American Association for the Advancement of Science

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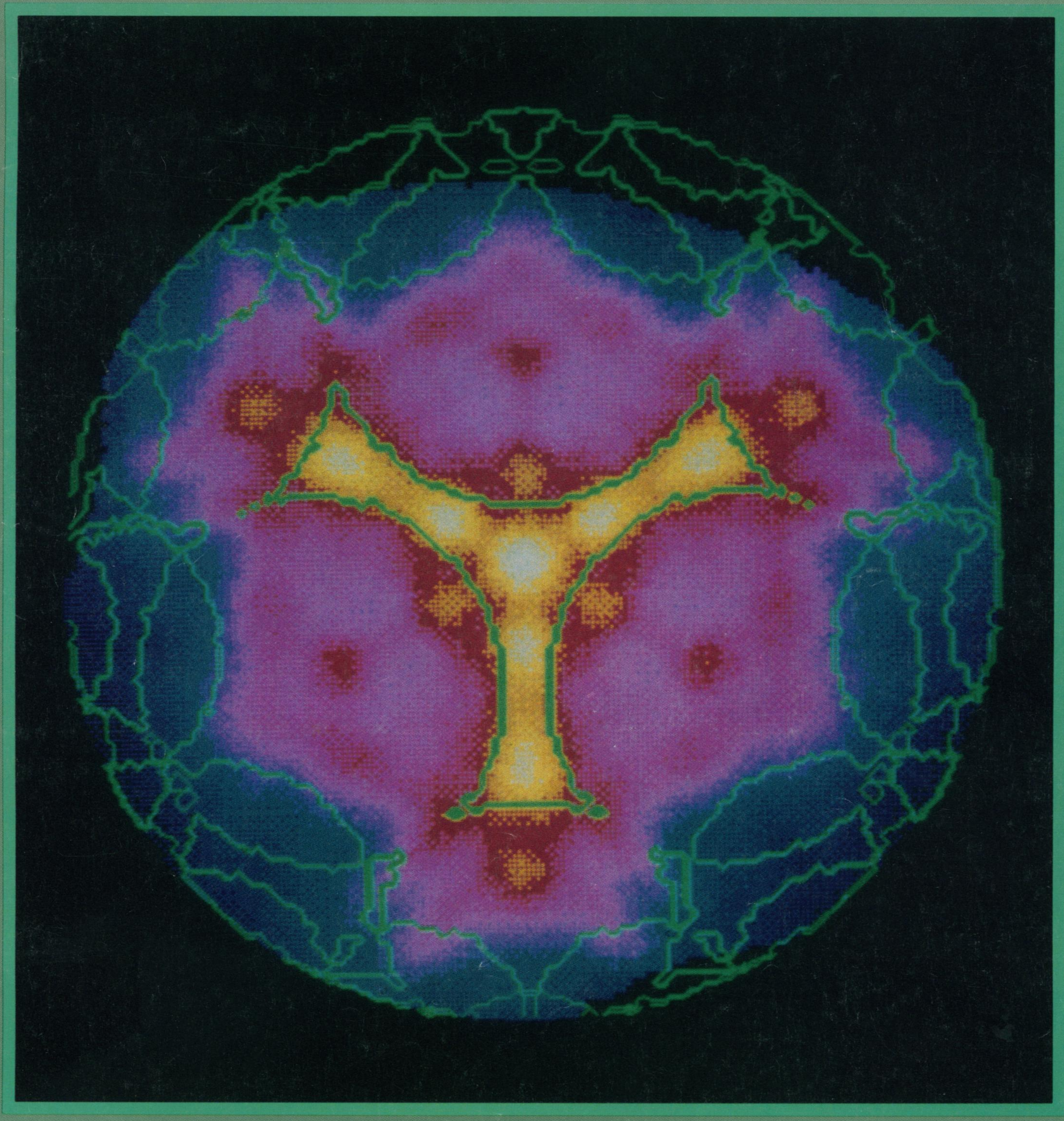

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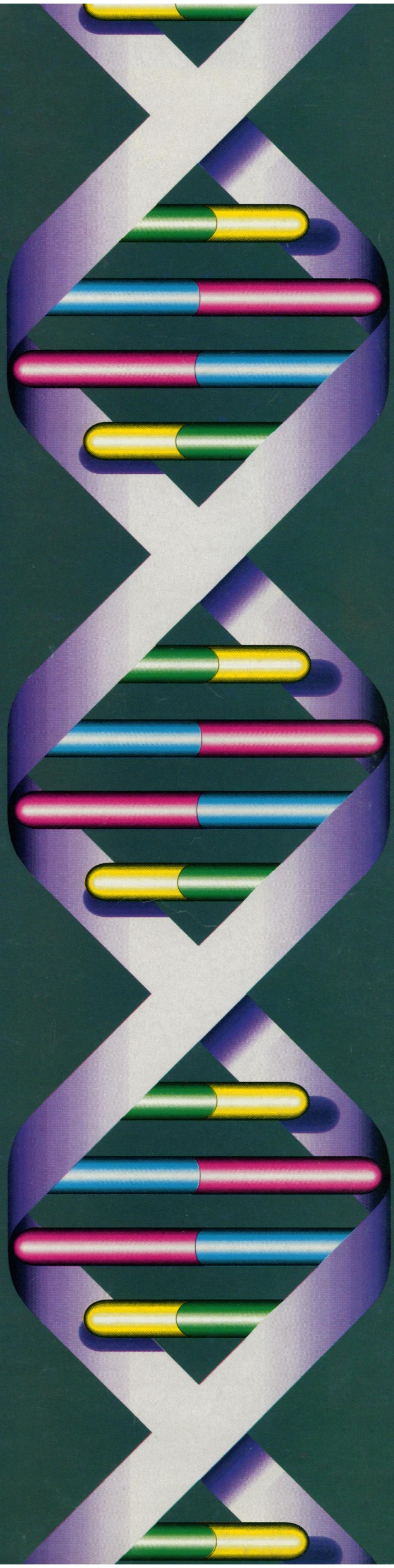

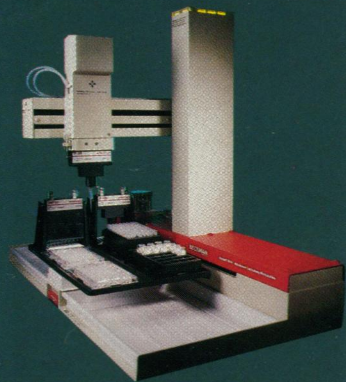

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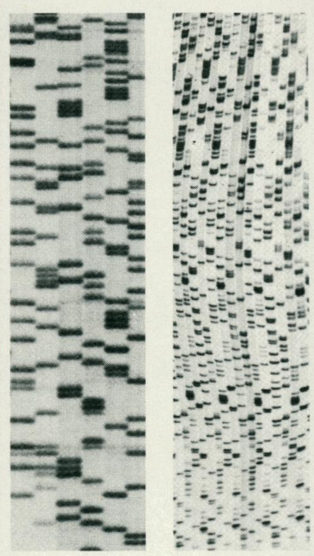

Figure 1. Autoradiogram of sequence analyses accomplished on the Biomek 1000 using GemSeq K/RT double-stranded DNA sequencing system and Riboprobe Gemini pGEM-3 vector, containing an insert of a known cDNA.

Figure 2. Autoradiogram of sequence analyses using M13mp18. Lanes 1-9 were performed manually, lanes 10-18 were performed on the Biomek 1000.

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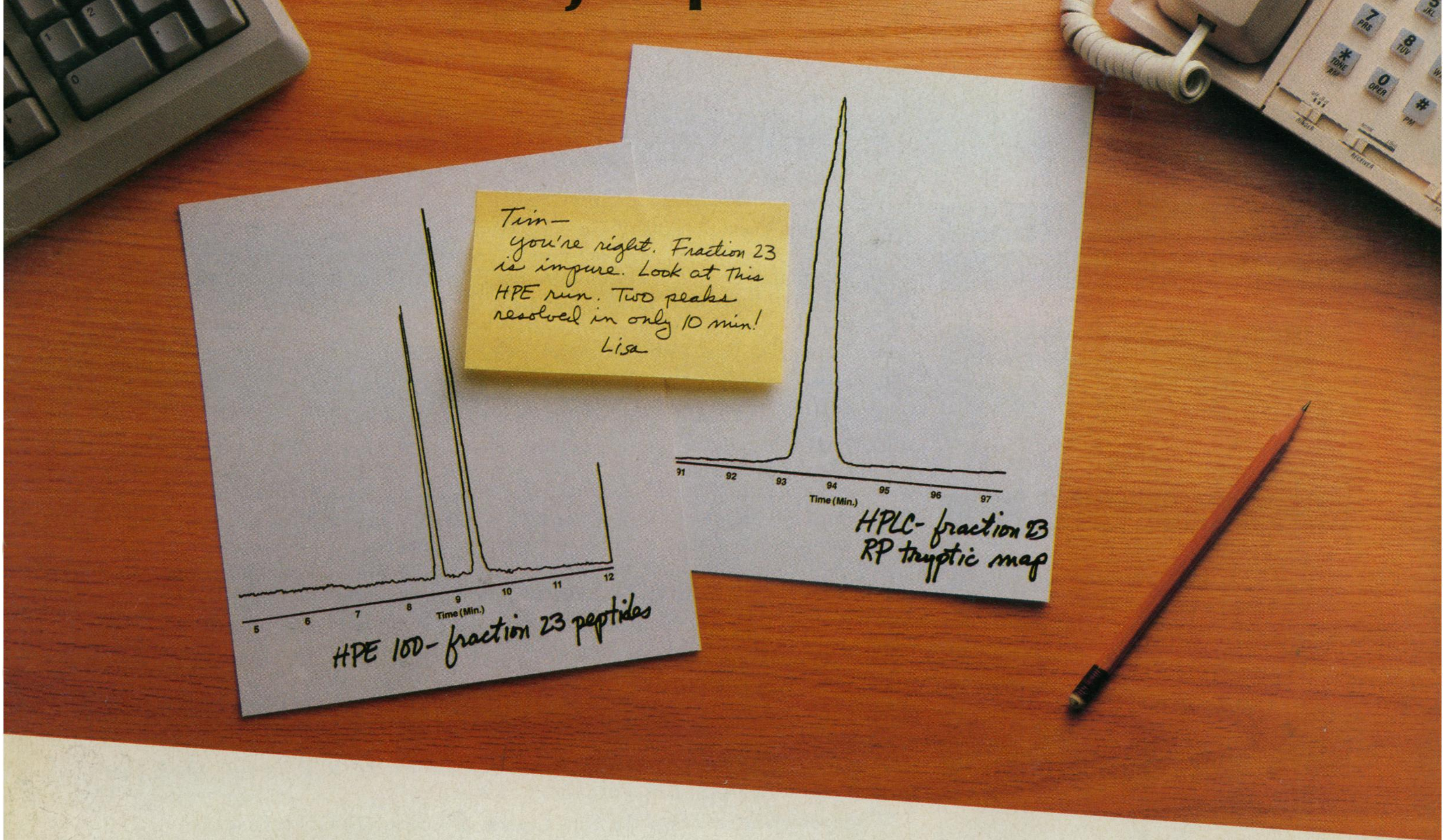

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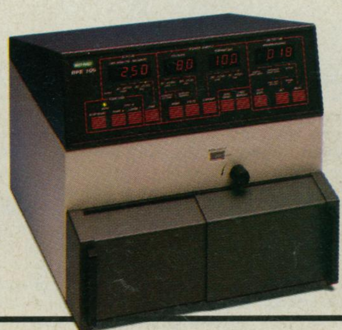

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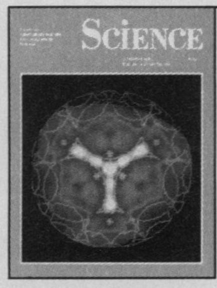

COVER Experimental angular distribution of 65–electron volts Auger electrons emitted from an atomically clean platinum[111] single-crystal surface. Lighter colors represent larger signal. Contours (green) depict the theoretical distribution from a pair of adjacent atomic layers. These results reveal that Auger electron angular distributions consist of the "silhouettes" of near-surface atoms "backlit" by Auger emission originating from atoms located deeper in the sample. See page 182. [Data acquisition and graphics by D. G. Frank, N. Batina, and A. T. Hubbard; photography by R. Shaw, University of Cincinnati, Cincinnati, OH]

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This Week in SCIENCE

Nuclear winter update

In the early 1980s, the first nuclear winter scenarios were proposed. Since then, mathematical simulations, global climate models, laboratory experiments, studies of fires and natural dust clouds, and various other analyses have provided new information critical to our understanding of how nuclear war could alter climate and life on the earth. A review of the nuclear winter scenario is provided in this issue by Turco *et al.* (page 166). After a nuclear exchange, urban fires would generate soot, ash, dust, oily droplets, and other products. (Different flammable materials—lumber, fossil fuels, plastics, vegetation—generate different combinations of these.) The most important combustion product for producing the nuclear winter conditions is black sooty smoke. Studies of the optical and physical properties of soot have made predictions more accurate of soot's effects on surface temperatures, atmospheric temperatures, circulation patterns, precipitation, and insolation. There remain a number of uncertainties in the nuclear winter equation, but the basic physics of the phenomenon has remained essentially as originally formulated.

Mountains and climate

Mountains play a major part in inducing arid and semiarid climate conditions (page 192). Two of the Northern Hemisphere's great arid stretches that abut mountainous regions—western North America from the Great Basin eastward across the Rocky Mountains to the Great Plains and central Asia from Turkestan east across the Tibetan Plateau to the Gobi Desert—were targeted in simulations with a general circulation model. Simulations that included mountains reproduced the arid conditions and dry soils of these regions; simulations run without mountains predicted moister climates and wetter soils. Elevated land masses evidently perturb the jet stream and shift the paths of storms away from the region by inducing large-scale stationary waves in the atmosphere. In addition, mountain ranges and plateaus produce a rain-shadow effect (rain falls only on the front side of the mountain) for those storms that are able to enter the region. Manabe and Broccoli note that the climate record shows these regions have grown progressively drier during the past 10 million years; they were much wetter before the uplift of the Rocky Mountains and the Tibetan Plateau.

Improving air quality

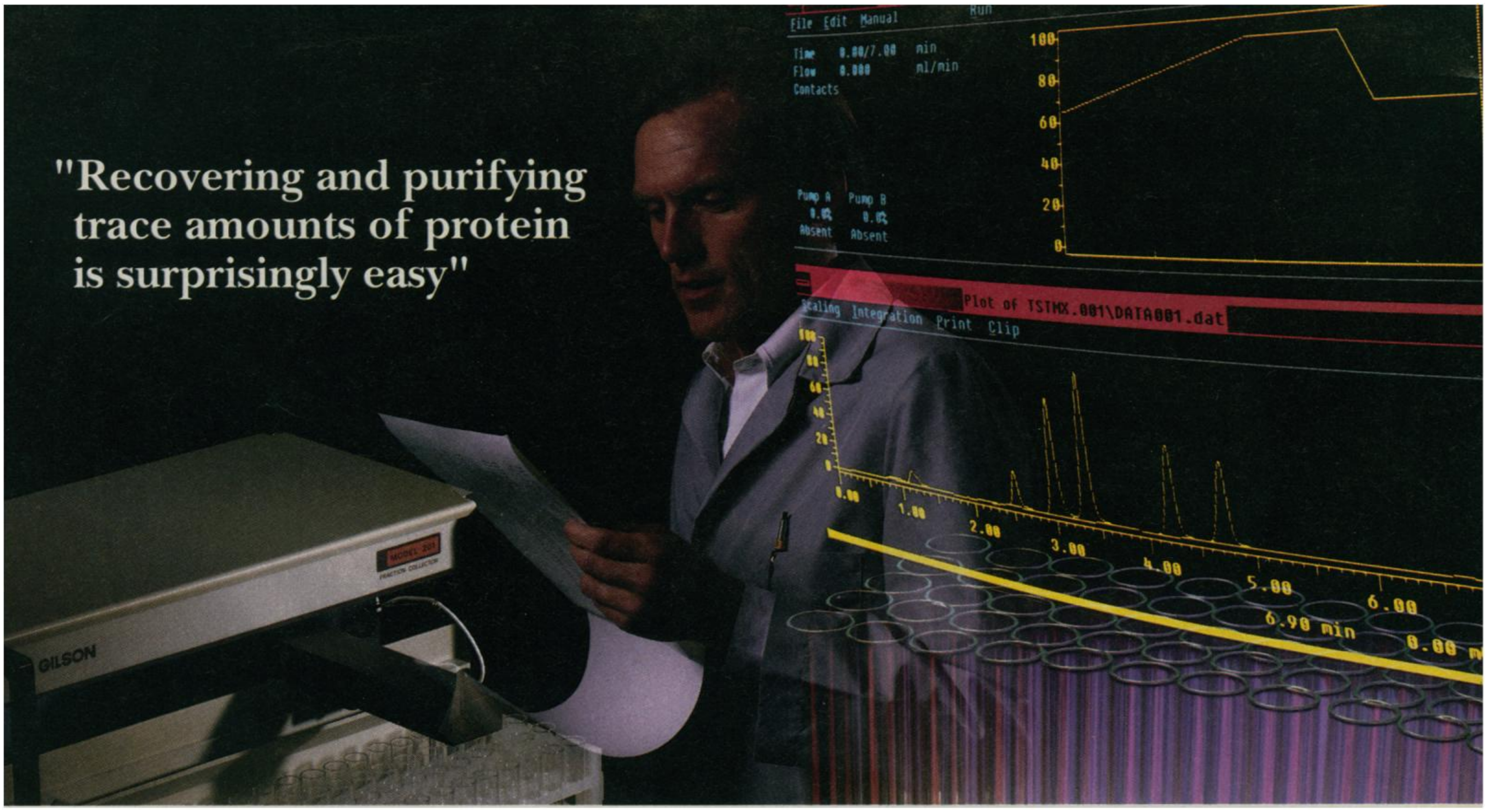
Can urban air quality be improved through use of methanol-based fuels in cars, trucks, and other vehicles (page 201)? Simulations, run by Russell *et al.*, show how air quality would change in the Los Angeles region 10 and 20 years from now if vehicles were powered by methanol. Methanol has lower chemical reactivity in the atmosphere than most components of gasoline; when it is used as a power source, ozone production and the formation of photochemical smog are reduced. Pure methanol is more effective than a methanol-gasoline blend but cannot yet be used safely. Methanol-fueled vehicles now in use emit more formaldehyde than vehicles powered by gasoline, but the simulations indicate that this poisonous gas would not be produced in dangerous amounts. In addition, there would not be a dangerous buildup of methanol in the atmosphere with continuous use. Overall, the studies suggest that use of methanol could reduce ozone formation by up to 11% in the year 2010 but that significantly greater improvements would not occur even if all cars were eliminated. Thus, converting vehicle engines for methanol use would help to improve air quality only if it were part of a more comprehensive strategy.

Cellular senescence

When normal human fibroblasts are put into culture, they have only a limited lifespan. Typically, these cells will undergo from 20 to 60 population doublings before they stop dividing. The molecular basis of this "cellular senescence" was studied by Seshadri and Campisi by comparing patterns of gene expression in senescent cells with those in younger quiescent and actively growing cells (page 205). Senescent cells were not just blocked in a quiescent phase but had a distinctive altered pattern of gene expression. Of seven genes studied, four were expressed about normally in the senescent cells, although one did not produce normal amounts of its enzyme product; expression of the other three genes was greatly reduced. The protooncogene *c-fos* was one of the repressed genes; its normal expression is considered essential for cell division, and the reduced expression may account for the inability of senescent cells to proliferate. The results strengthen the hypothesis that cellular aging is an active terminal differentiation process.

Brain chemotropism

What makes the axons of nerves grow to specific targets in the brain? A study by Heffner *et al.* indicates that diffusible substances from the target tissue, in this case the pons, can induce growing axons from the cortex to send collateral branches in the direction of the pons (page 217). The study was performed by coculturing portions of the cortex with the pons or other tissues of the nervous system. The branching of axons was shown not to be an inherent property of the axons that was predetermined either in time or space; instead, lateral growth was induced by a long-distance signal from the pons. The chemotropic substance attracted only axons coming from cells in layer 5 of the cortex, the layer that typically sends its axons to the pons. In vivo, these axons, guided by growth cones at their tips, grow out from the cortex but pass by the pons and enter the spinal cord. Only later in development, perhaps when the pons has matured to a certain point, does the pons produce the chemoattractant; the neural connections are then made that will participate in motor control. ■ Ruth Levy Guyer



Chromatographers speak out about the Gilson Auto-Prep HPLC system

The Gilson Auto-Prep HPLC system has one pump for mobile phase delivery, another for repetitive sample injection. And that, according to a chromatographer in radiation oncology and cancer research, makes it surprisingly easy to recover trace amounts of protein from complex sample matrices. Repetitive injection of small volumes of sample allows the use of high-efficiency analytical or semi-prep columns for high throughput, excellent resolution, and very pure fractions.

"Overnight operation has really increased throughput"

A pharmaceutical QC lab supervisor likes the capacity and reliability of the system. A multimode fraction collector with 120- or 540-tube capacity is the key. The collector—either the Gilson 201 or 202—has a stationary rack design. Unlike collectors with carousel racks, it won't jam. The collector acts as a system controller, and multicycle capability allows collection of fractions from the repetitive runs into the same set of tubes for automated sample purification.

"Analytical and prep run results are reproducible"

After method development with an analytical system, many labs switch to preparative scale sample purification. Or switch back and forth to perform purity checks. With Gilson HPLC pumps, you simply replace the pump head to change the flow rate. Eight interchangeable pump heads offer flow rates as high as 200 ml/min.

"It's a compact system that saves bench space"

The Gilson Auto-Prep system is made up of modular components. The basic system stack, including the detector and pumping modules, has a footprint of about one square foot. And the 201 fraction collector offers 120-tube capacity in an equally compact space.

"Upgrading to gradient analysis was easy"

The modular design that makes our systems easy to fit on a crowded bench also makes it easy to upgrade the system. Going from isocratic to gradient with the Auto-Prep system simply requires the addition of pumping modules and, when necessary, a controller. All components from the original system are used, so none of your initial investment is lost.

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We'll start by sending you a data sheet on this and other Gilson HPLC systems. Then, if you'd like, we'll put you in touch with some of the researchers we've been talking to. You can ask them yourself about the performance of the Gilson Auto-Prep HPLC system. Just mark the reader service number below. Or call us toll-free at 800-445-7661 (In Wisconsin call 608-836-1551).

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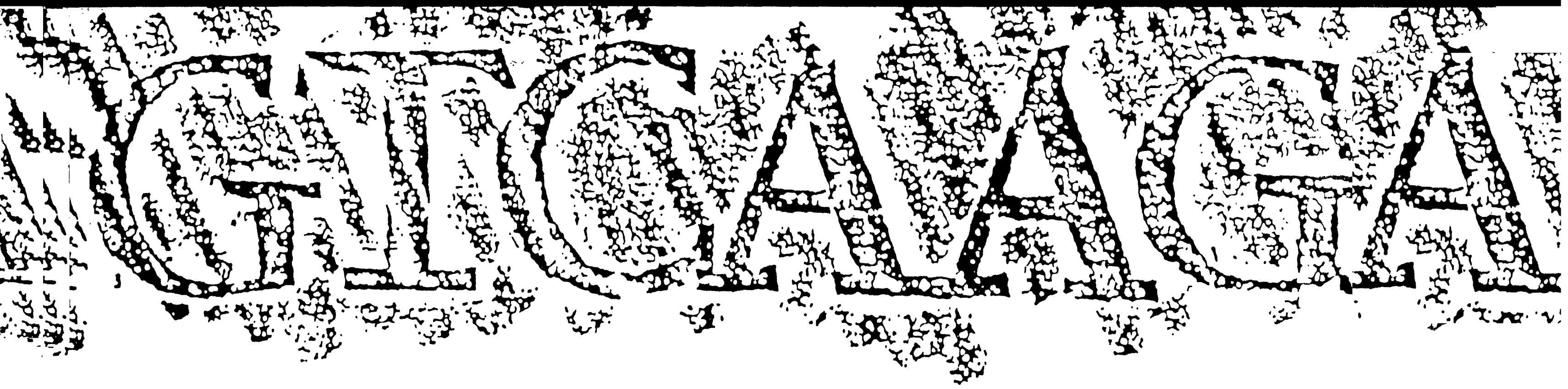

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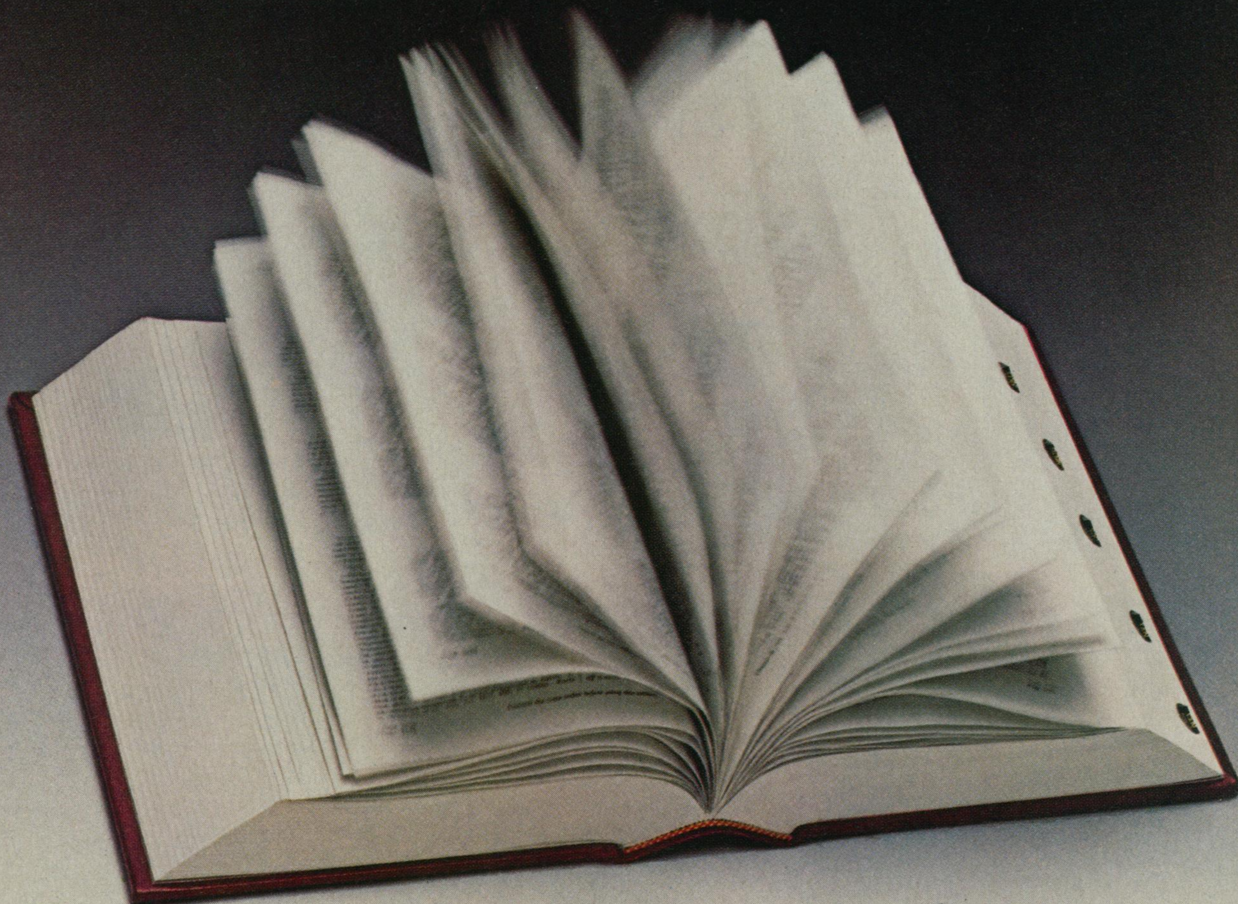

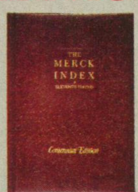


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Science & Society

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Science, Technology, and Society
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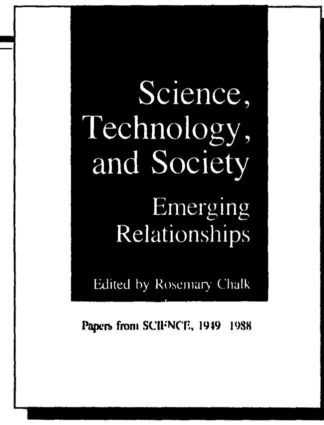
Edited by Rosemary Chalk



This volume provides a thorough introduction to the issues concerning the unique relationships among science, technology, and society (STS). It offers 85 articles, editorials, and letters published over the past 40 years in *Science,* the weekly journal of the AAAS.

The material provides a broad overview of the emerging relationships of science, technology, and society in the period after World War II. Contributors include Bertrand Russell, C.P. Snow, Pope John Paul II, and many scholars well known in the scientific literature. The collection reflects a variety of perspectives on science, technology, and society. Provocative essays capture the concerns of leaders in the scientific community who sought to articulate the pressing problems of their times.

The book is a valuable resource for those with a professional interest in STS studies. It is also designed for use as a supplemental text for college or high school courses examining the social context of STS. And it is of interest to lay readers who want to gain an insight into the purposes and values that shape the directions of science.

Topics include: Scientific responsibility; science and freedom; science and ethics; the human side of science; scientists and citizens; science and the modern world; fraud and misconduct in science; professional rights and duties in the health sciences; science and risk; and science and national security.

1989; 262 pp.; softcover; index
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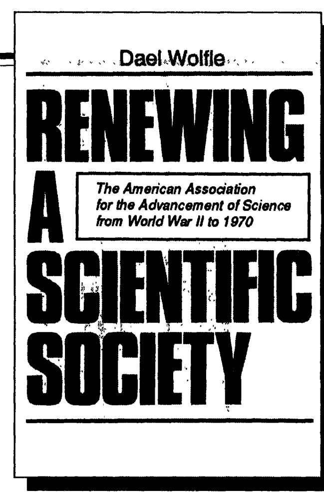
Renewing a Scientific Society
The American Association for the Advancement of Science from World War II to 1970

Dael Wolfle



Dael Wolfle was executive officer of AAAS during the post-war period that saw an unprecedented growth in American science. In this clear and engaging narrative, he describes the Association's role in that growth as well as its internal changes as it sought to serve its four key constituencies: scientists working in all fields of science and technology, students seeking careers in those fields, a public that increasingly needed to understand new technological advances, and opinion leaders whose decisions could influence scientific and technological activities.

Dr. Wolfle also describes the AAAS's work on a wide range of national issues, including development of the National Science Foundation; Cold War concerns about the loyalty and freedom of scientists; questions about the ownership and control of research; efforts to develop an effective science curriculum for all Americans; and issues regarding air conservation, the use of arid lands, the effects of herbicides in Vietnam, and much more.

This book is essential for historians of science, members of scholarly organizations, and everyone who wants to understand the inner workings of a major scientific society.

346 pp.; softcover; index
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