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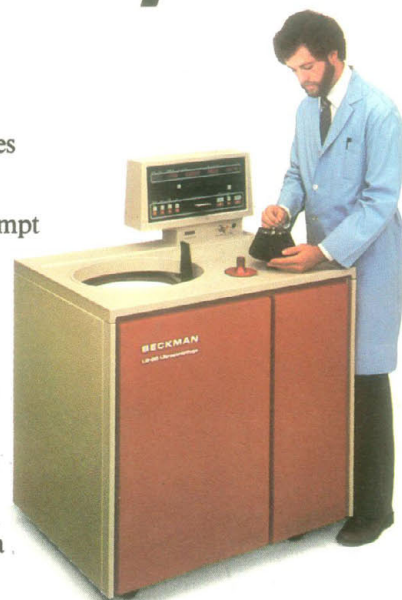
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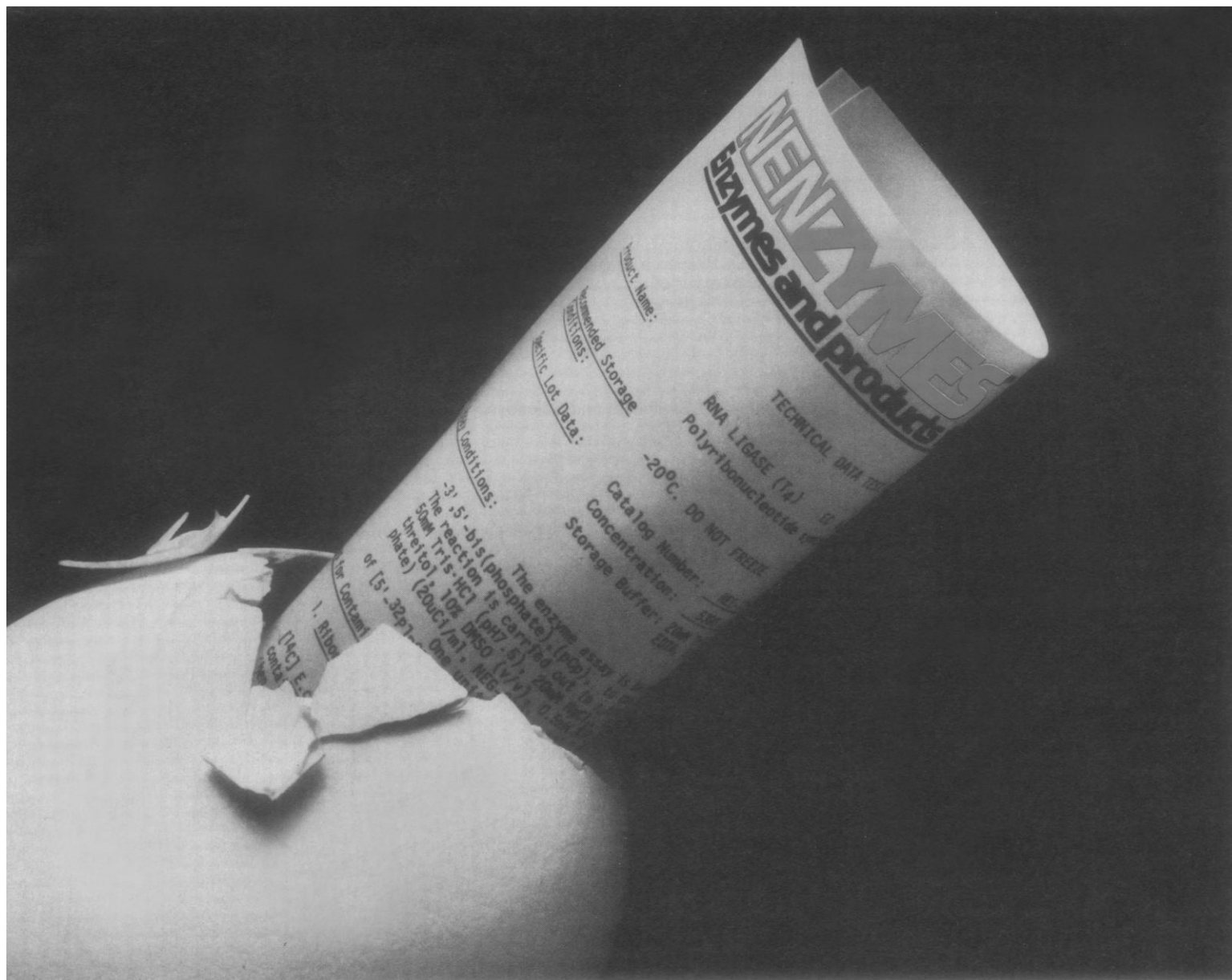
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<b>LETTERS</b>	Acid Precipitation: <i>G. T. Wolff</i> ; Watching the Watchers: <i>W. W. Lowrance</i> ; Leprosy Research in India: <i>M. G. Deo</i> ; Soot-Catalyzed Reactions: <i>D. R. Schryer et al.</i> .....	1172
----------------	---	------

<b>EDITORIAL</b>	Employment of Engineers and Scientists .....	1177
------------------	--	------

<b>ARTICLES</b>	Nuclear Magnetic Resonance at High Pressure: <i>J. Jonas</i> .....	1179
	Organization of Endogenous Opiate and Nonopiate Pain Control Systems: <i>L. R. Watkins and D. J. Mayer</i> .....	1185
	Energy Self-Sufficiency for Hawaii: <i>J. W. Shupe</i> .....	1193

<b>NEWS AND COMMENT</b>	The Hoechst Department at Mass General. ....	1200
	The MGH-Hoechst Agreement .....	1201
	NRC Must Weigh Psychic Costs .....	1203
	The Mysterious Chinese Luggage Incident. ....	1204
	<i>Briefing</i> : China Switches from Protons to Electrons; Senate Approves Binary Weapons Plan; Gas Centrifuge Plant in Trouble in Congress; The Latest on MX .....	1206

<b>RESEARCH NEWS</b>	Big Problems Faced in RNA Processing. ....	1208
	<i>Saturn Briefing</i> : Caged Argon: A Clue to the Birth of Titan; Rings, Rings, What Makes the Rings?; Lightning on Saturn or Ring Discharges?; What Battered the Satellites of Saturn? .....	1210
	Adaptation Can Be a Problem for Evolutionists .....	1212
	Solar with a Grain of Salt .....	1213

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<b>BOOK REVIEWS</b>	Environmental Regulation and the U.S. Economy, reviewed by G. S. Tolley and R. G. Fabian; Techniques and Concepts of High-Energy Physics, T. Ludlam; Neutrino Physics and Astrophysics, S. P. Rosen; An Integrated System of Classification of Flowering Plants, R. Dahlgren; Books Received . . . . .	1215
<b>REPORTS</b>	Micronutrients and Kelp Cultures: Evidence for Cobalt and Manganese Deficiency in Southern California Deep Seawater: J. S. Kuwabara . . . . .	1219
	Localization of Calcium in Amyloplasts of Root-Cap Cells Using Ion Microscopy: S. Chandra et al. . . . .	1221
	Venus: Halide Cloud Condensation and Volatile Element Inventories: J. S. Lewis and B. Fegley, Jr. . . . .	1223
	The Role of Surface Chemistry in Filter Feeding by Zooplankton: J. Gerritsen and K. G. Porter . . . . .	1225
	Deep Oxygenated Ground Water: Anomaly or Common Occurrence?: I. J. Winograd and F. N. Robertson . . . . .	1227
	Induction of Crisis Forms in Cultured <i>Plasmodium falciparum</i> with Human Immune Serum from Sudan: J. B. Jensen, M. T. Boland, M. Akood . . . . .	1230
	HEL Cells: A New Human Erythroleukemia Cell Line with Spontaneous and Induced Globin Expression: P. Martin and Th. Papayannopoulou . . . . .	1233
	Tumorigenesis at a Predetermined Oral Site After One Intraperitoneal Injection of N-Nitroso-N-Methylurea: A. Konstantinidis, J. B. Smulow, C. Sonnenschein . . . . .	1235
	Growth Hormone Stimulates Longitudinal Bone Growth Directly: O. G. P. Isaksson, J.-O. Jansson, I. A. M. Gause . . . . .	1237
	Single-Neuron Labeling in the Cat Auditory Nerve: M. C. Liberman . . . . .	1239
	Interaction of Convulsive Ligands with Benzodiazepine Receptors: C. Braestrup et al. . . . .	1241
	Flexor Reflex Control of the External Sphincter of the Urethra in Paraplegia: F. A. Jolesz et al. . . . .	1243
	Temperature-Dependent Sex Determination: Current Practices Threaten Conservation of Sea Turtles: S. J. Morreale et al. . . . .	1245
	Micromolar Affinity Benzodiazepine Receptors: Identification and Characterization in Central Nervous System: A. C. Bowling and R. J. DeLorenzo . . . . .	1247
	Efferent Fibers to <i>Limulus</i> Eyes Synthesize and Release Octopamine: B.-A. Battelle, J. A. Evans, S. C. Chamberlain . . . . .	1250
	Naloxone Reverses Neonatal Depression Caused by Fetal Asphyxia: V. Chernick and R. J. Craig . . . . .	1252
<b>PRODUCTS AND MATERIALS</b>	Laboratory Freezer; Gamma Counter; Fresh Tissue Sectioning; Nuclear Waste Monitor; Cell Separating Kits; Modular HPLC; Electrophoresis Cell; Literature . . . . .	1254

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## COVER

Under the cover of darkness hatchling green turtles (*Chelonia mydas*) emerge from their nests, orient, and scurry toward the ocean along the beach at Tortuguero, Costa Rica. Their sex has been determined by the temperature of their eggs during incubation. Nest temperatures above 29.5°C produced predominantly females, while temperatures below 28°C resulted in male turtles. See page 1245. [Edward A. Standora, State University College at Buffalo, Buffalo, New York 14222]

# You should be thinking about the problem, not about the computer.



Thirty years ago, engineers and scientists found a workhorse computer to meet their needs: the IBM 701.

Today, the descendants of the 701 are the most effective IBM systems ever: they help you get answers quickly, cost-effectively, and so easily that you'll almost forget you're using a computer.

For example, IBM's Virtual Machine/Conversational Monitor System (VM/CMS) lets you set up and enter a job and monitor its progress. And intervene, if necessary, to change a parameter to drive the whole process toward better results, faster.

Under VM/CMS, even the IBM 4341 super-mini can support as many as 200 interactive users at a time.

### **VM/CMS Easily Learned**

One user of VM/CMS on a 4341 is the University of Pennsylvania, where Roy Marshall

directs the Physics Department Computer Facility. "Users learn it very easily," Marshall says. "They do simple things the first day. They flow with the problem-solving: A physicist does physics, not computer science."

"The editor is the most powerful I have ever used," says Dr. Richard Steinberg, who is pursuing a proton decay experiment. "I can get any file-data, programs, text—with two keystrokes. With the prompting system, I can enter a big job and *know* it will run. I won't find out the next morning that there was a job-entry error."

### **A Super-Mini with Punch**

The IBM line of upwardly compatible computers extends from the small 4331 to a giant system. The 4341 is a true super-mini in size and cost, yet it has every feature that makes its larger counterparts ideally suited as engineering and scientific

systems: for example, the 64-bit data paths and the rich set of 51 floating-point instructions.

### **The Top of the Line**

IBM's largest computer is the 3081. With its processing speed, memory size, and the speed and number of its I/O channels, the 3081 is designed to handle the massive problems presented by such disciplines as elementary particle physics.

At the Stanford Linear Accelerator Center (SLAC) near Palo Alto, a 3081 reduces a flood of recorded sensor data.

"CPU power is critical to us, in terms of saving the scientist's time," says Charles Dickens, director of computing services at SLAC. "Under VM, he can look at intermediate results and—if necessary—change the physical experiment or the calculation.

"And the ability to move sensor data rapidly from our instrument tapes is vital. We need





the fast channels and high-performance peripheral devices of the IBM system."

### **This One Grows on You**

The IBM 3033, upgradable over a 4:1 range of computing power, covers the span from the super-mini to IBM's biggest.

At Western Geophysical Company, nine 3033 systems with attached IBM array processors are absorbing a torrent of data from geophysical exploration all over the world. From a jumble of seismic echoes, they derive the hidden contours of underground rock layers.

At Western's headquarters in Houston, senior vice president Carl H. Savit explains: "To improve the signal-to-noise ratio and arrange the data for the required series of calculations, we perform massive data sorts. The rapid channel rates of the 3033 are essential to us.

"Our product is data," Savit

adds. "The computer is our production machinery. We depend critically on continuous operation and quick response. We need close support from our computer vendor, and we get it from IBM."

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At first glance, it looks as though we've just put a polycarbonate cage on top of a standard mouse cage with the "roof" of the top cage vented. Right... but there's more. The recessed roof functions as a static filter by virtue of a special filter material that's protected by a perforated aluminum sheet. And, most importantly, the top cage overlaps the bottom cage and effectively forms a giant Petri dish-like structure. Result: There is a substantial interchange of gases *and* an effective microbiological barrier.

## How effective is all this?

This system, when incorporated into most existing facilities (with only minor facility modification), can maintain axenic mice in the gnotobiotic state. The static filter and the cage overlapping effectively keep dust particles—which are the "microbiological taxis"—out of the system. Accordingly, this is really a miniature isolator, an "island," a protected microenvironment within any macroenvironment.

Does it really work? Even immune-suppressed mice have been successfully maintained in this system *adjacent* to mice contaminated with *Pseudomonas*, *Pasteurella*, *Citrobacter*, *Aerobacter*, *Klebsiella*, and *Staphylococcus aureus* without any transfer of organisms.

## What are the applications of the MICRO-ISOLATOR System?

It's ideal for the maintenance of a stable limited defined-flora mouse colony... for either animal production or research. It is also a first-rate quarantine housing system because animals from different sources with differing microbiological profiles can be quarantined in the same room without cross-contamination. (The barrier works in both directions: keeps contaminants in or out.)

## What are the other advantages?

This caging system is rigid, durable, easy to handle, uses minimal rack space, is easy to sterilize, and because the top fits snugly on a standard 29.2 x 19 x 12.7 cm mouse cage, it doesn't dislodge when cages are pushed together (the way other filter caps sometimes do).

The system eliminates the expense and inconvenience of starting or maintaining a complex SPF barrier type facility. Simple, inexpensive, and no time-consuming "entry" procedures.

Finally, the colony odor is significantly minimized; allergic responses are substantially reduced through containment of animal dander.





### But is the air interchange really adequate?

Institutions now using this system report that hypoxia is not a problem. Additionally, ammonia level is not a problem if the population density per cage is kept at three to four mice and bedding changed every three or four days... especially when relative humidity can not be well controlled. (Ammonia can be totally eliminated from the colony if defined-flora mice without urease-positive aerobic bacteria are used.)

### What else do I need to make the MICRO-ISOLATOR System work?

To effectively maintain the isolation of the animals at all times, cages must be opened and serviced within a Class II Biohazard Hood and aseptically supplied with sterile feed, bedding, and water. (For additional guidance on the use of this system, please consult the references below.)

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#### References

R. S. Sedlacek, H. D. Suit, K. A. Mason, and E. R. Rose; 7th ICLAS Symp.; Utrecht, 1979; Gustav Fischer Verlag, Stuttgart, Germany, 1980; New York, 1980.

See also: abstracts of papers Nos. 32 and 35 of papers presented by R. S. Sedlacek and R. P. Orcutt at 32nd Annual Session AALAS, Salt Lake City, Sept. 20-25, 1981.

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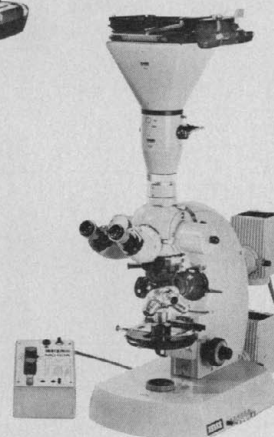
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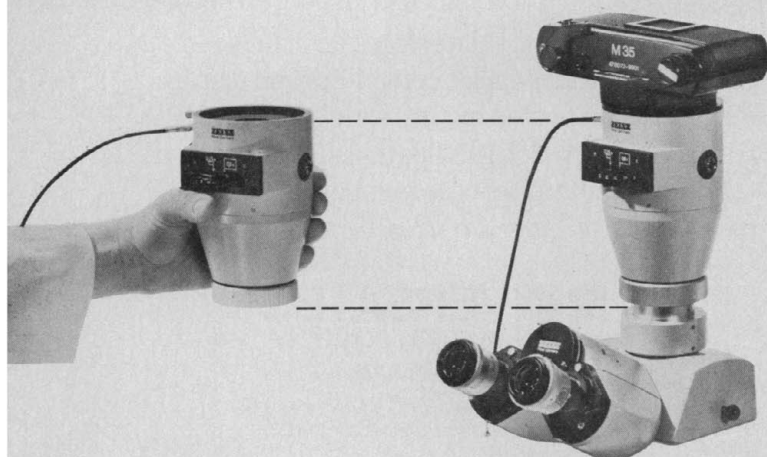
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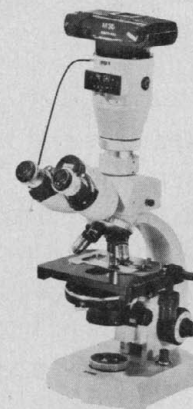
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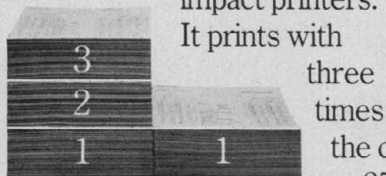
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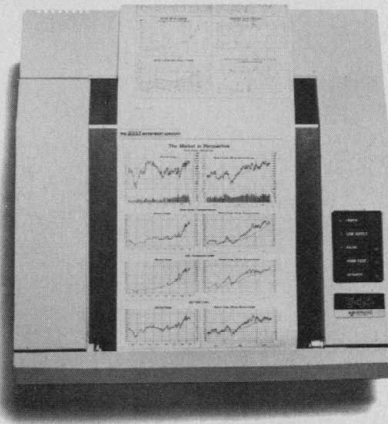
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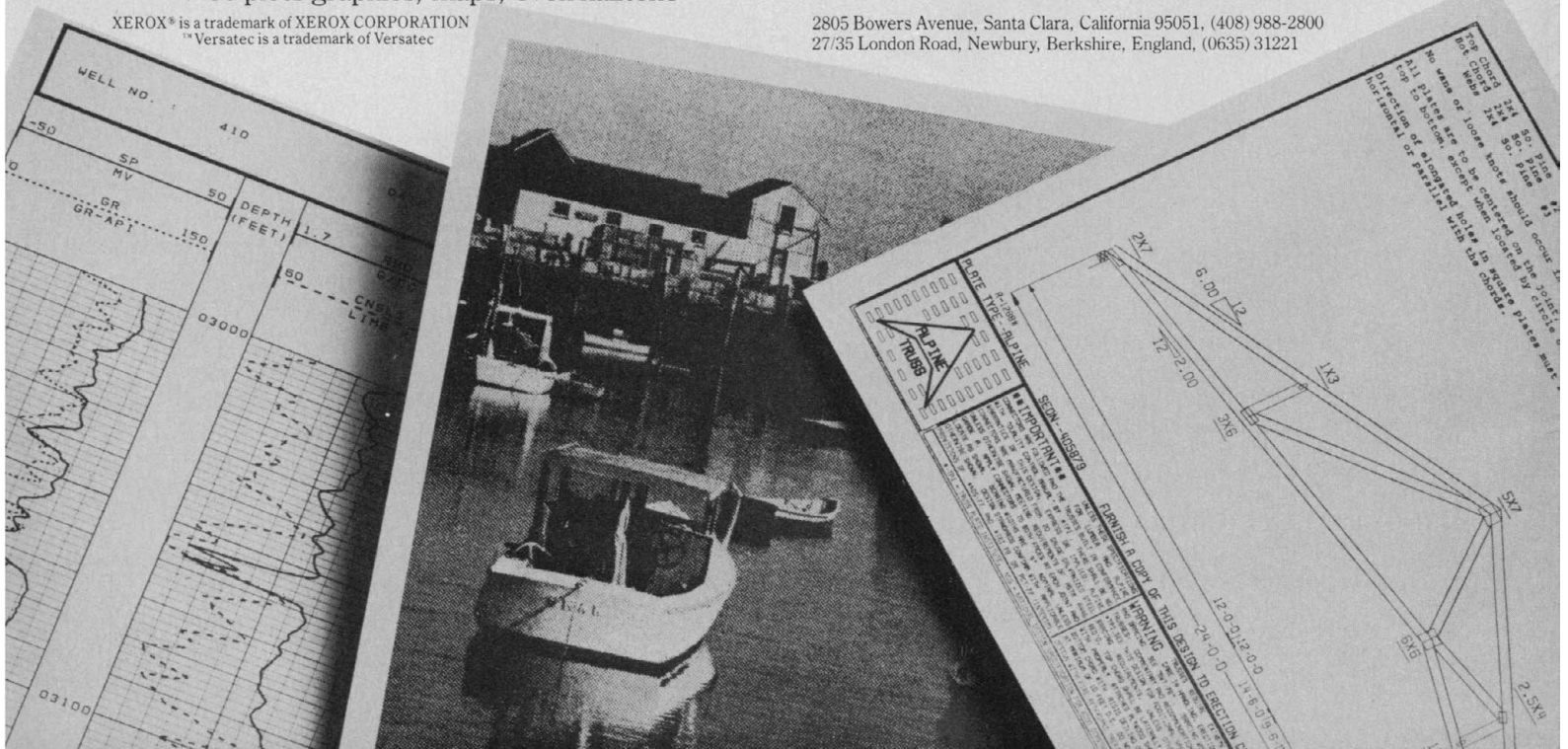
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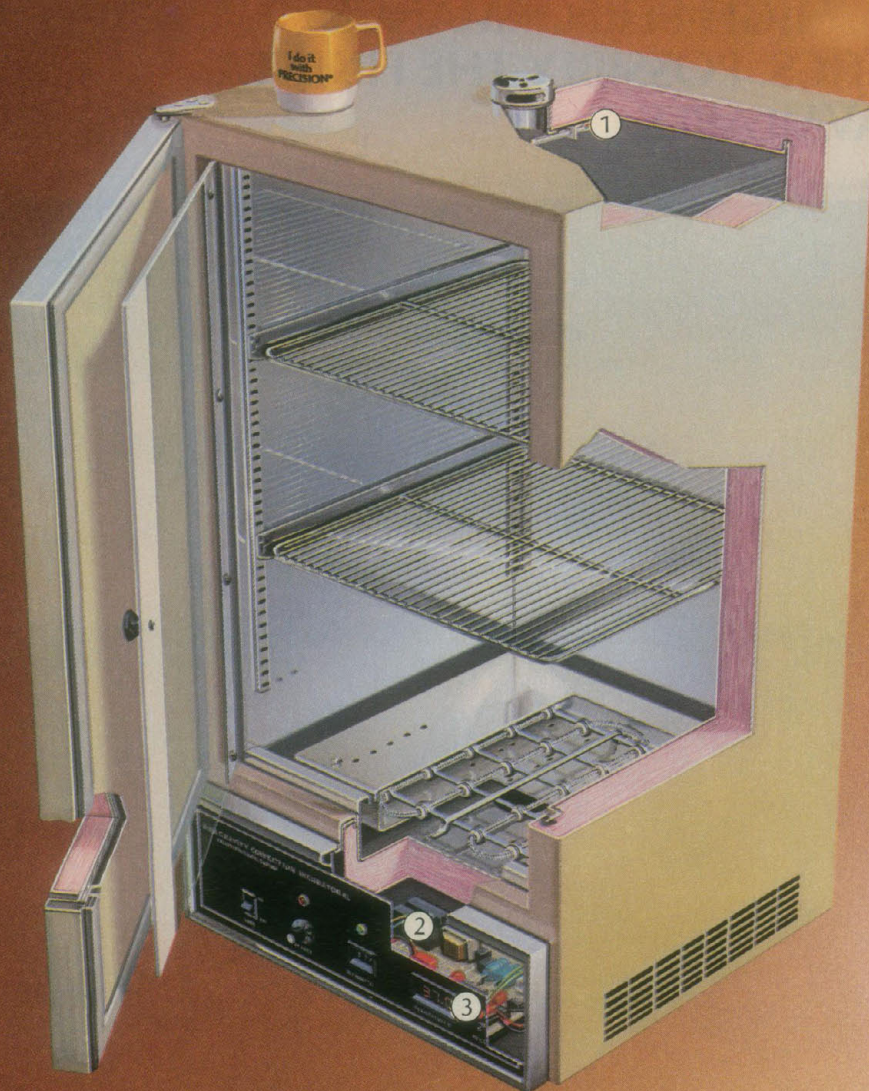
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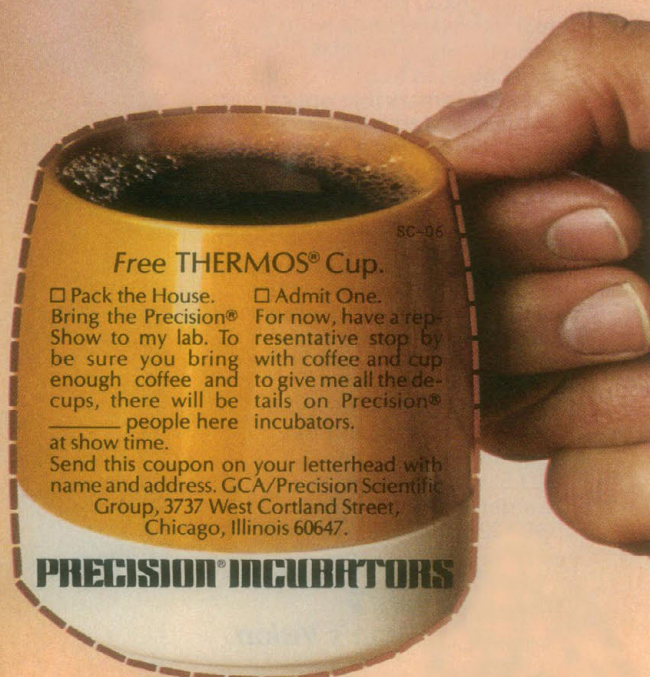
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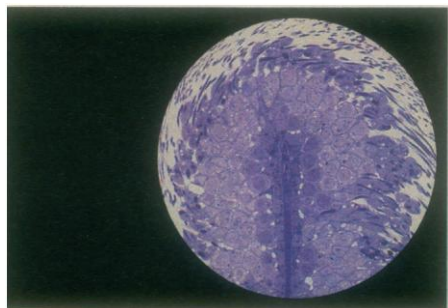
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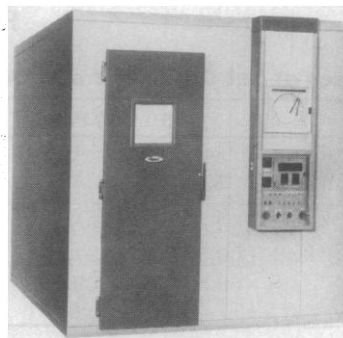


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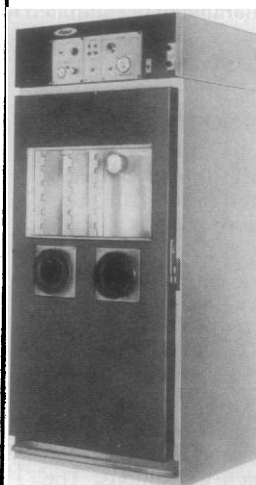
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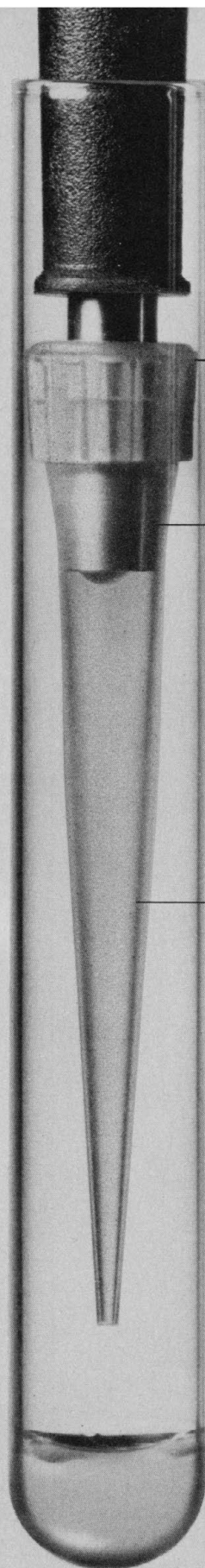
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M. G. DEO

*Cancer Research Institute,  
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### **References**

1. M. G. Deo, C. V. Bapat, R. G. Chullawalla, W. S. Bhatki, *Indian J. Med. Res.* 74, 164 (1981).
2. ———, in preparation.

### **Soot-Catalyzed Reactions**

A recent letter by Herbert Rosenkranz (23 Apr., p. 360) discusses some of the potential health effects associated with increasing soot emissions from diesel vehicles. We would like to point out another potential problem associated with soot particles in the atmosphere, namely, the catalytic activity of such particles for certain atmospheric chemical reactions, including the oxidation of sulfur dioxide (SO<sub>2</sub>) to sulfate.

Conversion of SO<sub>2</sub> to sulfate is widely recognized as a major source of acidity in clouds and rain water. The conversion is generally assumed to occur in the gas phase, with subsequent condensation or solution, or both, of the product sulfate. Gas phase conversion of SO<sub>2</sub> to sulfate implies that reduction of SO<sub>2</sub> emissions should result in roughly proportional reductions in sulfate and acidity. However, reductions in SO<sub>2</sub>, when actually accomplished, have not resulted in corresponding reductions in sulfate (1-2). This is the well-known "urban sulfate anomaly," which has provoked considerable debate (1, 3).

A possible explanation for this anomaly is that a significant component of atmospheric sulfate may be generated by

heterogeneous (multiphase) reactions rather than gas phase reactions (3). Heterogeneous conversion of SO<sub>2</sub> to sulfate on soot particles was demonstrated in laboratory studies by T. Novakov and co-workers in 1974 (4). Subsequent laboratory investigations by these and other investigators have confirmed and extended this finding (5-7). For example, water (liquid or vapor) has been found to enhance carbon-catalyzed sulfate formation and, in fact, to effectively prevent saturation of the reaction (6, 7). Furthermore, carbon has been shown to catalyze oxidation of SO<sub>2</sub> by the trace oxidant NO<sub>2</sub> as well as by O<sub>2</sub> (6-8). The range of other atmospherically important reactions that may also be catalyzed by carbon is not known.

Serious consideration of heterogeneous reactions in the atmosphere is a relatively recent phenomenon, and much more research will have to be done before the importance of soot-catalyzed reactions is fully established. Nevertheless, in view of existing laboratory results it seems advisable to consider the catalytic properties of soot when assessing the potential impact of increasing diesel emissions.

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2. R. E. Meyers and E. N. Ziegler, *Environ. Sci. Technol.* 12, 302 (1978).
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4. T. Novakov, S. G. Chang, A. B. Harker, *Science* 186, 259 (1974).
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6. W. R. Cofer, III, D. R. Schryer, R. S. Rogowski, *Atmos. Environ.* 14, 571 (1980).
7. R. S. Rogowski, D. R. Schryer, W. R. Cofer, III, R. A. Edahl, Jr., S. Munavalli, *NASA TP-2014* (National Aeronautics and Space Administration, Washington, D.C., 1982).
8. L. G. Britton and A. G. Clarke, *Atmos. Environ.* 14, 829 (1980).

*Erratum.* In the report "Bronchoconstrictor effects of leukotriene C in humans" by J. W. Weiss *et al.* (9 Apr., p. 196), the second sentence of the abstract should have read: "Leukotriene C was 600 to 9500 times more potent than histamine on a molar basis in producing an equivalent decrement in the maximum expiratory flow rate at 30 percent of vital capacity above residual volume."

*Erratum.* Howard A. Meyerhoff, former AAAS official, died in Tulsa, Oklahoma, not Tucson, Arizona, as stated in AAAS News (7 May, p. 613).



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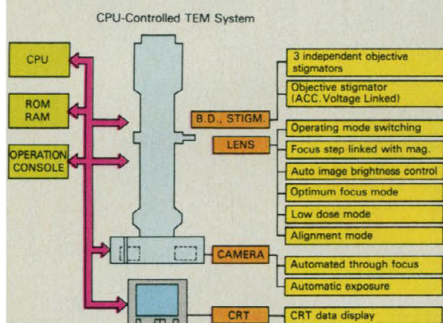
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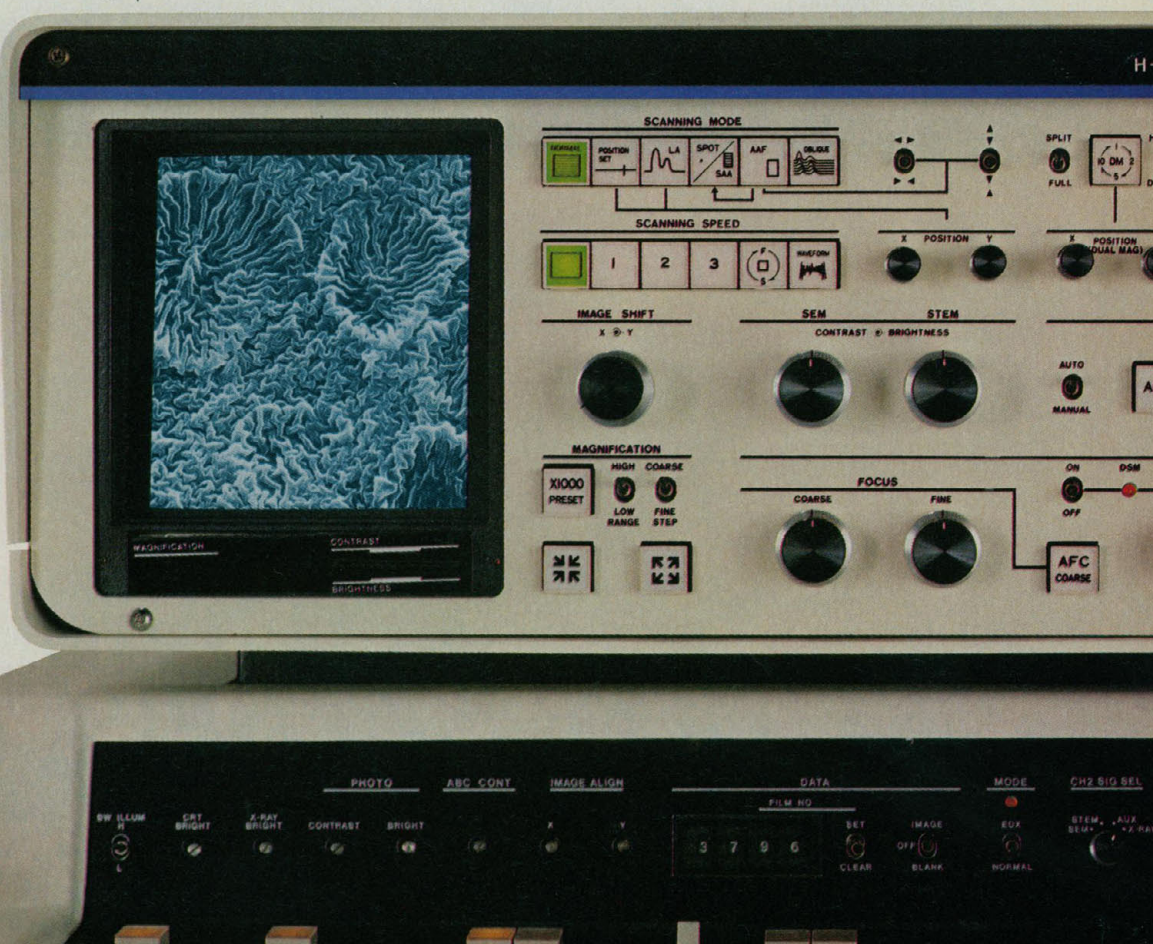
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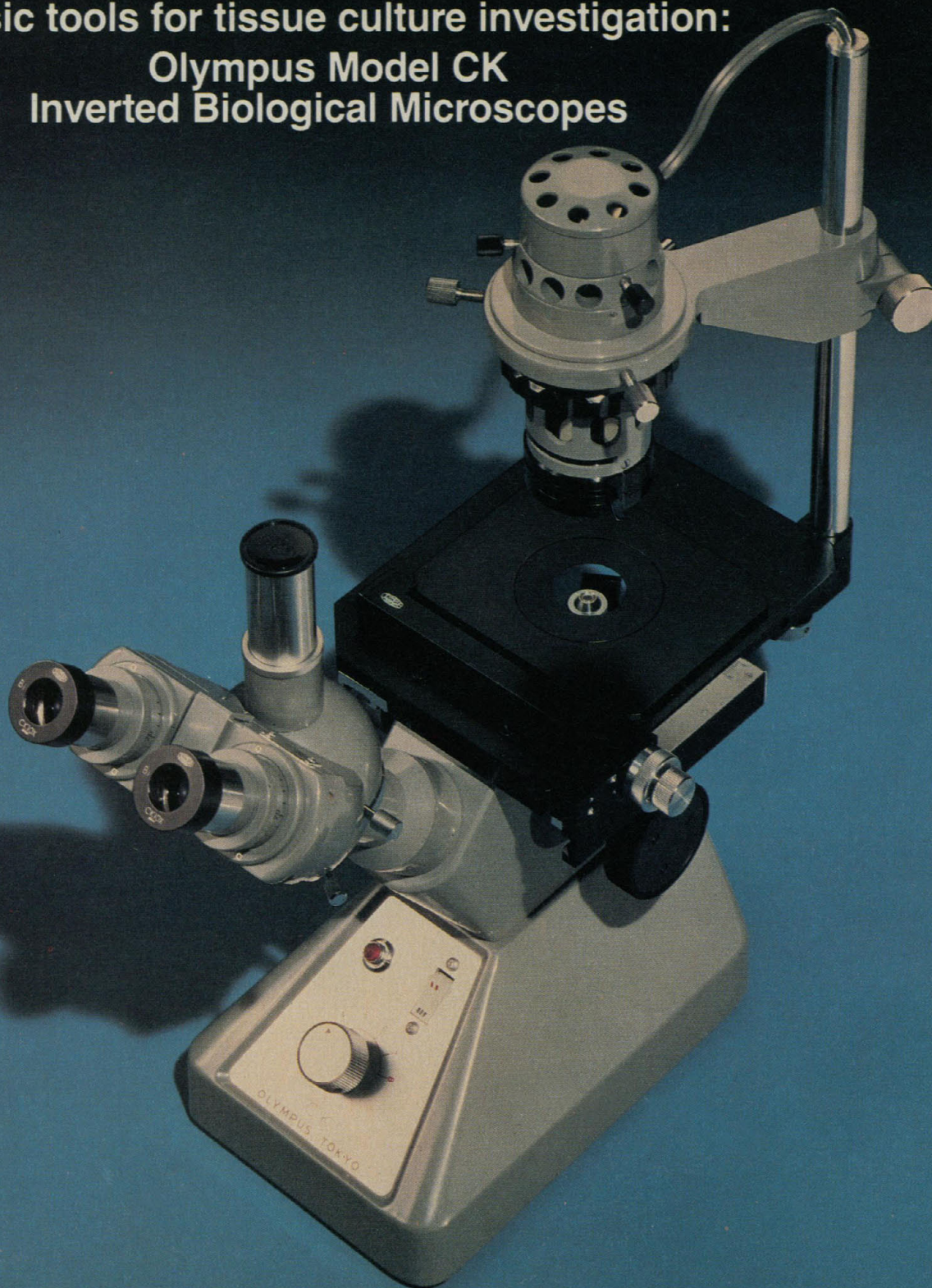
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# Employment of Engineers and Scientists

A deepening recession has brought the official national unemployment rate to about 10 percent. In its early phases, the downturn affected mainly the construction and auto industries, their suppliers, and people who were not well prepared or especially skilled. But now the effects of recession, coupled with high interest rates, are spreading to most segments of the economy. Thus far, scientists and engineers have been relatively insulated from the decline. For example, unemployment among members of the American Chemical Society is less than 2 percent and few, if any, major layoffs have been announced. However, the first quarter profit of the chemical industry is down 33 percent and continuation of that trend would surely affect employment.

Prospects for employment of young scientists and engineers by industry have changed recently. Six months ago, industry was avidly, even frantically, recruiting. But the deepening recession has generated gloom and uncertainty. Pessimists have begun to remind us of the situation in the late 1960's when stories appeared in the *New York Times* and elsewhere about an engineer driving a taxi. These stories dramatized unemployment among engineers and contributed to a sharp drop in engineering enrollments and a later shortage of engineers.

To obtain an indication of developing attitudes and trends, I contacted personnel officers in ten major firms active in applied science and engineering. Only one of them will hire more young engineers during the current recruitment year than it did in the preceding period. Imbalances of supply and demand vary with fields. In a few specialties, such as those related to computers and their applications, positions are still unfilled. In some fields, such as construction engineering, mining engineering, and metallurgy, there are far more applicants than positions. Respondents were confident that they would be recruiting actively in the coming season. The consensus was that the top fourth of classes in chemical, electrical, and mechanical engineering will be eagerly sought. In those fields, the upper two-thirds of the graduates will probably find jobs in their profession. One of the officers said that a person in the lower third needs to show leadership qualities and be an extrovert. Then he or she will probably wind up in marketing.

The personnel officers also indicated that earlier broad patterns of job and salary offers provided by the College Placement Council\* are likely to continue. Engineers, who constitute about 8 percent of the graduating class, have received more than 60 percent of the offers and the salaries provided exceed those in other fields. The latest compilation includes data for the period July 1981 to March 1982 and thus covers most of the recruitment for the current graduating class. The top and bottom monthly salary offers (90th and 10th percentiles) were as follows: chemical engineering, \$2425 and \$2100; electrical engineering, \$2225 and \$1834; mechanical engineering, \$2350 and \$1875; computer science, \$2125 and \$1608; and physical and earth sciences other than chemistry, \$2400 and \$1360. Offers were much lower in some fields. The corresponding figures for some of them were: biological sciences, \$1970 and \$1000; business, \$1870 and \$1075; and humanities, \$1650 and \$833.

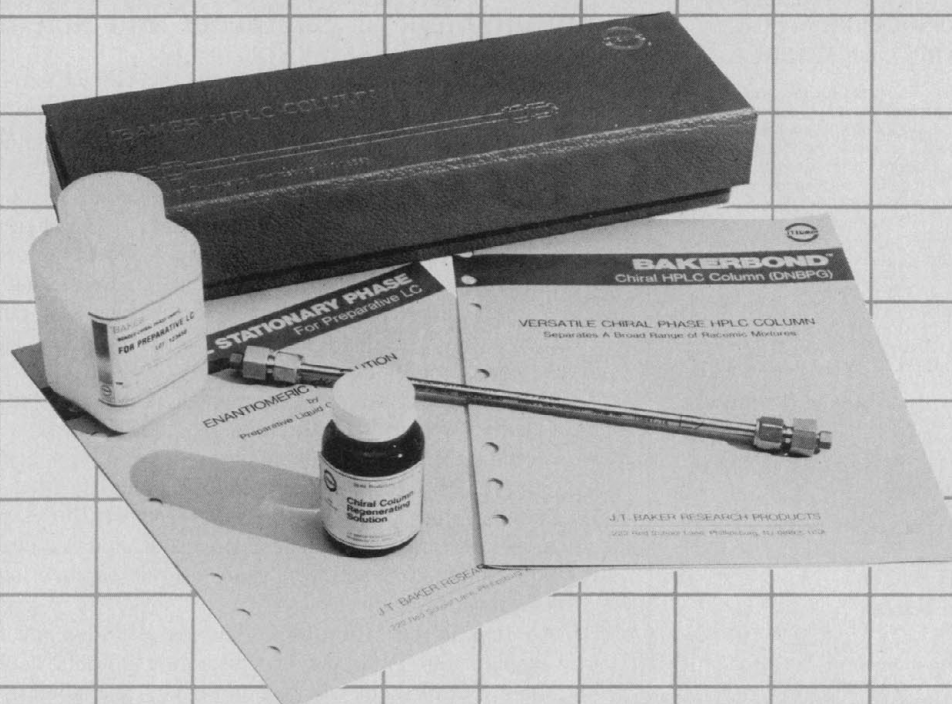
In whatever situation humans find themselves, they tend to overreact and to assume that a present state of affairs will continue indefinitely. The bleak outlook for some fields will not prevail forever, and the favorable status of engineers and physical scientists may lead to a surplus of them. However, the top fraction will be much sought after. We all know that good grades are an imperfect measure of a person's potential. But in an imperfect world, it is useful to have them, especially if they are in courses known to be demanding. The world must adjust to changed energy sources and feedstocks and to a further development of the computer revolution. These changes will require two decades at minimum and will demand the attention of many of our most capable minds.—PHILIP H. ABELSON

\*CPC Salary Survey, March 1982.



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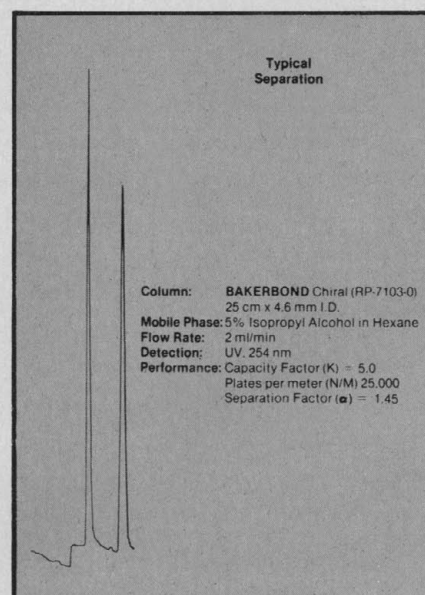
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