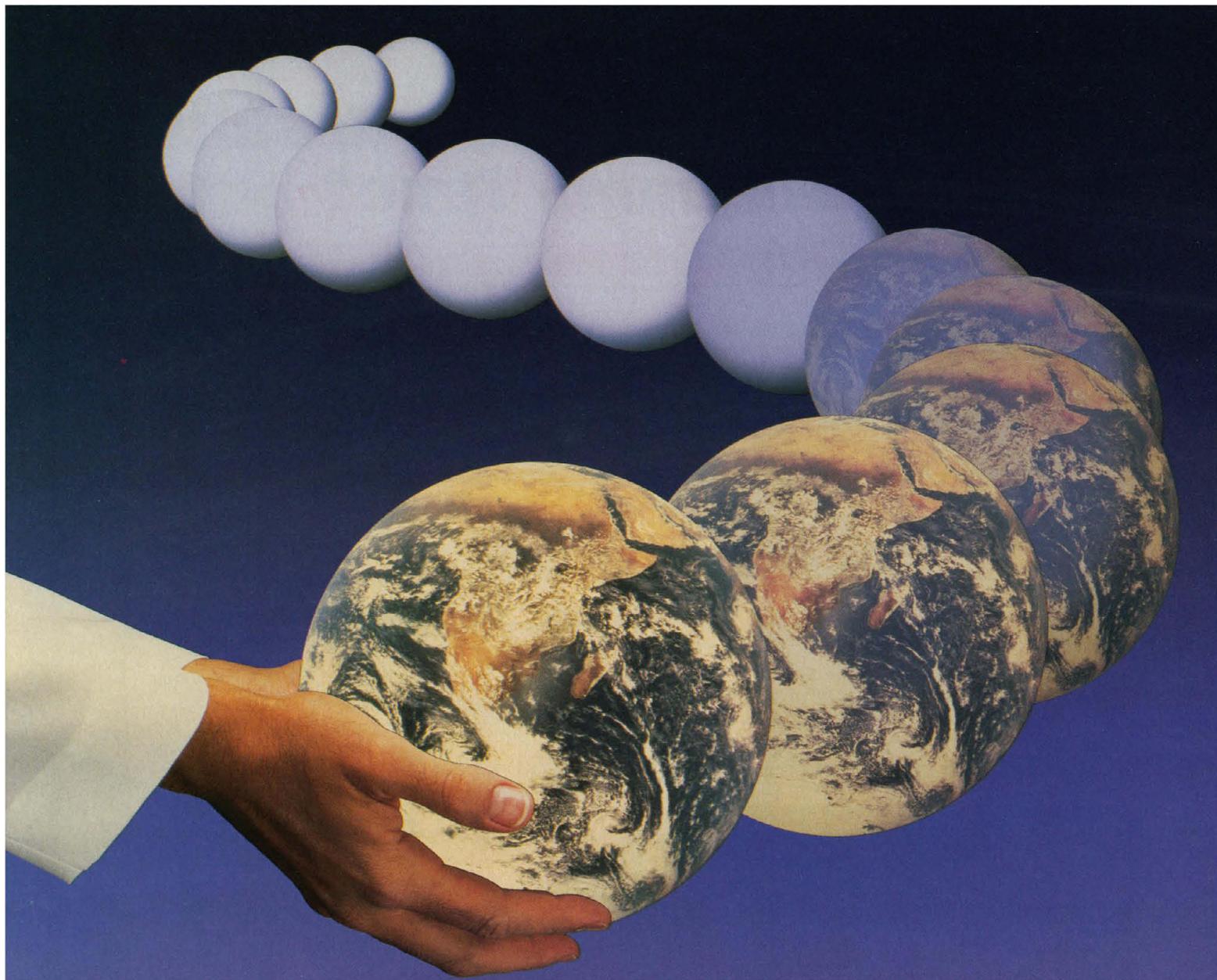
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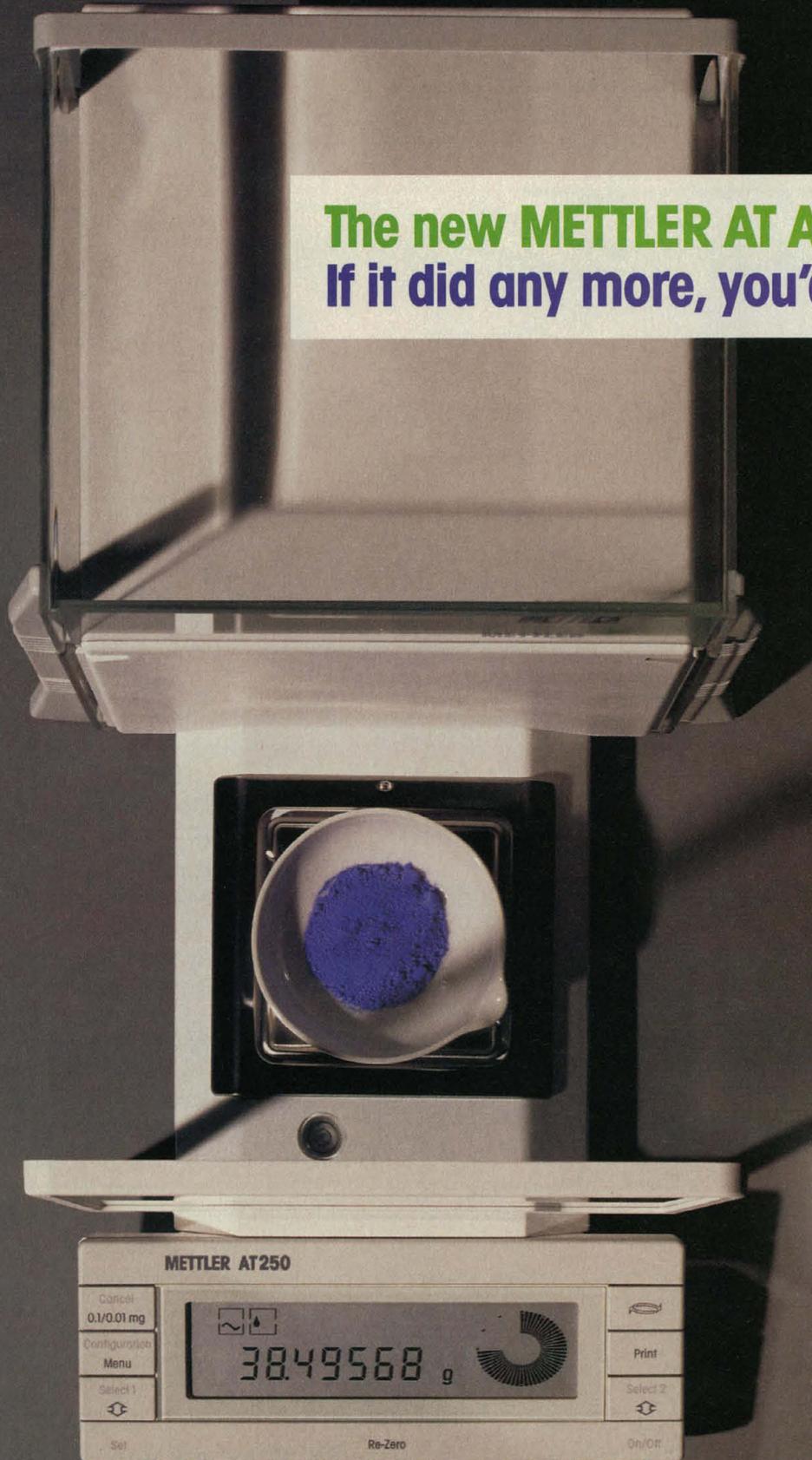
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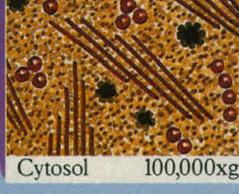
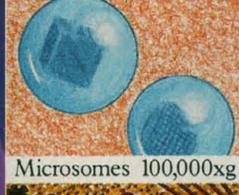
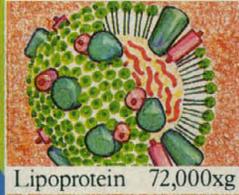
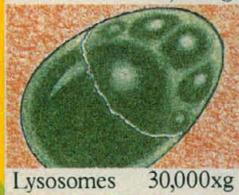
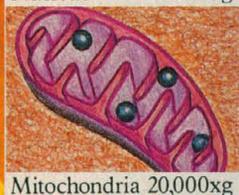
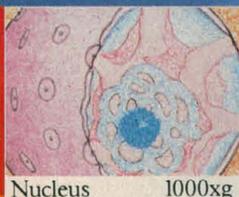
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