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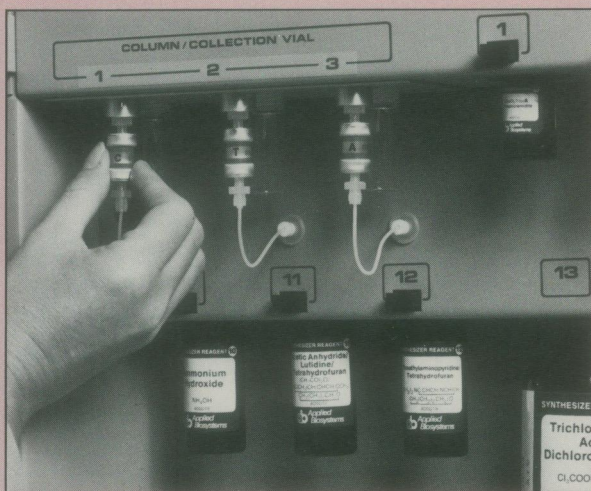
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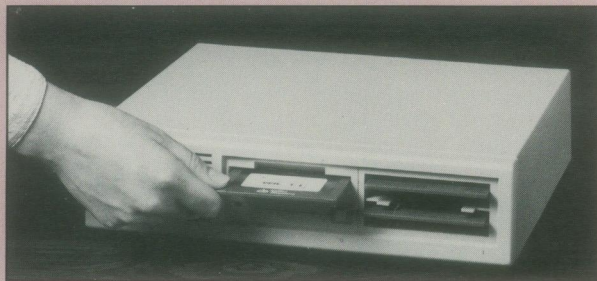
# BIOSYSTEMS UPDATE

## New Instrument for Multiple DNA Syntheses

Applied Biosystems has announced a new option for its Model 380A DNA Synthesizer which allows it to make three different oligonucleotides simultaneously. Syntheses can be started and stopped independently of one another so several users can share the same instrument. With this new option, the productivity of the 380A is tripled for less than one-fourth the original cost of the instrument. You also save bench space and minimize reagent consumption.



Three synthesis columns can be operated independently and simultaneously, tripling the productivity of the Applied Biosystems Model 380A DNA Synthesizer.

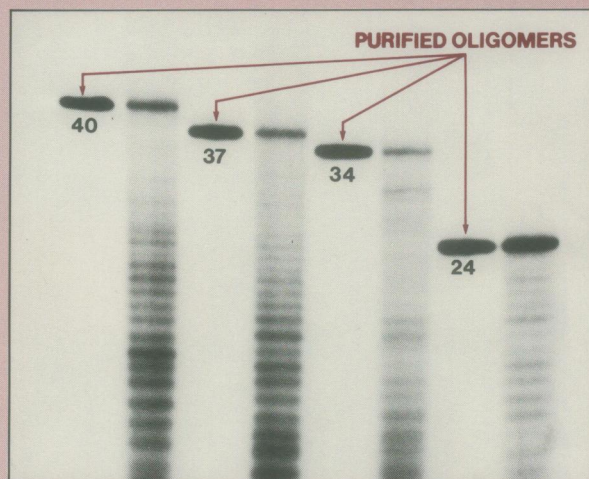


Disc drive for storage of your chemical methods.

This new option also includes hardware and software which allow you to use your own procedures. You can use other chemistries

and even make oligonucleotide analogues. All functions required for DNA synthesis are available and your methods are stored on a flexible disc. With 18 solvent/reagent reservoirs, the 380A offers flexibility unmatched by other synthesizers.


Applied Biosystems has the total solution for your DNA synthesis needs. We provide ultrapure, highly stable reagents, the key to successful syntheses. With our efficient phosphoramidite chemistry, you can make DNA with up to 50-60 bases without the use of the dimers, trimers or ligation required with other chemistries. This is the true test



Autoradiogram of  $^{32}\text{P}$  labeled oligonucleotides up to 40 bases long. Efficient phosphoramidite chemistry allows direct synthesis of long oligonucleotides.

of coupling efficiency. Only the Applied Biosystems Model 380A DNA Synthesizer can synthesize long oligonucleotides quickly and with high product yields. And if your requirements for DNA are large, you can now synthesize three times as much with one instrument.

For more information, circle no. 238.

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## COVER

Two male Grant's gazelles (*Gazella granti*) prepare to butt horns (or clash horns) as an adult female walks by. See page 1191. [Craig Packer, University of Chicago, Chicago, Illinois 60637]

American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to promote the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

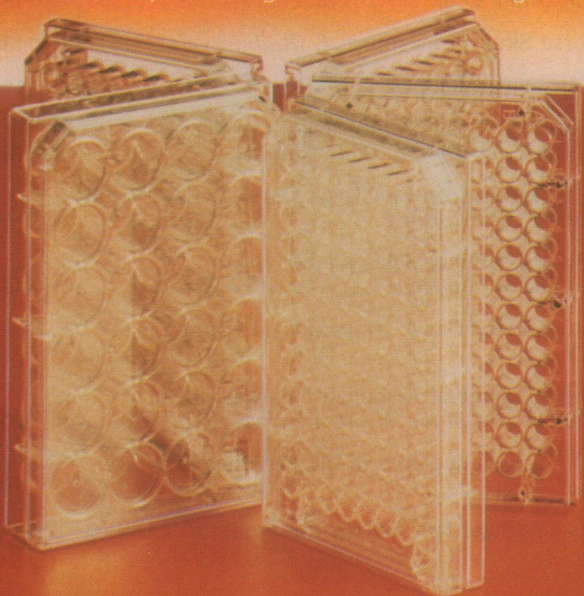
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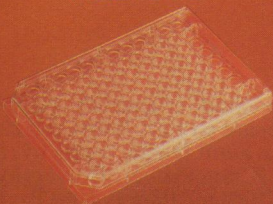
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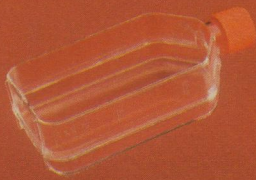
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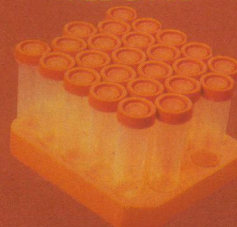
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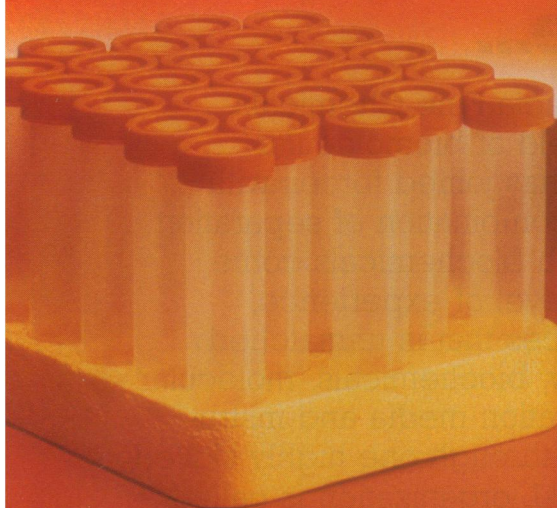
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# FROM THE GROVE

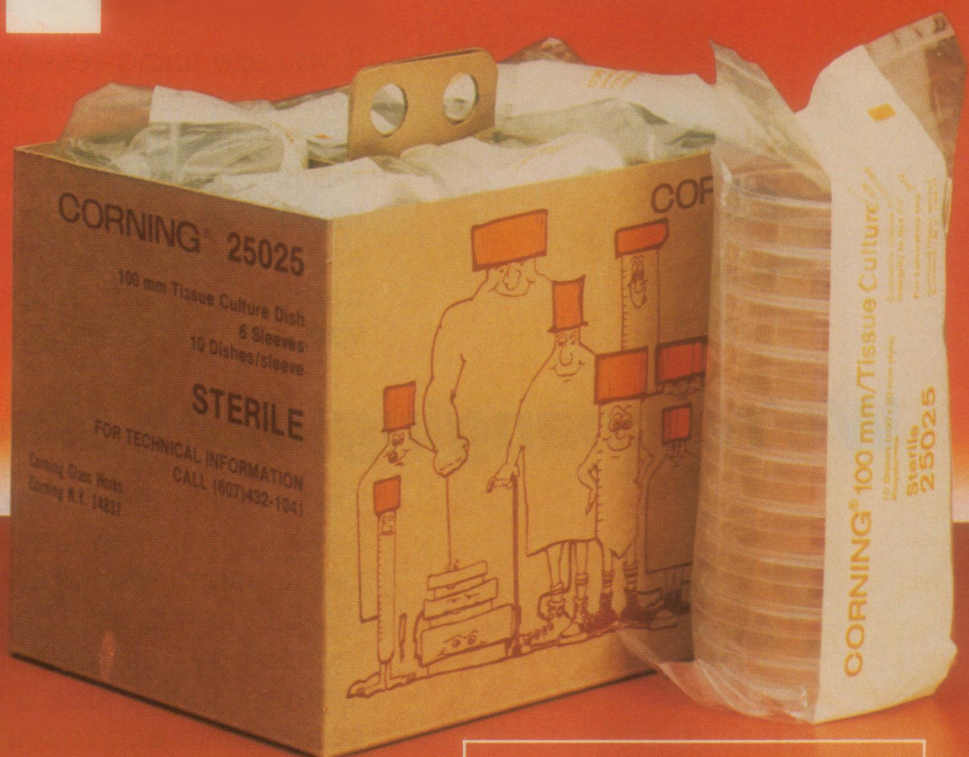
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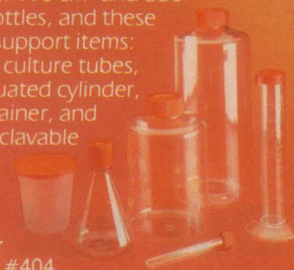
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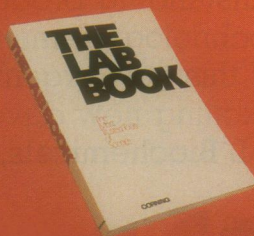
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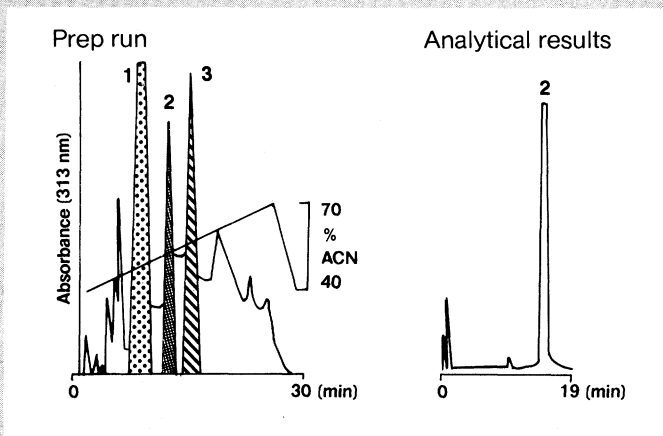
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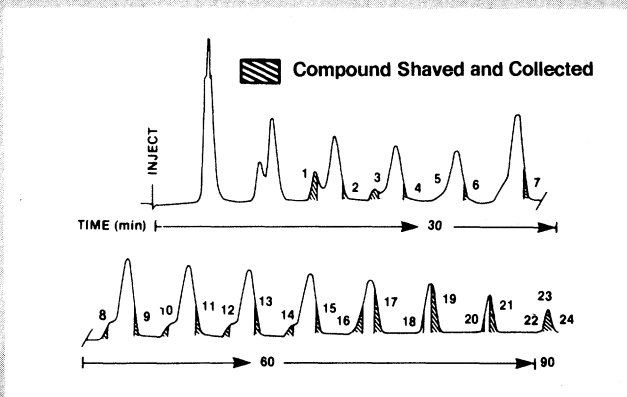


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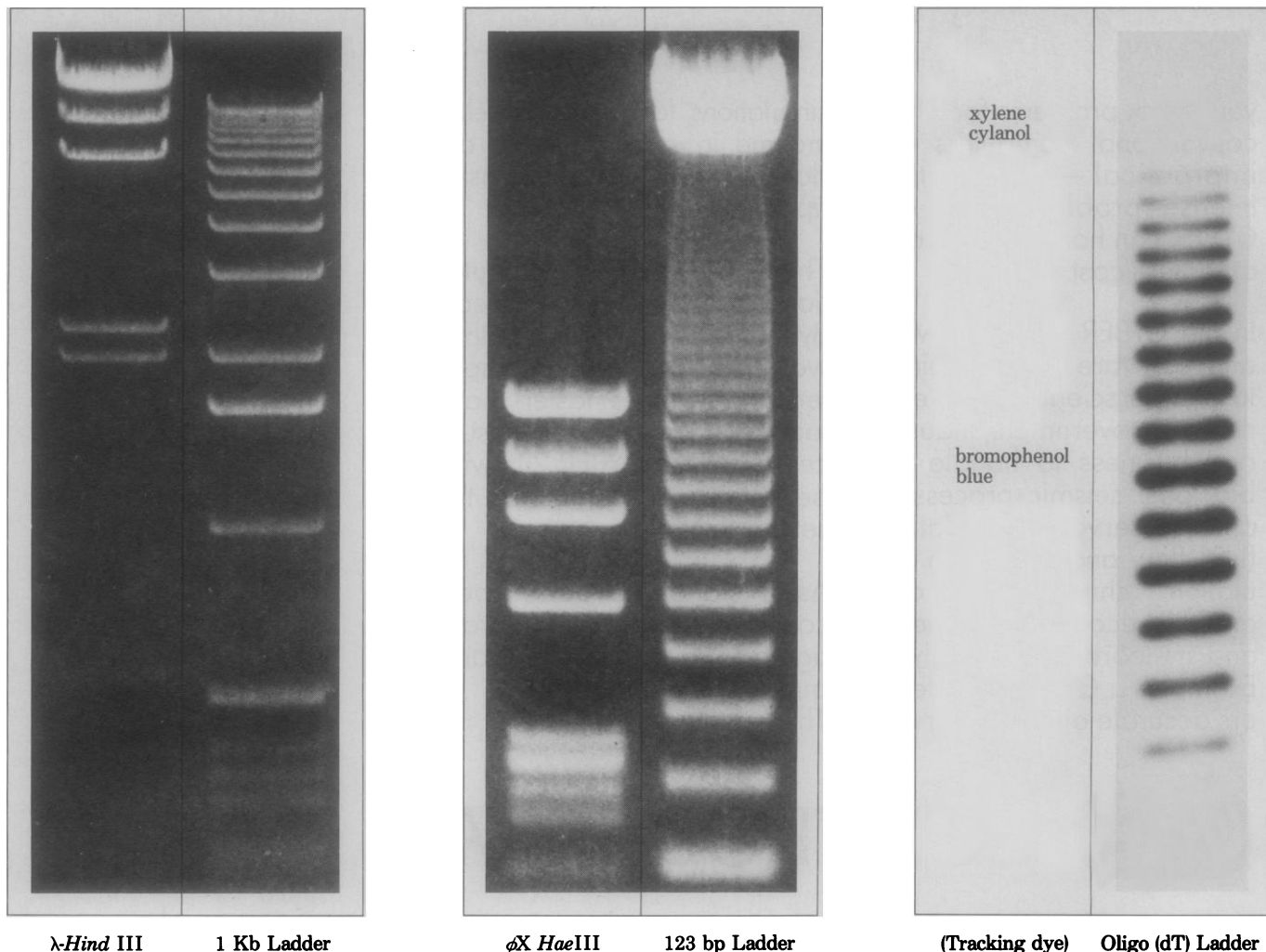


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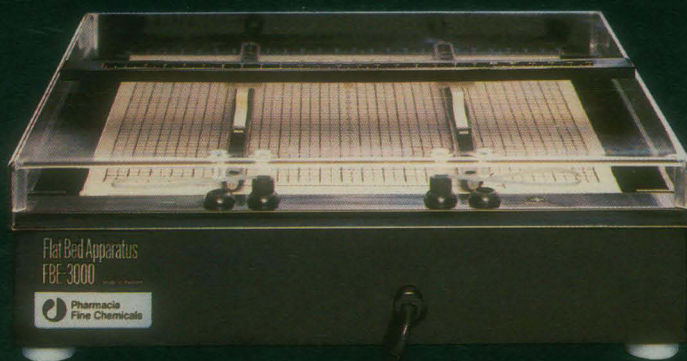
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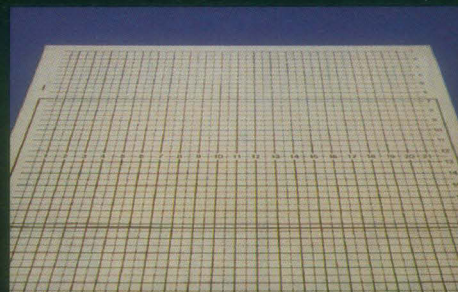
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"The university's 4341s serve as a major resource for interactive computing," says James S. Harvison, Acting Assistant Vice President. "We have five 4341s installed at different campuses serving our university community. They are a definite asset to our instruction and research computing network."

#### **The Johns Hopkins University**

Here, the 4341 is used by The Center for Metropolitan Planning

and Research. Teams of Ph.D.'s, under Dr. Steven Gottfredson, perform complex analyses of huge data bases. One study takes ten-year census figures and utilizes small samples to test the effects of federal programs on inner-city housing. Another breaks down census data to make it useful for planning by fire, sanitation and education departments.

Professor Gottfredson explains that "machine capacity and speed are vital because of the size of our data sets. We also handle many interactive algorithms, and the 4341 gives us fast access to information."

The 4341 is used in other areas at Johns Hopkins, including stud-

ies of cancer frequency and astrophysics applications in preparation for the planned launch of the space telescope. Vice Provost of the university, Richard Zdanis, says, "We decided on a 4341 because it's easy for inexperienced users and can support a variety of peripherals."

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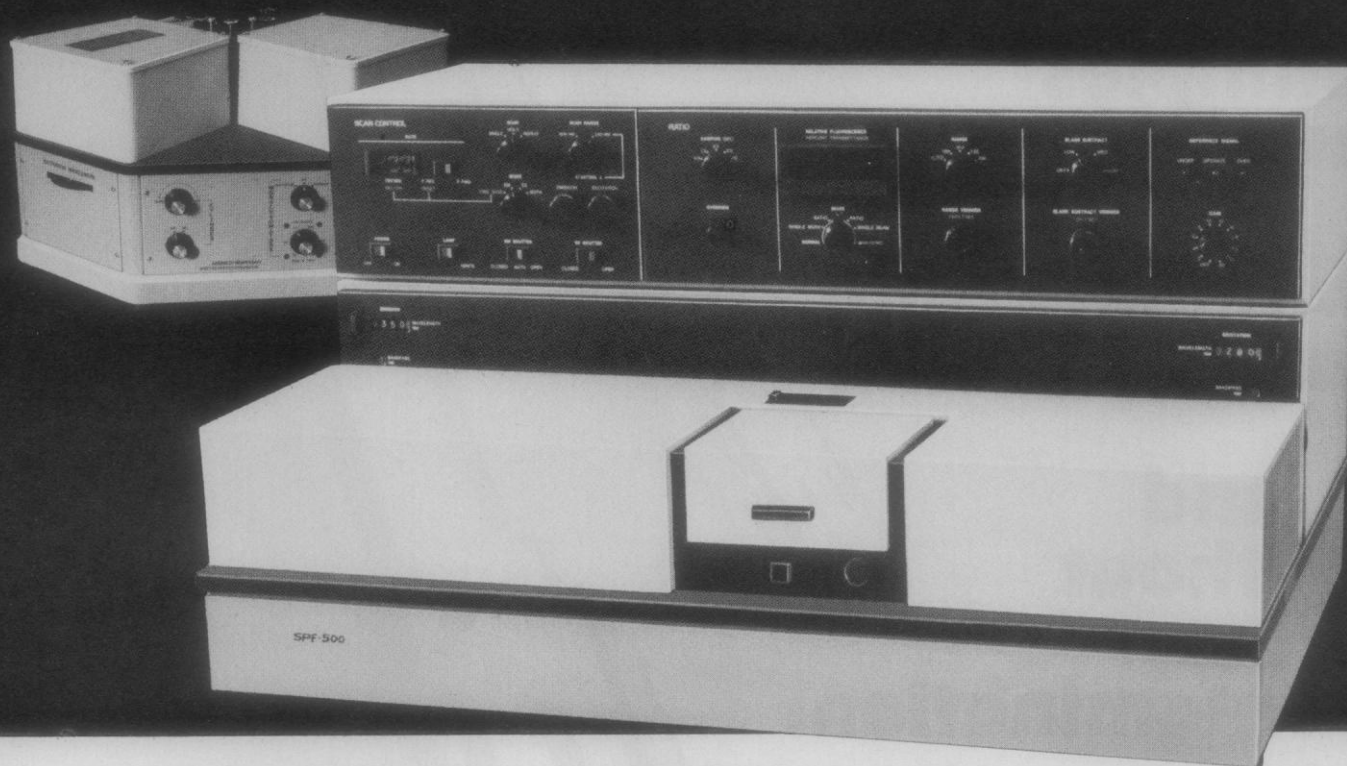
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## ***SCIENCE/SCOPE***

The space shuttle's new "eyes, ears, and voice" will revolutionize future missions, tests aboard the shuttle Challenger last June indicate. The integrated radar and communications system, also called the Ku band radar because of its operating frequency, uses an antenna dish at the front of the cargo bay. The system will let shuttle crews talk to Earth or transmit TV, high-speed data, and payload telemetry through NASA's tracking and data relay satellites. Crews now communicate with the ground less than 20% of the mission because the spaceship passes beyond the range of ground stations. With the Hughes Aircraft Company system, communications time will increase to over 90% of the mission.

Pioneer 10 is streaking into interstellar space with navigational help from its electronic imager. The spacecraft, which made history last June upon leaving the solar system, is using its imaging infrared photopolarimeter (IPP) to fix on the star Sirius. Pioneer 10 previously oriented itself with a sun sensor, but the sensor, now well beyond its design range, is reaching its limits of sensitivity 2.9 billion miles away. Pioneer 10 needs a reference point for spacecraft attitude control and interpretation of scientific data on solar wind. The IPP had been repeating various cruise-mode experiments since giving scientists their first close-up pictures of Jupiter and its four largest moons in late 1973. The IPP was built by the Santa Barbara Research Center, a Hughes subsidiary.

An advanced antenna farm designed with the aid of a computer will be carried into space by Intelsat VI communications satellites. The system will provide many different kinds of coverage -- beams transmitting to entire hemispheres, "global" beams, focused regional beams, and very narrow spot beams for broadcasting high-speed data. Hundreds of computer patterns were created to predict antenna performance. These studies led to the choice of transmit reflectors 3.2 meters in diameter instead of 4 meters. The larger size was rejected because it offered only slight improvement at the cost of being much heavier, larger, and more complex. Hughes heads an international team building Intelsat VI.

The new Landsat 4 spacecraft measures surface temperatures with an emitted thermal energy band not available on previous Earth resources satellites. The band, part of an instrument called a thematic mapper, adds a new dimension of data to that of bands that measure reflected sunlight. The new band can identify and map surface composition for geological studies and for mineral and petroleum exploration. It also can identify vegetation types and monitor their health. Hughes and its Santa Barbara Research Center subsidiary built the mapper for NASA.

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## What are the benefits to the animals?

There are many. Cross-contamination is substantially decreased because air from an infected animal goes to the exhaust system with an absolute minimal exposure of the other animals. Animal stress is also significantly reduced: the enclosed environment is quiet; drafts and thermal and humidity fluctuations are greatly minimized; and animals can be easily observed without inducing stress. The success of this environment is attested to by the fact that the total number of animals born to a species that breeds poorly (DBA/2J mice) is increased and the percent survival is also appreciably higher. Additional evidence: judging by acceleration of weight gain, newly arrived animals housed in this system become acclimated more rapidly. Further evidence? Even multiple species can be successfully housed in the same rack.

## What are the benefits to the research workers?

Since the air in the rack is exhausted into the main exhaust system and does *not* re-enter the animal room itself, research workers are effectively isolated from animal dander or other allergens, odor, pheromones, microorganisms, and food and bedding dust. Even with the doors of the unit open, the direction of air flow tends to be *from* the room and *into* the unit which helps to contain contaminated air *within* the unit. Result: virtual elimination of allergic reactions and generally, a cleaner, safer, odor-free work environment for the research people.

## What are the benefits to research programs?

Because this system greatly reduces the chance of cross-contamination, and because it provides a much less stressful environment generally (e.g., it tends to reduce the amount of animal handling required), the chances of jeopardizing expensive research programs are substantially minimized.

## Are there other benefits?

The air velocity is variable and is separately adjustable for *each* shelf. The system offers a choice of bottle watering or a specially designed upfeed serpentine automatic watering configuration that eliminates stagnant water, permits flushing during the day, and significantly minimizes contamination. This rack also permits excellent space utilization since multiple species can be safely housed in the same room. Cleaning is easy; VR-1 can be handled by most standard rack washers. The unit is quiet. And, in summary, it is a most effective isolation system *that can actually divide a room into multiple separate, isolated environments.*

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The VR-1 is the subject of one or more pending patents.

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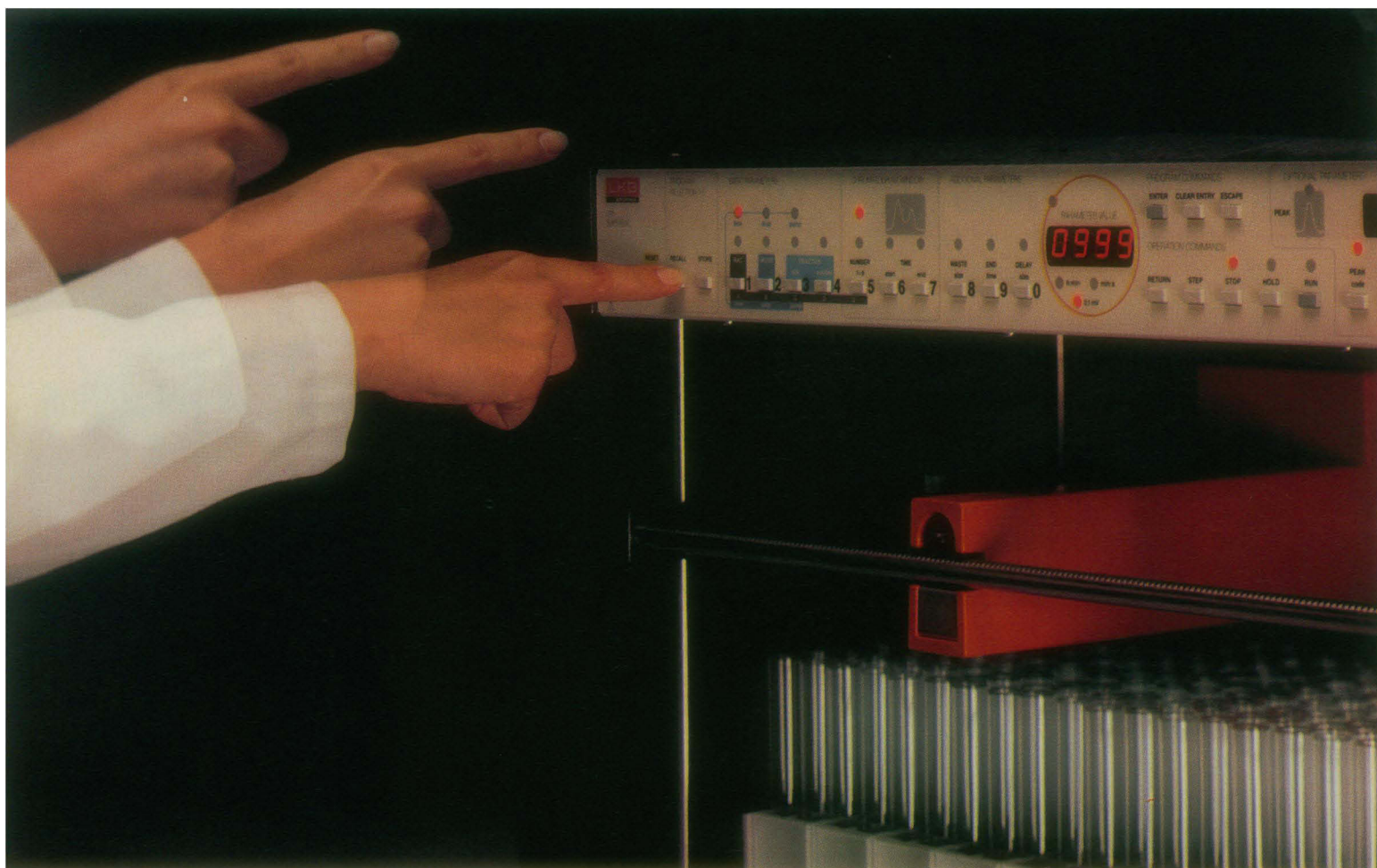
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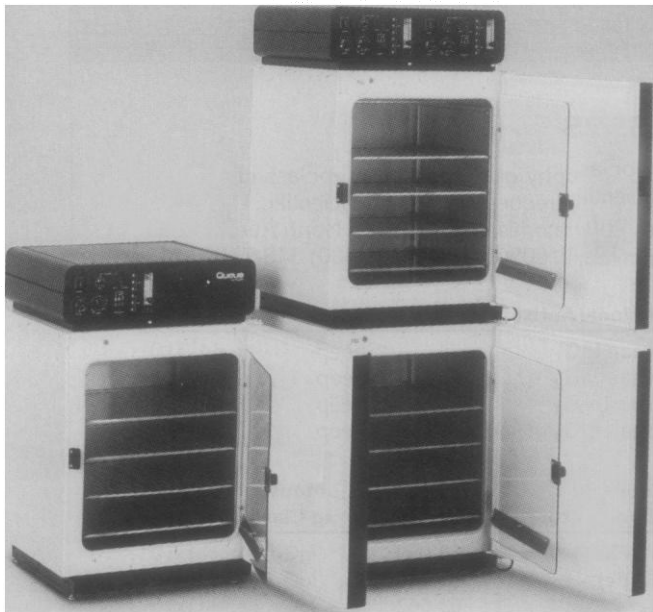
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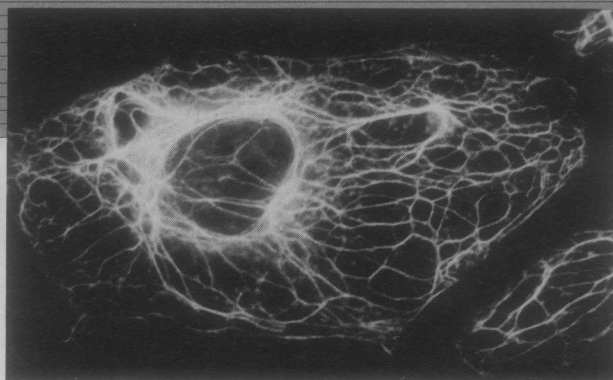
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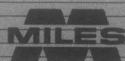
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Tubulin (chicken brain)	Rabbit	65-095
<i>Second Antibody Conjugates</i>		
Guinea Pig IgG, FITC	Rabbit	65-166
Guinea Pig IgG, Peroxidase	Rabbit	61-208
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IgG <sub>3</sub>	63-062	IgG	1x10 <sup>2</sup>
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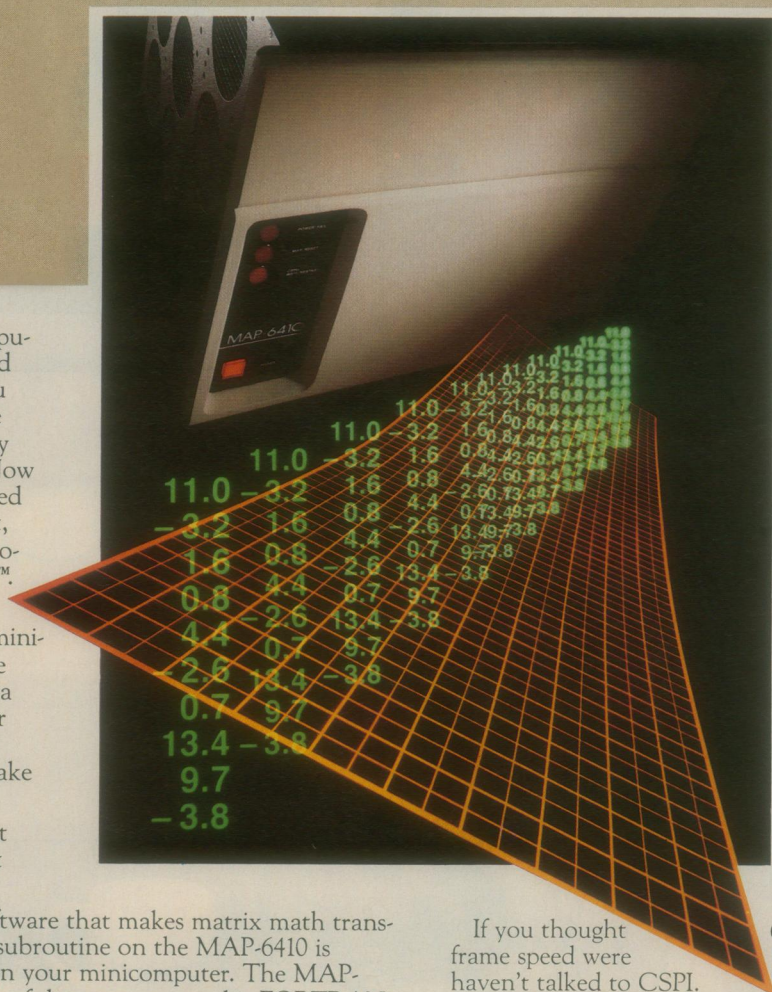
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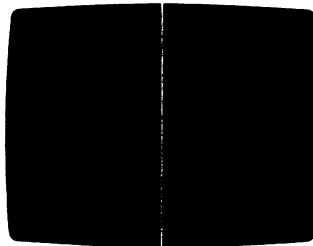
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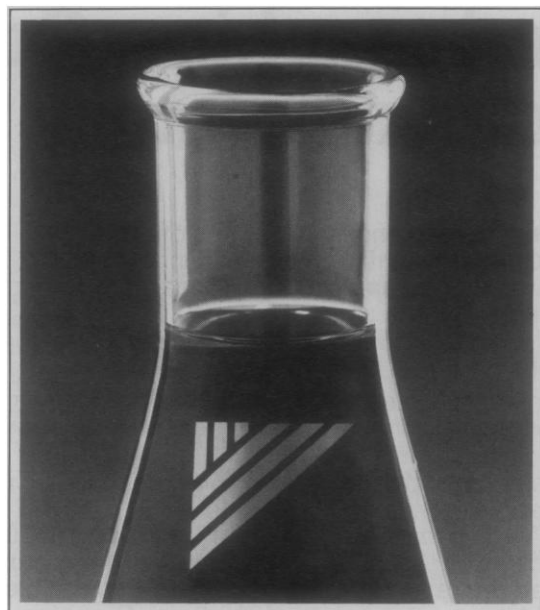
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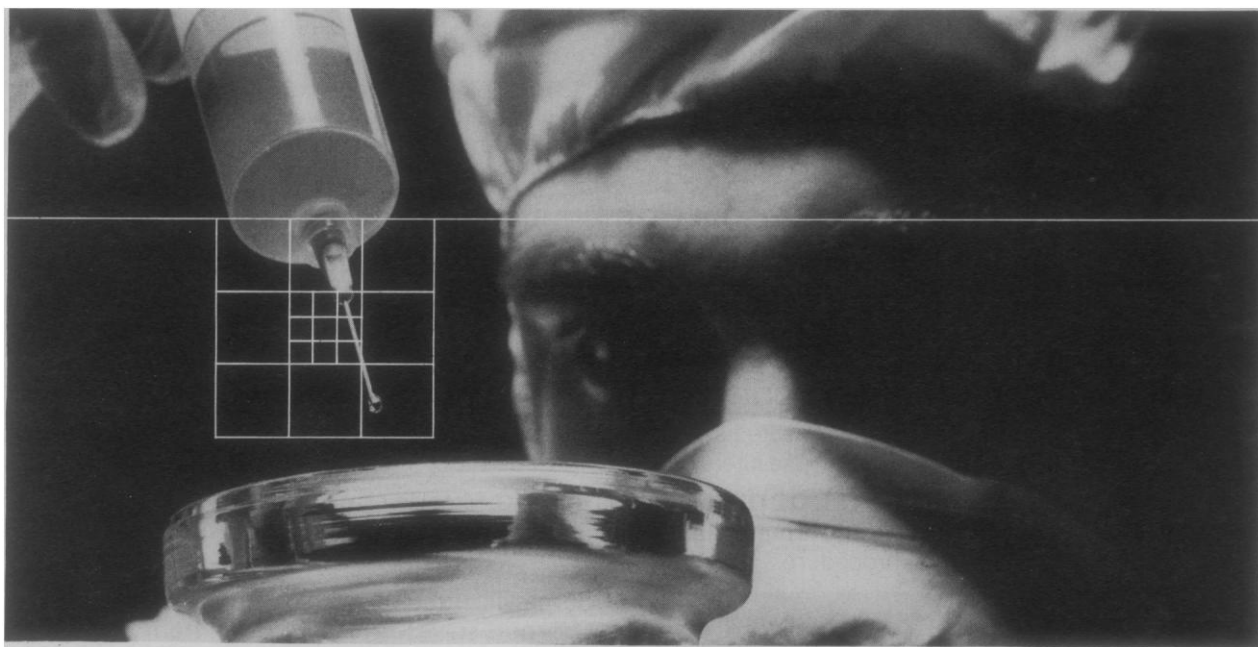
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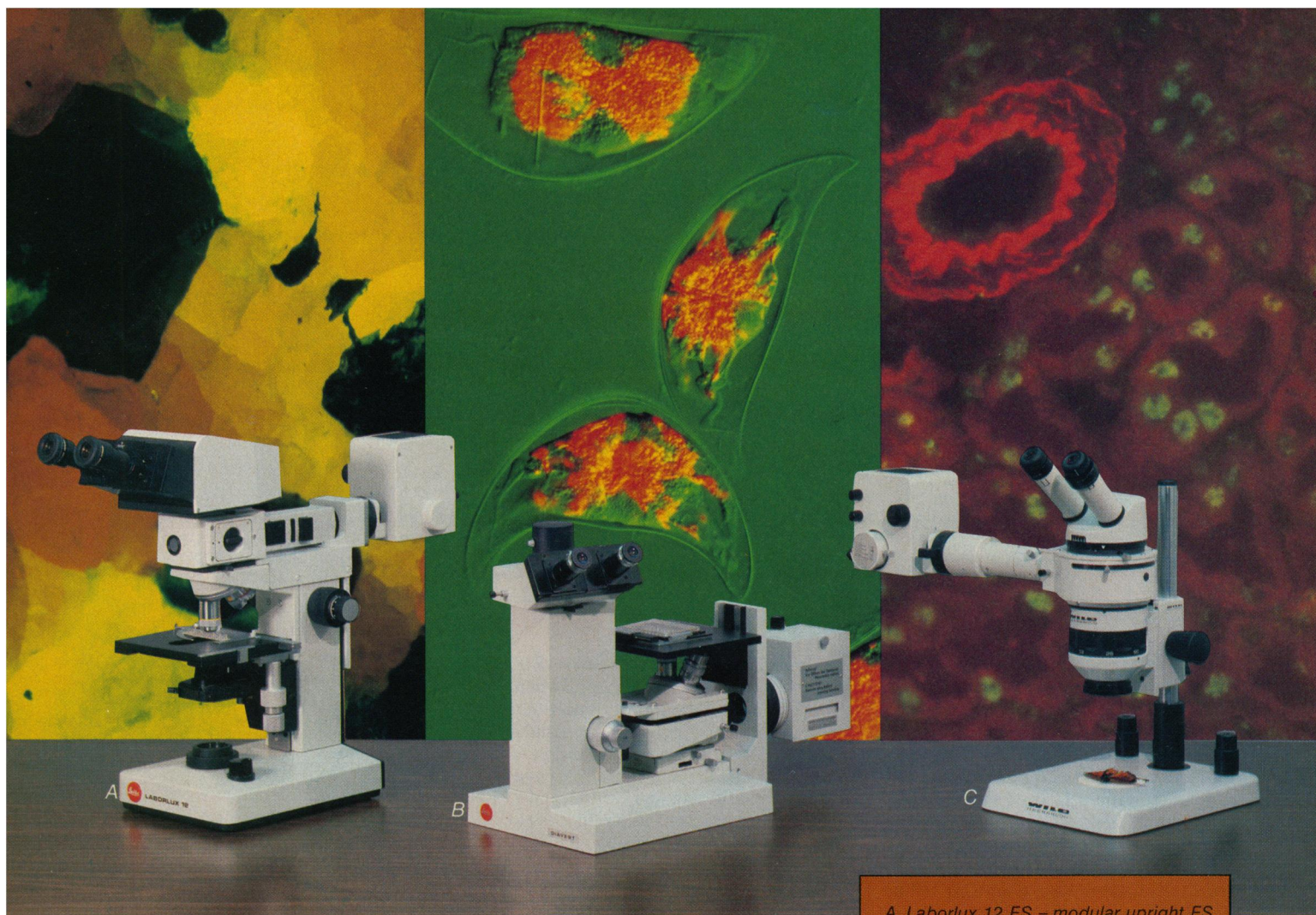
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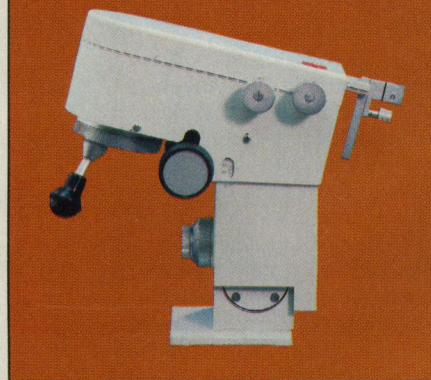
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# The Continuing Relevance of Foundations

Philanthropic foundations have just undergone three days of hearings by the Oversight Subcommittee of the House Appropriations Committee, chaired by Representative Charles Rangel. Neither the atmosphere nor the substance of the discussion bore any resemblance to past inquisitions when such foes as the late Wright Patman or B. Carroll Reece seemed bent at times on doing away with the very notion of using private money for public purposes through the device of the foundation.

Today's less threatening situation derives in part from improved foundation behavior since 1969, some of it mandated by the legislation that grew out of hearings that year. More foundations, including most large ones, now publish full reports on how they have spent their money; all foundations must provide expenditure and other information to the Internal Revenue Service, which in turn makes the data available to the Foundation Center library system, where the public may consult them. All foundations are required to spend annually at least 5 percent of the value of their assets on philanthropy; the scandal of a few foundations enriching their directors or trustees but spending little on philanthropy thus no longer provokes the righteous wrath of Congress.

Another reason for a more benign atmosphere may be that foundations no longer seem like big game to congressional hunters. Their resources have been seriously eroded by inflation, and the growth of government spending in virtually all fields of interest to foundations has reduced their role to that of a very junior partner. Long gone are the days when Wycliffe Rose could dream of the Rockefeller Foundation carrying scientific education and research to all corners of the earth, or when the Carnegie Foundation for the Advancement of Teaching could undertake to reform all of American higher education, using its provision of pensions for faculty as leverage.

Even if the glory days are irretrievably gone, however, there remains much that private organized philanthropy can do. Foundations still enjoy some potential advantages over other funders. They are better able to enter a given field of endeavor selectively than is government, which generally finds that what it does for one it must do for all. For foundations, unlike corporations, philanthropy is their central purpose, their *raison d'être*, and they need not justify their grants to shareholders. Unlike most individual philanthropists, foundations can readily investigate a problem, using their still considerable ability to convene the relevant expertise (and to know where that expertise is to be found) or to commission study papers. They can take the time and exercise the patience to approach new initiatives thoughtfully—which is not to say that they invariably do so, of course. Foundations have never fully figured out how to evaluate results of their work, but at least they can try, and their political problems in doing so forthrightly and comprehensively ought to be fewer than those faced by government. To the extent that foundations can evaluate not only their own work but that of government, they have opportunities to influence the nation's agenda and to provide a service to the public that others are not likely to provide.

None of this requires omniscience on the part of foundations. But it does require clearheadedness about what philanthropy can and cannot do in this era of big government and big science, of enormous change and formidable challenges to human capacity. It requires the ability to resist fads and to eschew institutional vanity—abilities not yet universal in the foundation world but surely attainable. And it requires that foundations listen creatively, that they be receptive but not passive, as they strive to fulfill their unique role.—RICHARD W. LYMAN, *President, The Rockefeller Foundation, 1133 Avenue of the Americas, New York 10036*



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