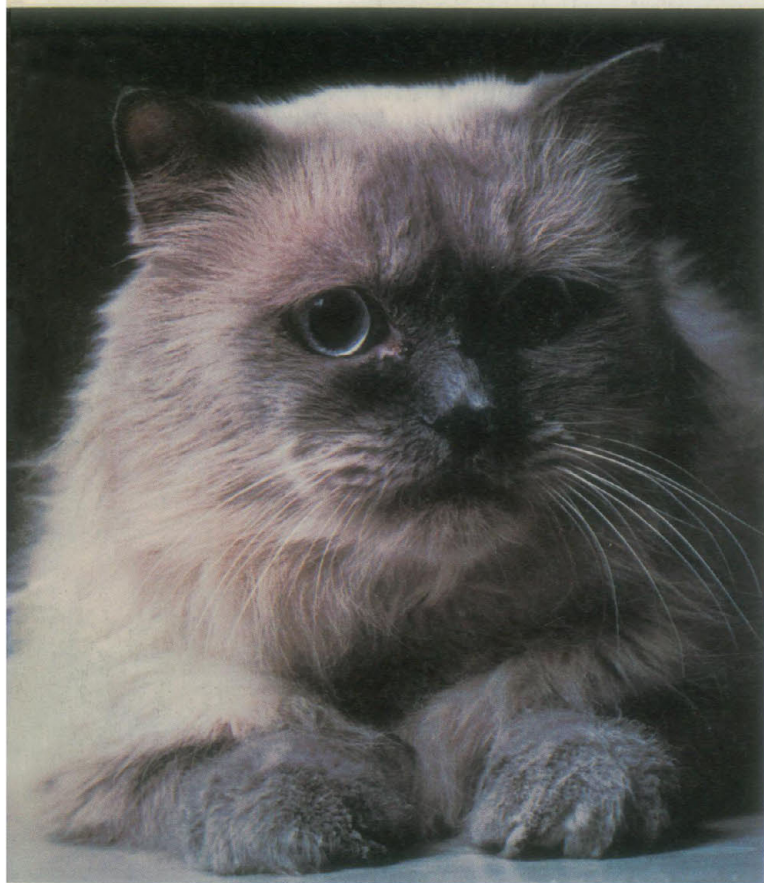


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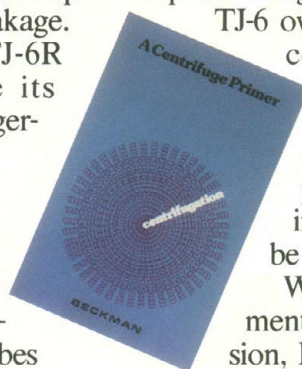
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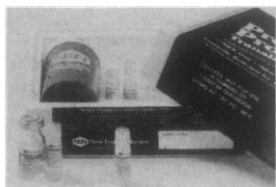


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Domestic cats (top, left: Himalayan blue color point; bottom, left: American shorthair tabby; top, right: short-hair Abyssinian orange; bottom, right: Persian orange). Approximately 25 mutant morphological genes have been described in the domestic cat, ten of which contribute in various combinations to the more than 100 breeds of cats presently being maintained. See page 257. [Mauro Calingo, Kensington, Maryland]

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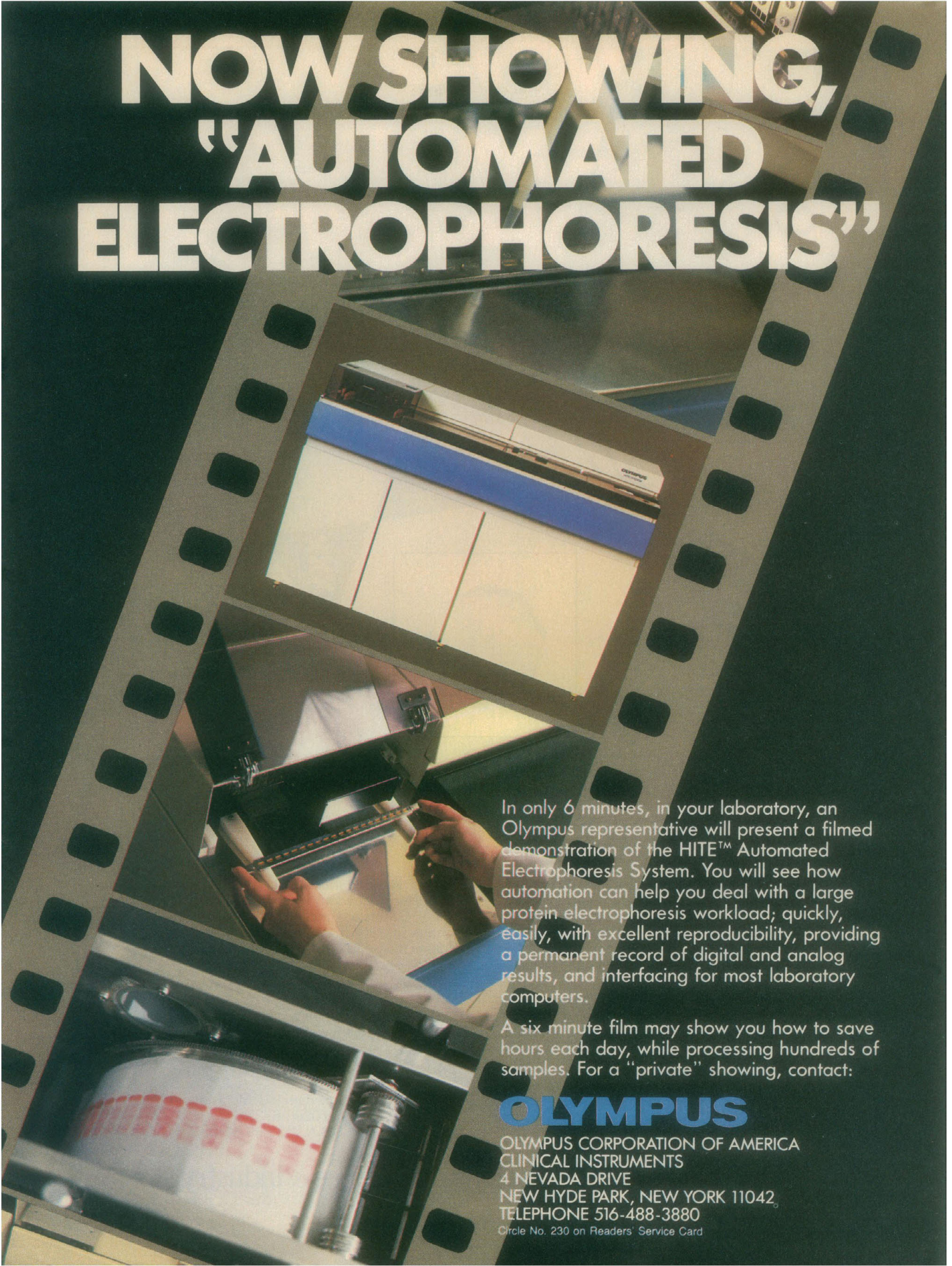
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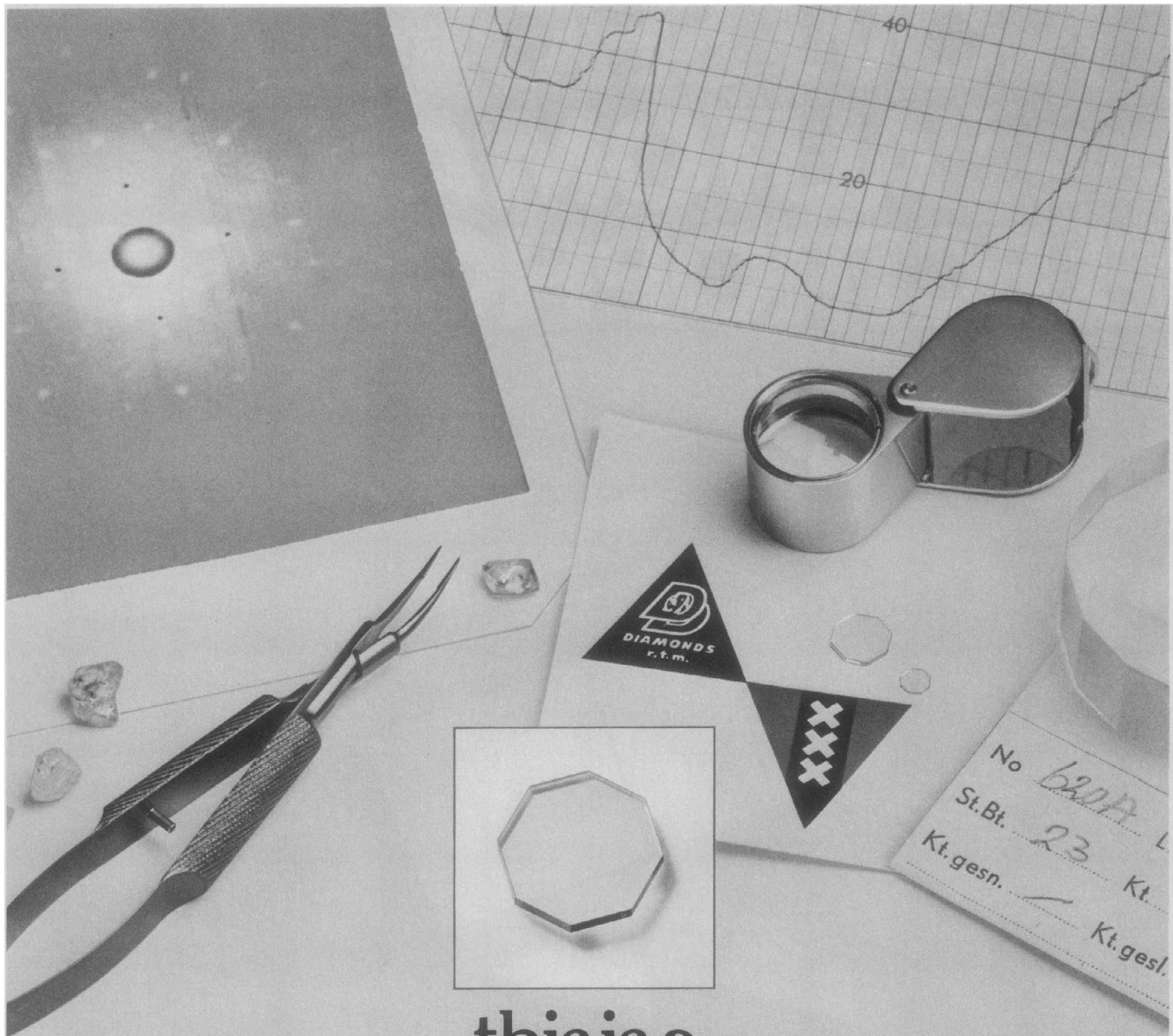
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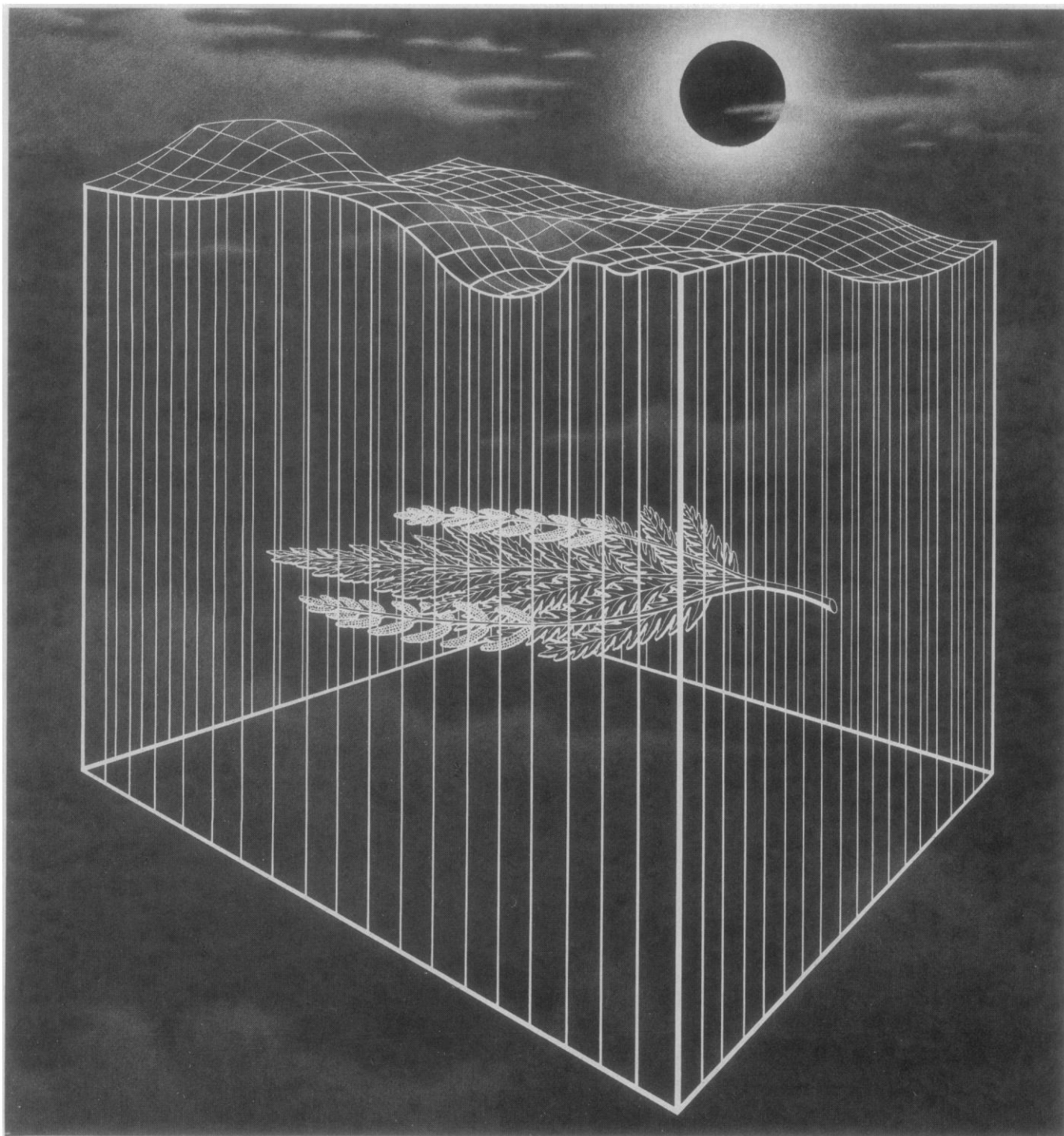
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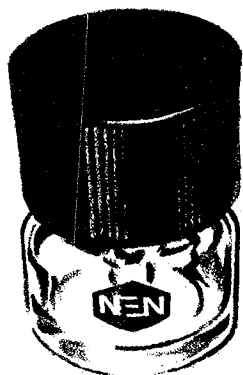
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# The Ventilated Animal Rack:

Some day soon most research animals, personnel, and research programs will be protected this way.\*

## What is a "Ventilated Animal Rack"?

It is a portable, totally enclosed animal rack with four separate, independent, isolated-from-each-other chambers. Low velocity air enters each chamber, makes a single pass over the cages, and is exhausted by negative pressure directly to the main exhaust system. This special rack (VR-1) most effectively isolates the animals from the animal room... and the research personnel from the animals.

## 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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\*Many of these systems are already installed in major research institutions... and conversion to these ventilated animal racks is accelerating.





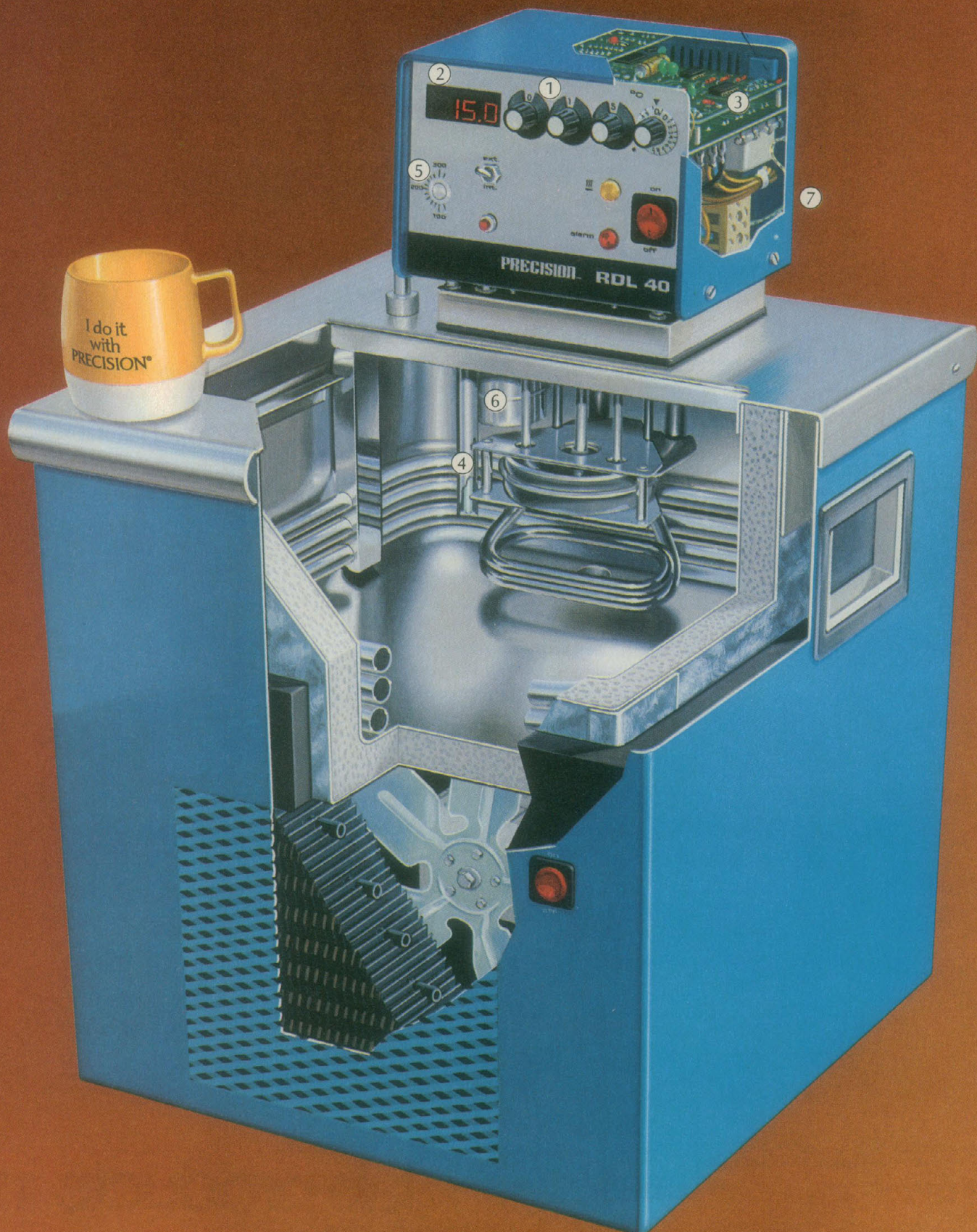
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# "When he grinned, I knew he was onto something. But what?"



"I was leading a seminar on fluorescence spectroscopy. My audience was small but represented some of the leading principal investigators in the country.

"After my presentation I invited questions. One researcher in attendance posed some very interesting ones.

"At first his questions were of a general nature: 'What's the fluorescence lifetime measurement capability of your SLM 4800 Spectrofluorometer?' 'How about fluorescence polarization?' Then they became more specific. And their delivery more rapid. His pauses between questions were punctuated by a contemplative tug on his left eyebrow.

"Our conversation—a quiz really—ended when I directed a specific question at him. A grin was his only response.

"Then I knew he was onto something. But what?

"After the meeting broke up, he cornered me and said he had more questions but would rather discuss them privately. With his colleagues present. In his lab.

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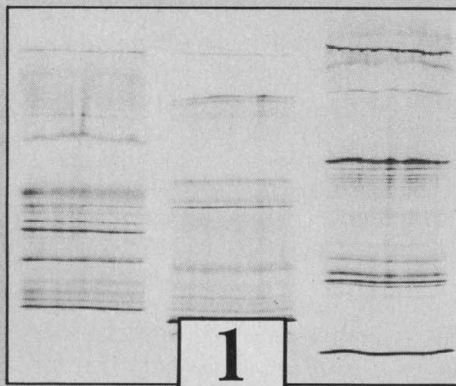
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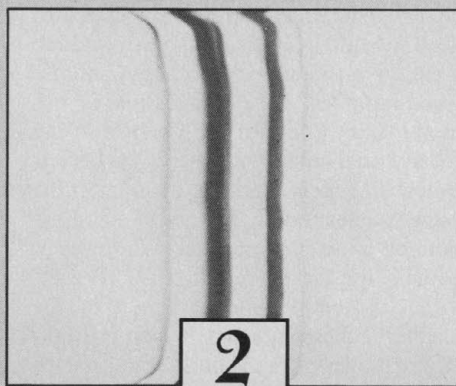
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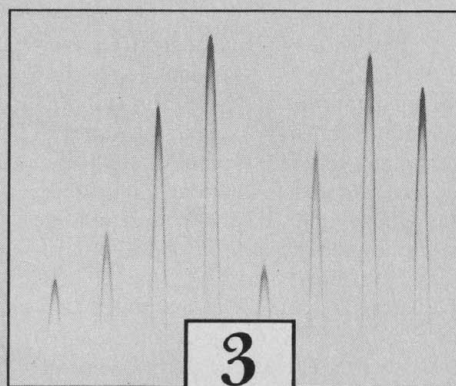
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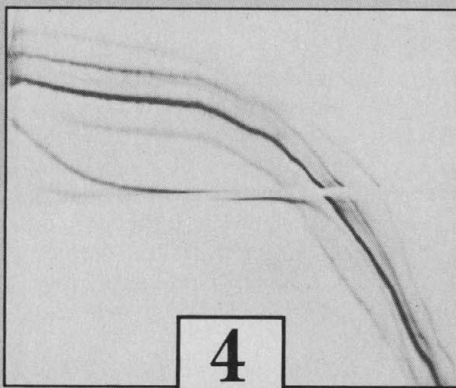
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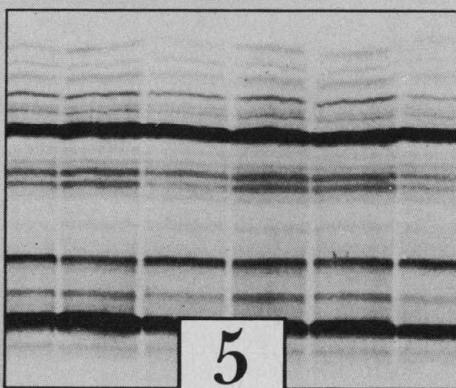
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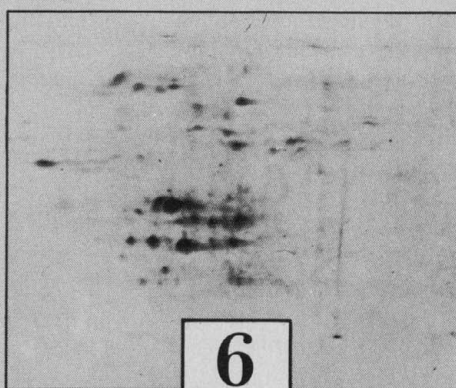
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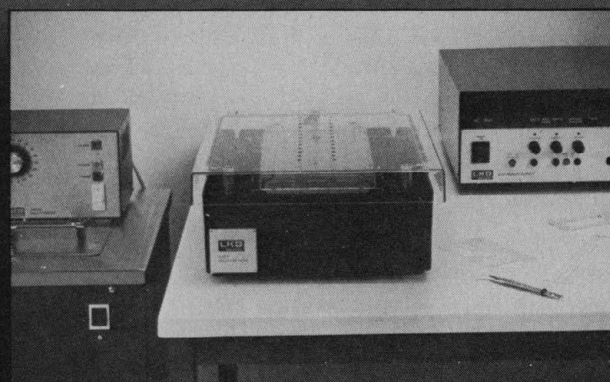
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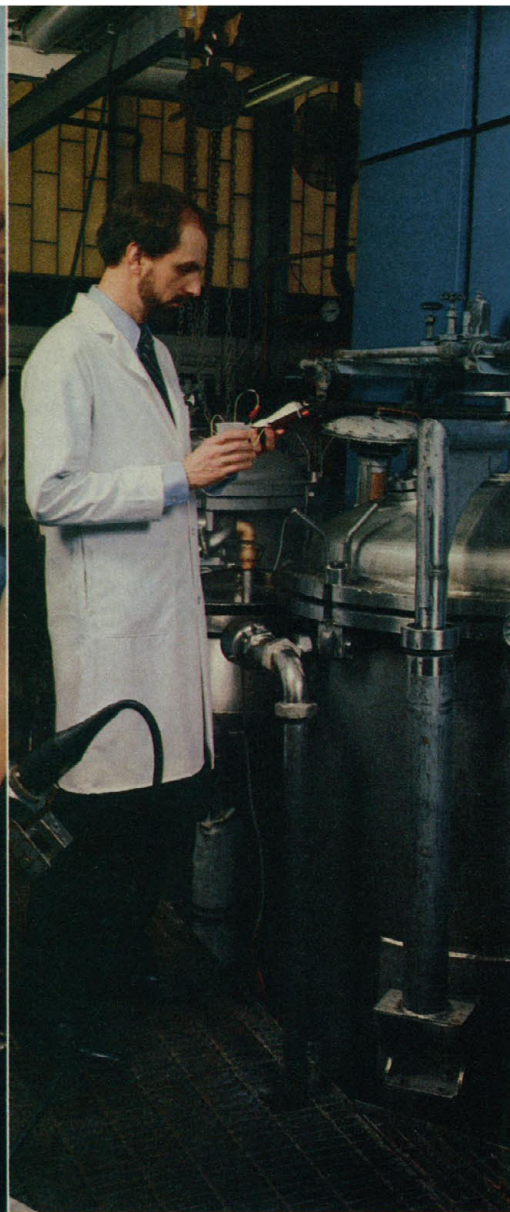
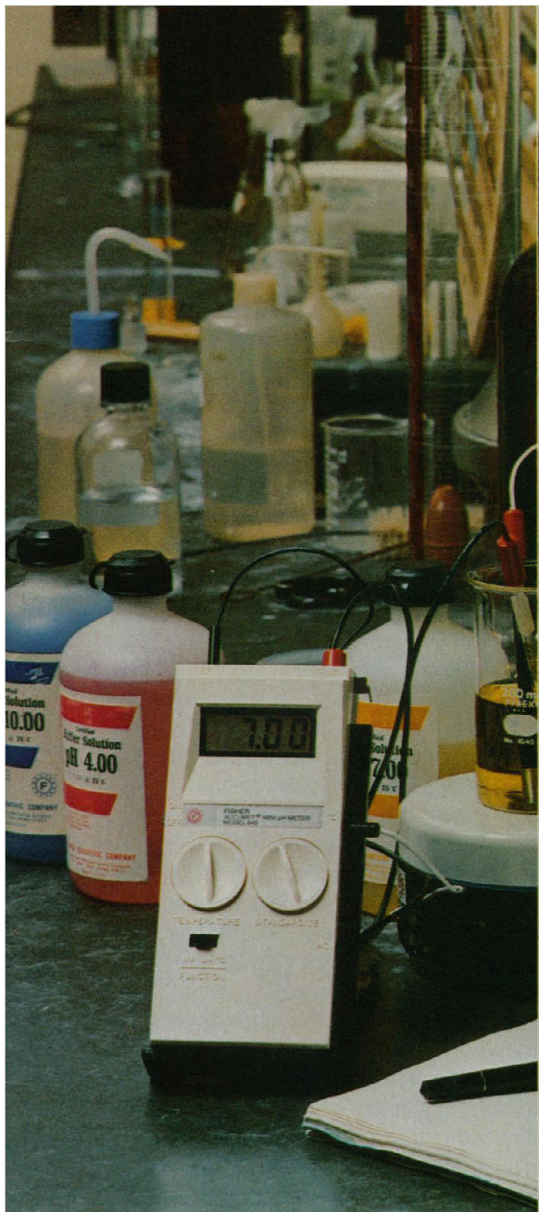


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## Improvement of Grain Crops

It was a sunny day in late March on a field of irrigated land located in the Sonora desert of northwest Mexico. The wheat stems were heavy with grain. They would be harvested in about 2 weeks. On closer examination, it was evident that the field of several hundred hectares was subdivided into thousands of experimental plots. Thousands of varieties of wheat were being tested, some for yield, others for resistance to disease.

This beautiful scene was viewed by an international group of visitors during Presentation Week at the Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT). This is the organization whose progenitors developed the wheats that played a major role in the Green Revolution. Today, CIMMYT is a nerve center of an international network of scientists located in more than 100 countries. When superior varieties of wheat are produced either in Mexico or elsewhere they are tested in as many as 250 locations around the world. When a new mutant form of a pathogen is detected within the cooperating countries, the news is spread and seed from resistant varieties is multiplied. The varieties of wheat being grown in Sonora represent only a small fraction of the germ plasm that is available. In reserve in wheat banks are more than 90,000 entries.

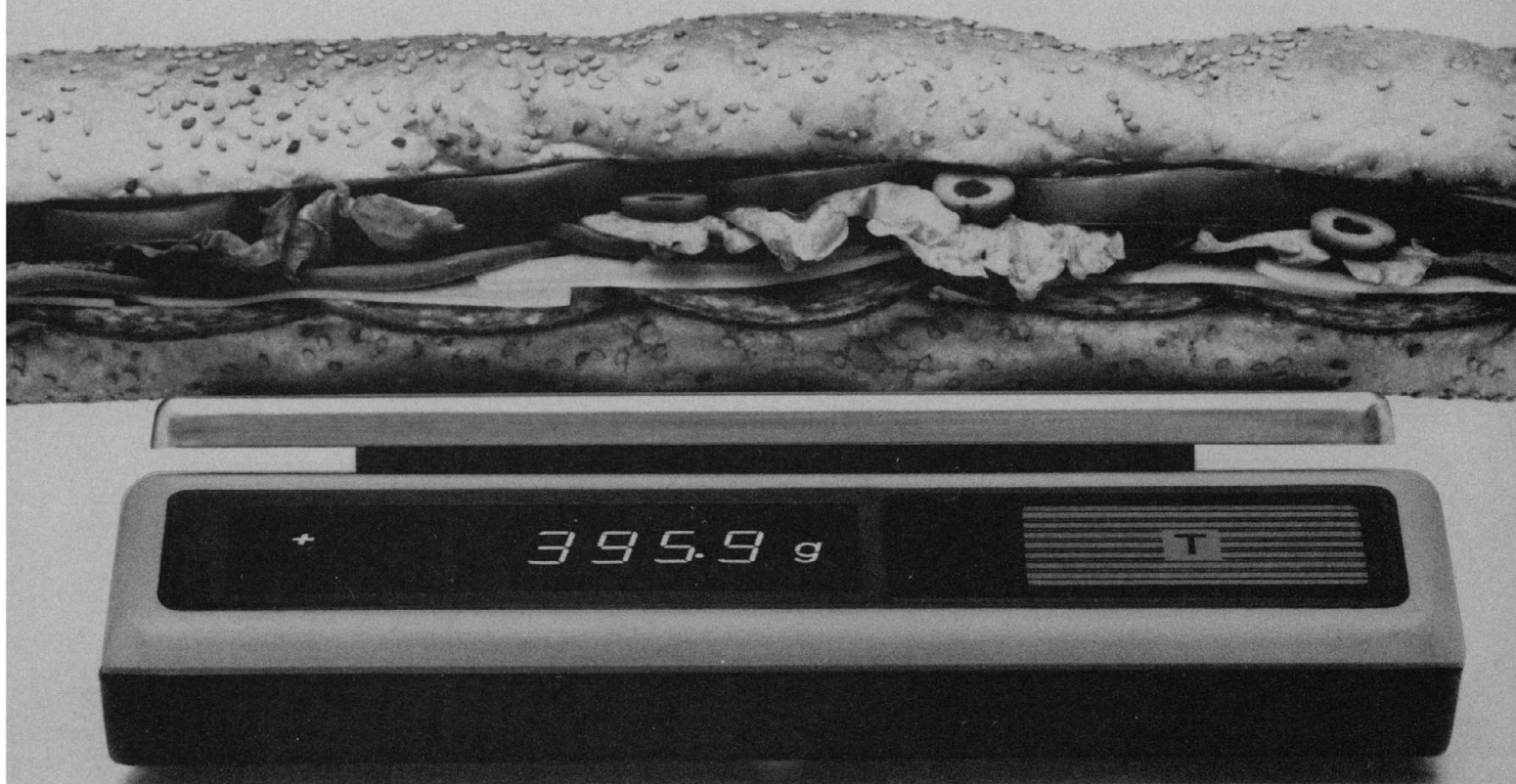
To facilitate its work, CIMMYT has several stations located in different climatic zones of Mexico. It is possible to expedite development of new lines of wheat by obtaining two harvests per year, one at Sonora and another in the highlands near Mexico City. The existence of stations in diverse environments also facilitates development of lines capable of thriving under comparatively adverse conditions.

Other programs designed to foster better yields from marginal lands include a form of genetic engineering. That is, wheat is being crossed with wild grasses that can grow under very unfavorable conditions, such as in seawater. Earlier, in Manitoba, a cross of rye and wheat was made, called triticale. Varieties of triticale now yield as well as or better than the best wheat and they can withstand a more harsh environment, such as the acid soils and aluminum toxicity of the lateritic soils of the Cerrado of Brazil. An intensive breeding and selection program is yielding varieties suited to this type of soil. The Cerrado includes 200 million hectares of land with adequate rainfall and tillable soil. In a decade the Cerrado will probably be producing significant quantities of grain. In addition, success in the Cerrado might speed development of other areas of the tropics where similar conditions prevail.

The maize program at CIMMYT is receiving an effort comparable to that devoted to wheat and triticale. Maize can be grown under a broader set of environmental conditions than wheat and it is particularly adapted to the tropics. Wild types have been growing in many parts of this hemisphere. More than 10,000 lines have been placed in maize banks. An intensive breeding program is creating higher yielding varieties. Norman Borlaug, the Nobel Laureate who has specialized in developing strains of wheat, believes that in 5 to 10 years production of maize will outstrip wheat production worldwide. Maize has the additional advantage of yielding about 50 percent more grain per hectare than wheat in many localities. A factor that may speed the adoption of maize is the development of a more nutritious variety. About a decade ago, the availability of a high-lysine, high-tryptophan line was announced. However, the plants then available were deficient in yield and disease resistance. Patient work over a decade at CIMMYT has led to varieties that are nutritionally balanced and also high yielding and disease resistant.

In addition to maintaining the basis for a response to threats of crop failure due to disease and to improving prospects for additional food, CIMMYT maintains a training program for agriculturists from many countries. Total annual cost of all these efforts is \$20 million, only a fraction of which comes from the U.S. government. Seldom has so modest a sum produced such significant results.—PHILIP H. ABELSON

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