

# SCIENCE

11 May 1973

Vol. 180, No. 4086

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Book Issue



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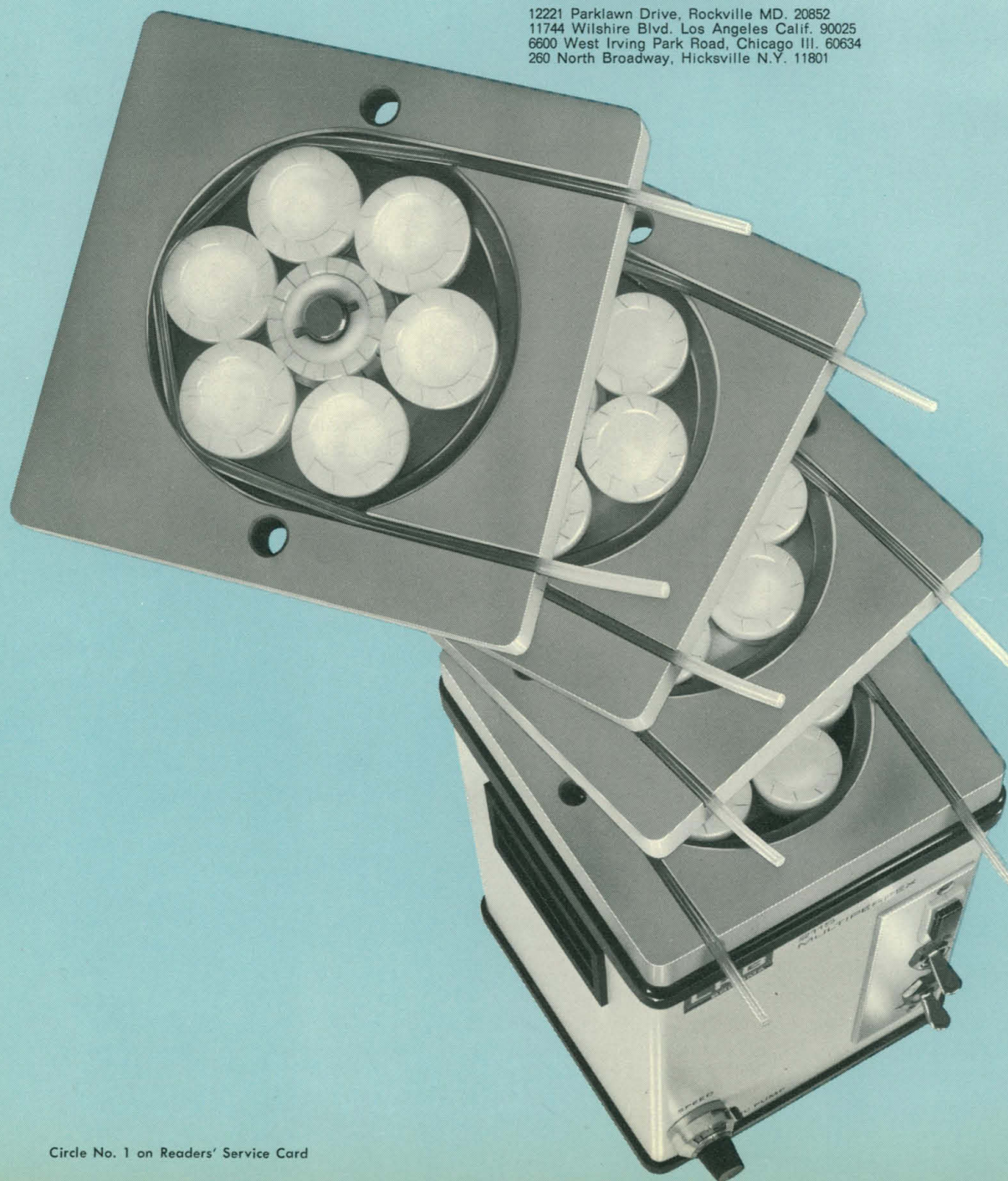
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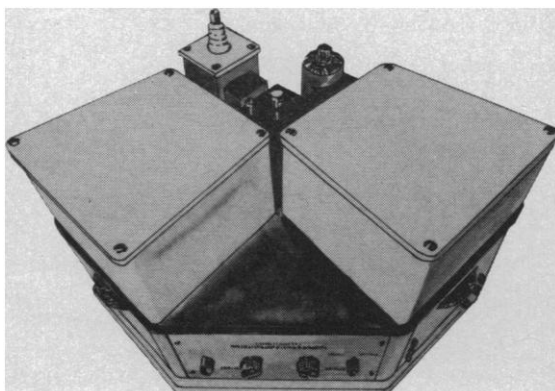
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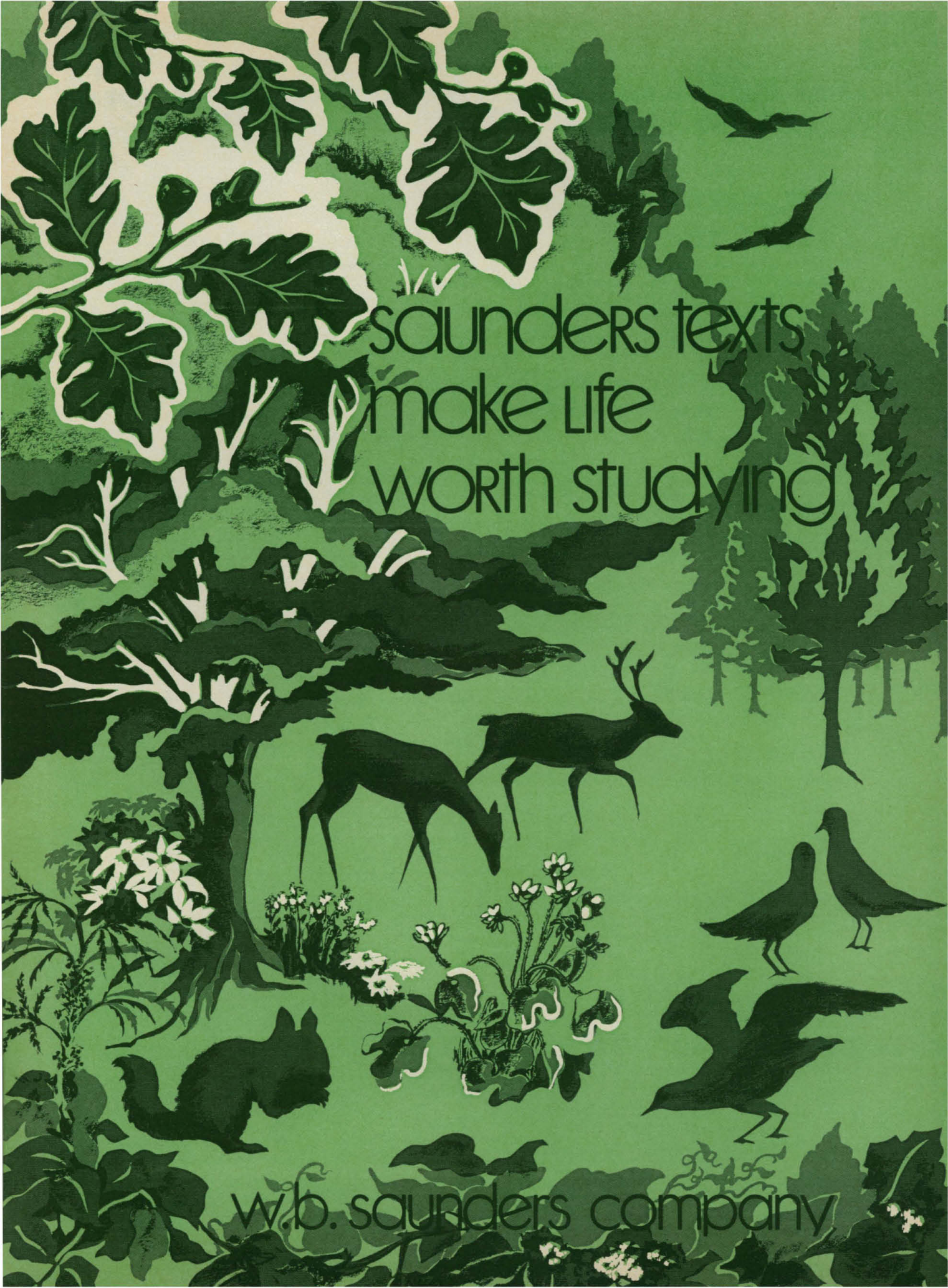
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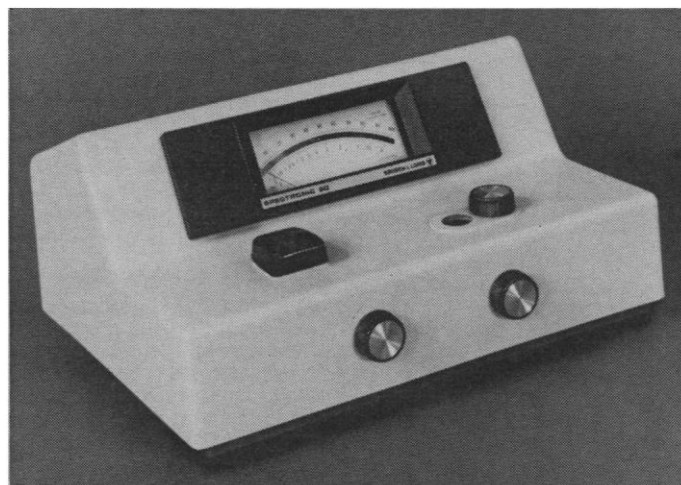
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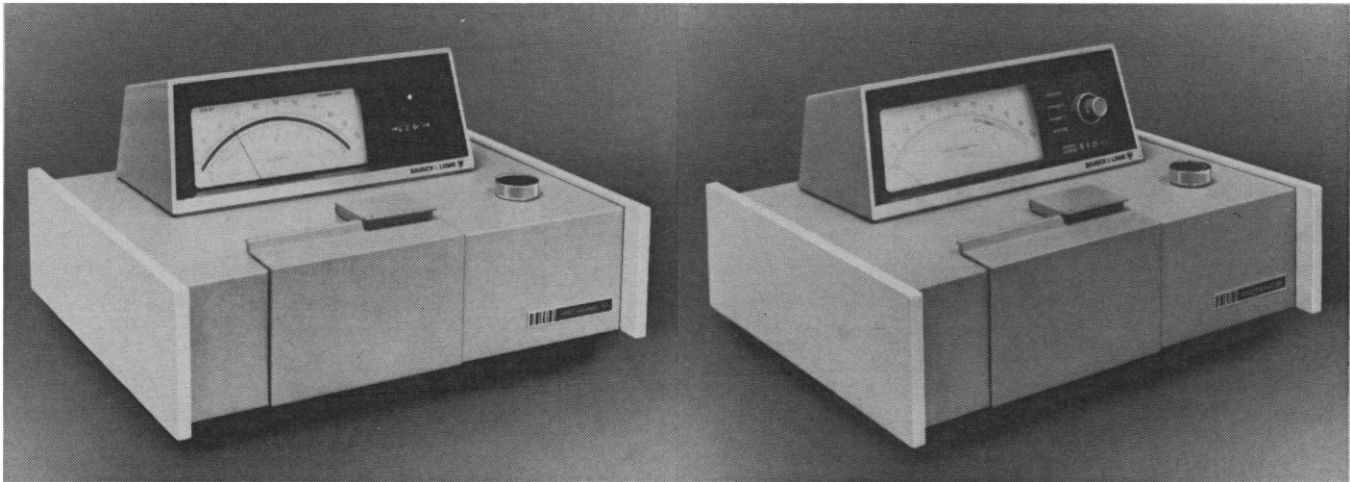
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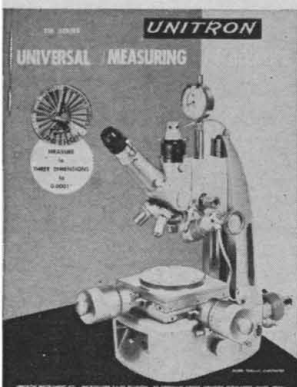
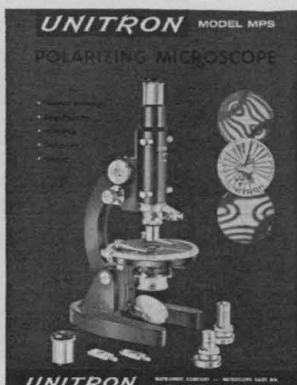
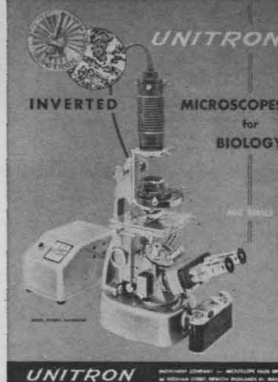
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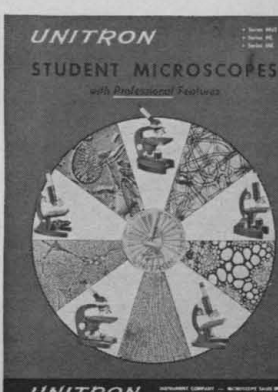
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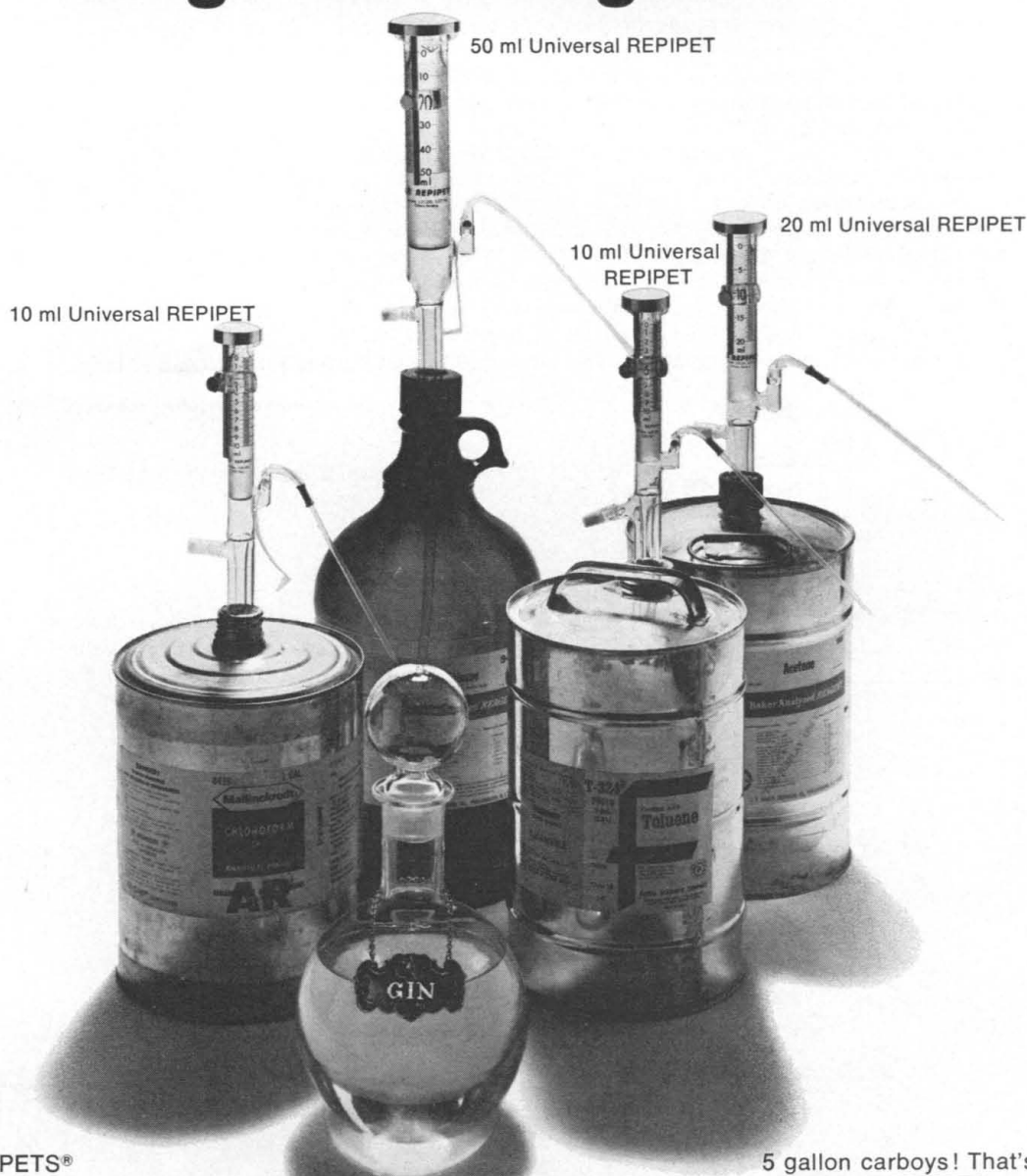
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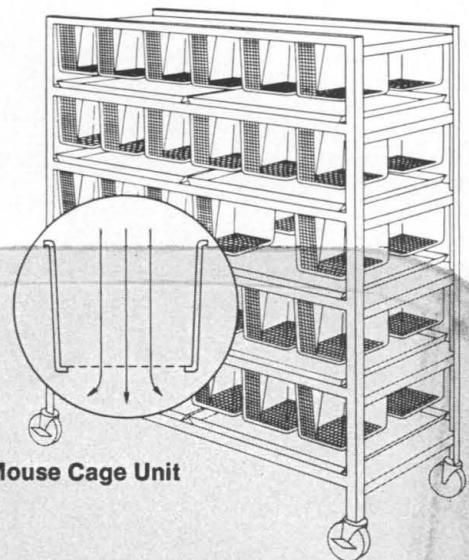
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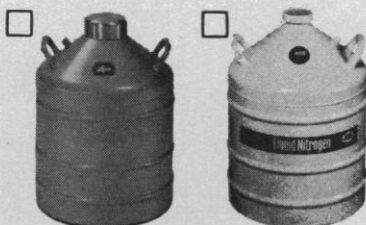
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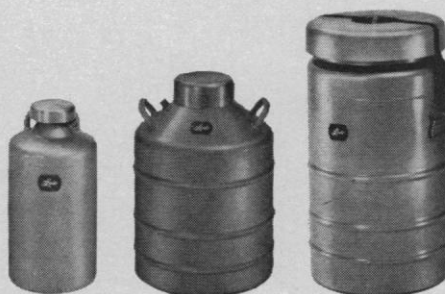
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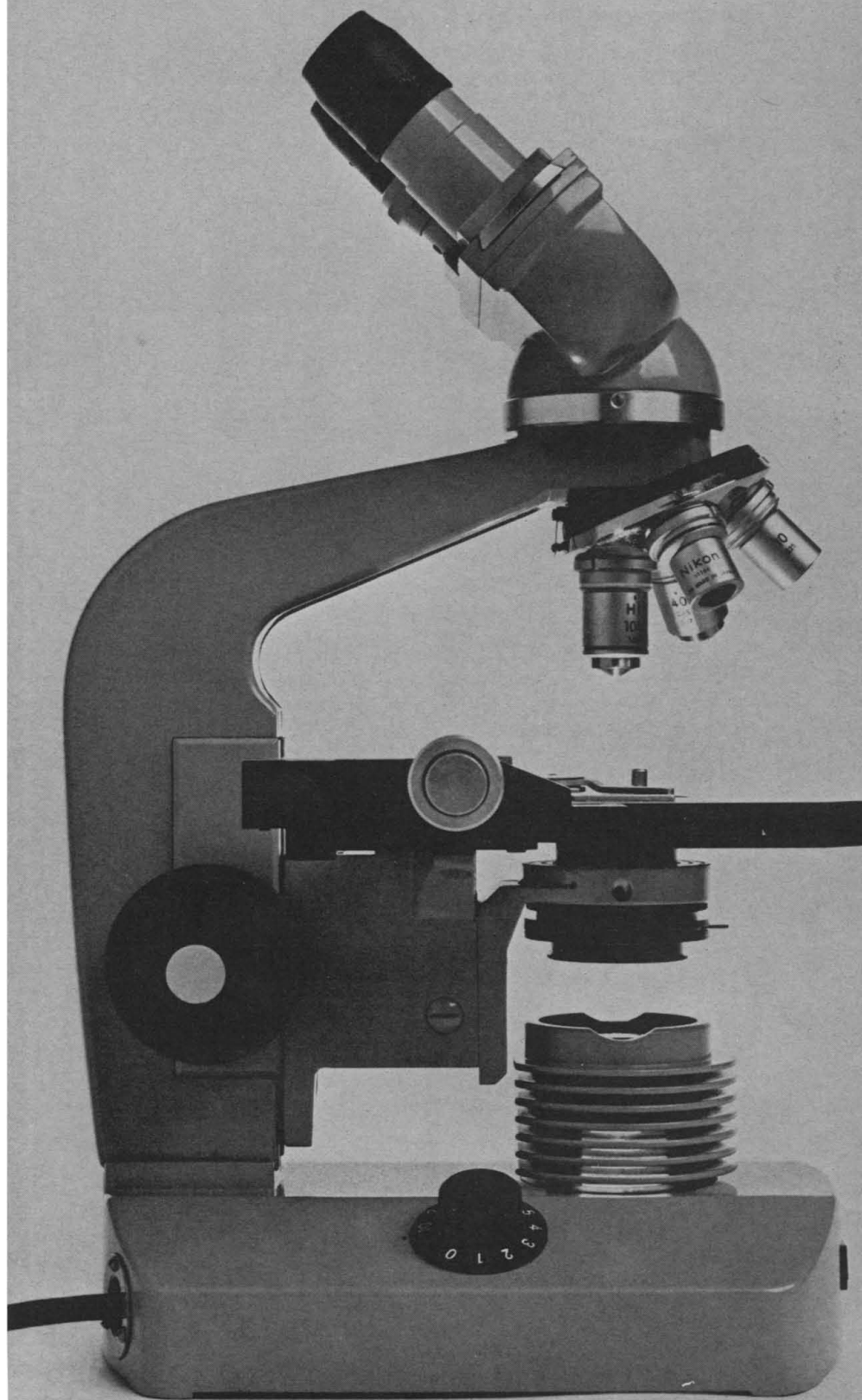


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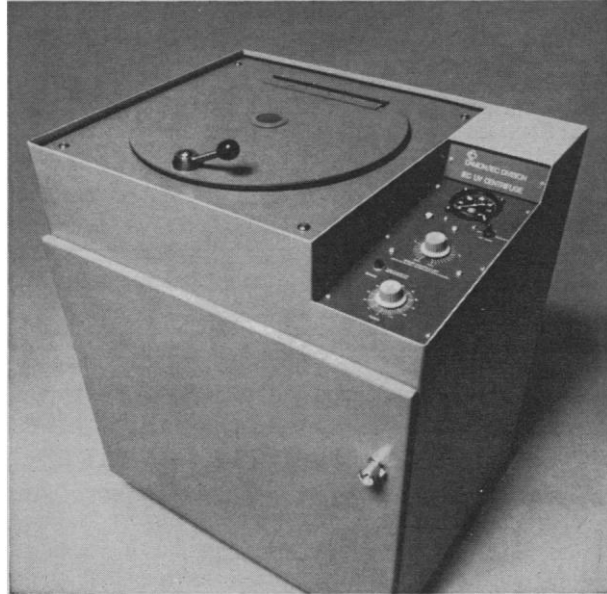
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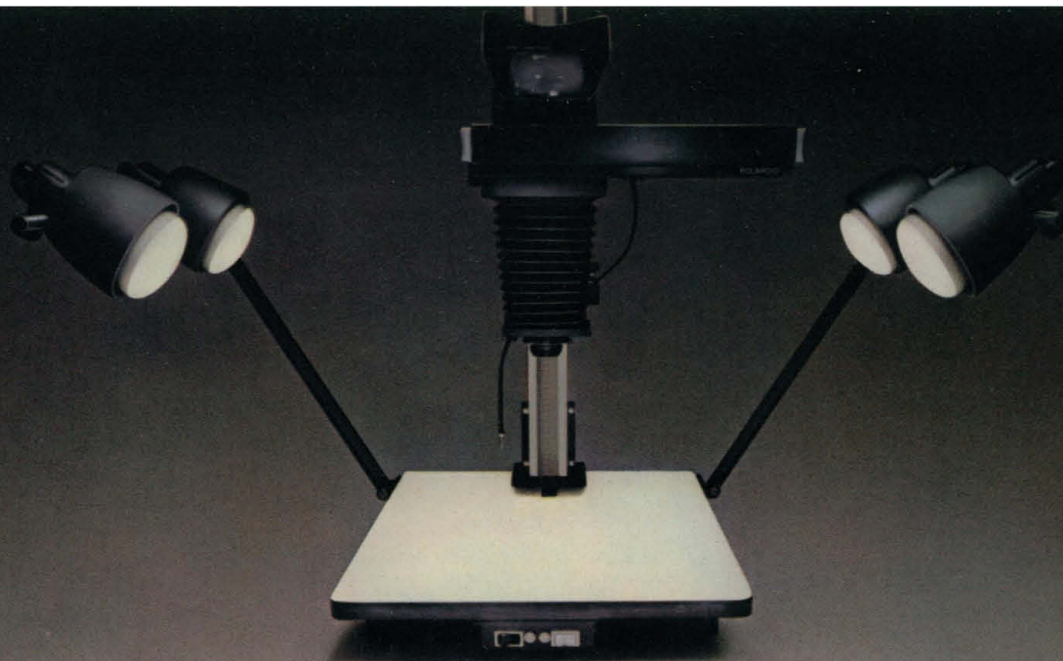


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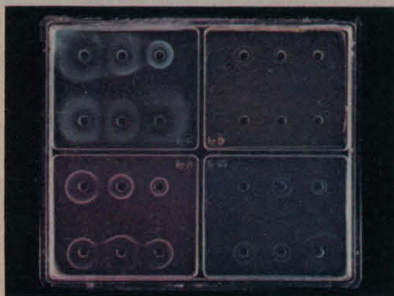
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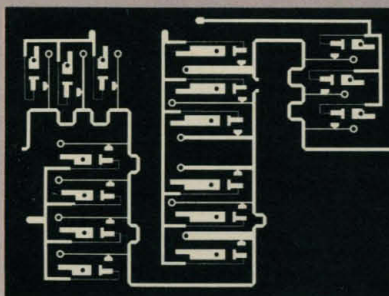
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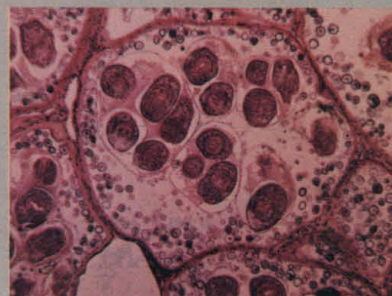
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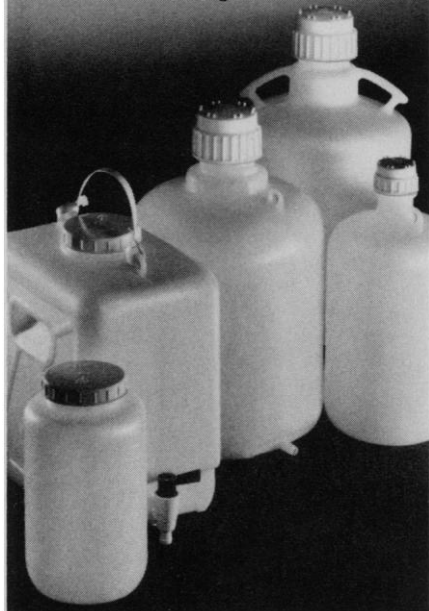


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## References

1. J. T. Salihi, *IEEE Spectrum* 9, 43 (1972).
2. Remarks by W. G. Meese on the new approach to R & D by the electric power industry; *IEEE Power Eng. Soc. Newsl.*, June 1972, p. 7.
3. E. J. Cairns and H. Shimotake, *Science* 164, 1347 (1969).

## Psychological Response to Tornadoes

Sims and Baumann (30 June 1972, p. 1386) attribute the remarkably high number of tornado deaths in the South to the psychology of the population. While human response to potential danger is always a factor in survival, Sims and Baumann do not prove that response is the controlling factor in the case of tornadoes.

The sizes of the samples that are compared, 33 people in the North and 24 in the South, are unacceptably small, and the populations, exclusively female with elementary education and unknown religion, are not representative of the regions. It can be argued that the "watch the sky" Alabama approach is more prudent than watching the news on television. Pertinent questions about available safe shelters, timely warnings, and response to actual tornado sightings were not asked. Also it has not been proven that tornado victims in Alabama died without seeking shelter. The conventional refuge place, the southwest corner of a building, has been shown *not to be* the best place to survive a tornado (1).

We disagree with the statement that "no easy generalization relating housing type to tornado casualties is possible." Mehta *et al.* (2) and Reynolds (3) have shown by means of damage surveys that tornado damage and deaths can be reduced markedly by tighter building codes that require the anchoring of houses to foundations and the use of mobile-home tie-downs. Fujita (4) did not find an inverse relation between damage and structural strength,

but rather showed that these are local inhomogeneities in the tornadic wind field. The effect of open windows and impact of flying objects (perhaps from substandard houses) should also be considered.

The statement that "the most accurate measure of a tornado's ferocity is the length of its path" is an oversimplification. Fujita and Pearson (5) consider also the path width and severity of damage, and Reed (6) has shown that the average area destroyed per tornado reaches a peak in the South that is 2 to 4 times higher in Alabama than in Illinois.

The significance of Skagg's work (7) on the diurnal distribution of tornadoes appears to have been missed by the authors. In the South there is an earlier primary maximum (12 noon, local standard time) and a much flatter frequency distribution than elsewhere. Hence, there is a greater chance in the South of a nocturnal tornado striking an unaware population. Furthermore, the tornado death index as defined and used by Sims and Baumann is in fact not an index because it is expressed in units of square miles.

While the authors' statistics bear on all tornadoes, only 1.5 percent of them account for 85 percent of the deaths (8). Perhaps an analysis of the frequency of "intense" tornadoes would reveal a higher frequency for the South.

ROBERT DAVIES-JONES

JOSEPH GOLDEN

JOSEPH SCHAEFER

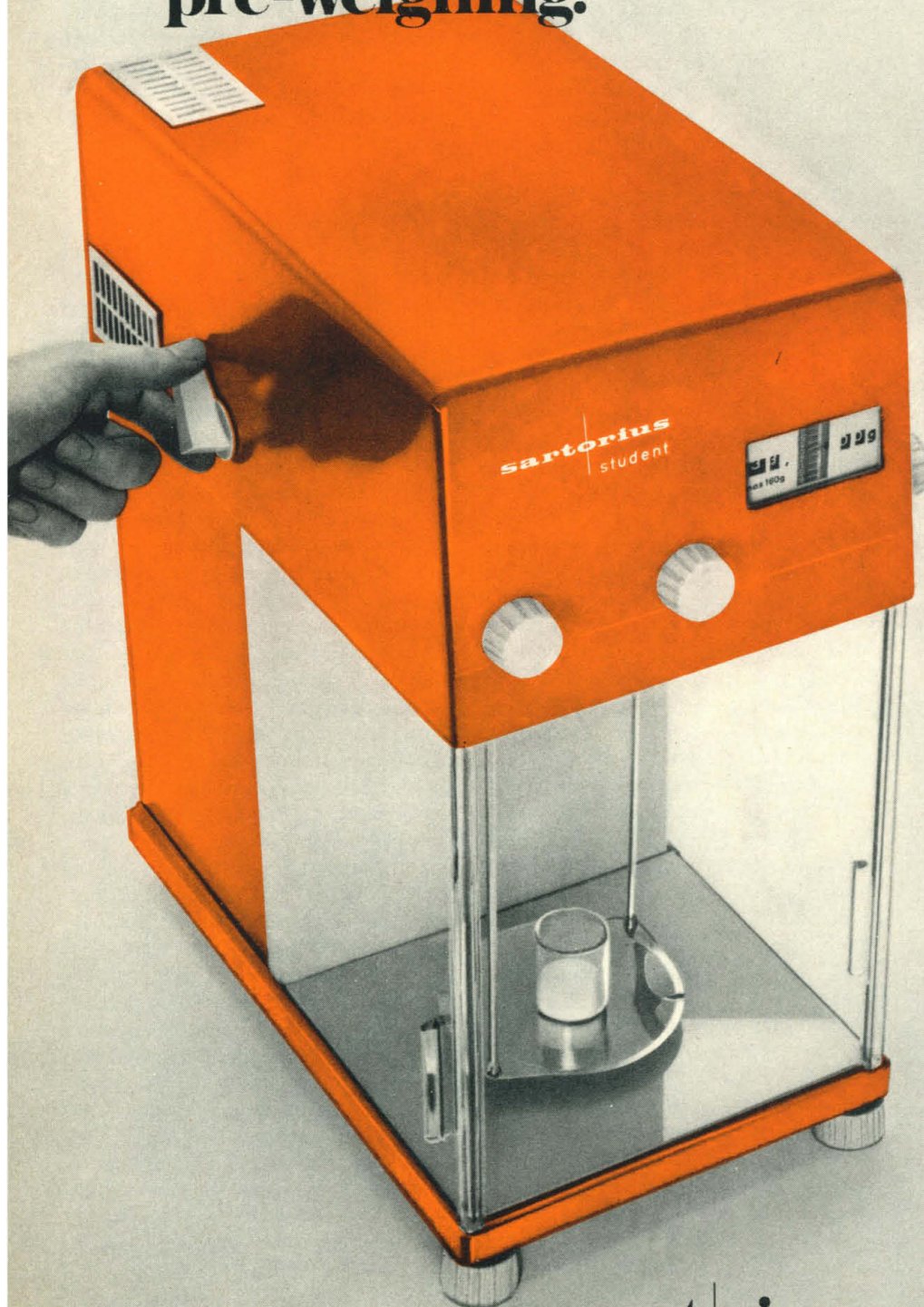
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Administration, 1616 Halley Avenue,  
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1. J. R. Eagleman, *Mon. Weather Rev.* 95, 370 (1967).
2. K. C. Mehta, J. R. McDonald, J. E. Miner, A. J. Sanger, *Response of Structural Systems to the Lubbock Storm* (Texas Tech University: Storms Research Report No. 3, Lubbock, 1971).
3. G. W. Reynolds, *Bull. Amer. Meteorol. Soc.* 39, 14 (1958); G. W. Reynolds, *Proceedings, Tornado Conference* (University of Wisconsin, Milwaukee, 1970); G. W. Reynolds, *Summary Report, Conference on Wind Loads and Structures* (California Institute of Technology, Pasadena, 1970).
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5. — and A. D. Pearson, *FPP Tornado Scale and Its Applications* (Satellite and Mesometeorology Research Project, Research Report No. 98, University of Chicago, Chicago, 1971).
6. J. W. Reed, *Preprints of the Seventh Conference on Severe Local Storms* (American Meteorological Society, Boston, Mass., 1971).
7. R. H. Skaggs, *Mon. Weather Rev.* 97, 103 (1967).
8. E. Kessler, *Bull. Amer. Meteorol. Soc.* 51, 926 (1970).
9. We wish to acknowledge Griffith Morgan for his contribution to this letter (Illinois State Water Survey, Urbana).



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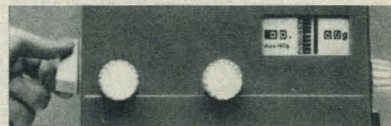
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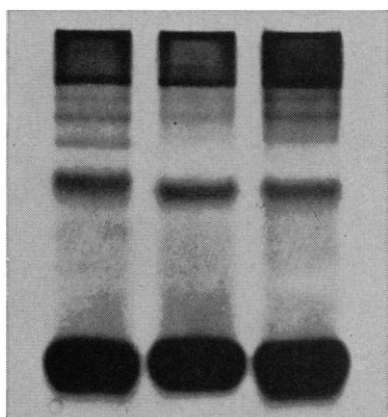
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Sims and Baumann attempt to explain "... the disproportionately higher frequency of tornado-caused deaths in the South" as a function of differences in psychological characteristics between Northerners and Southerners. The possibility that difference in construction of dwellings is an important causative factor was examined, but the authors concluded "... no easy generalization relating housing type to tornado casualties is possible." It should be noted that *above ground* differences in construction of dwellings were the only ones considered by Sims and Baumann.

In the more northerly portions of the United States, cellars (or basements) are common features of private and public structures. In addition to cellars which form integral parts of homes, nearby "root" or storm cellars can probably still be found in some rural areas of the North, although the ratio of storm cellars to people must be much less now than in earlier years. Underground sheltering areas of all kinds are much less common in the South.

In areas where cellars are abundant (the North), a tradition of "going to earth" when a tornado seems imminent has been long established. In my experience, it is understood by people without cellars that neighbors who have them will provide refuge if needed. If no study has been made of the relationship between availability of cellars and mortality from tornadoes, perhaps one should be made.

Sims and Baumann make the point that watching the sky around one's home instead of listening to broadcasts emanating from distant points may be "psychologically anachronistic." However, one may actually be able to assay immediate danger somewhat better. It could be argued that the former approach better demonstrates "the sense of being autonomous" than "the sense of being directed by outside forces."

RONALD H. PINE

*Division of Mammals,  
Mammal Identification Service,  
National Museum of Natural History,  
Smithsonian Institution,  
Washington, D.C. 20560*

Some of Sims and Baumann's conclusions presuppose that severe storm forecasting is equivalent for both the South and the Midwest. This is a very doubtful assumption. It is also questionable that communications are equivalent in the two regions.

It would, in particular, be unfortunate if use of "one's own senses" in lieu of "technology" would be considered a lack of sophistication. Even the best forecasts of severe storms, valid for hundreds of square miles, do not pinpoint tornadoes. Specific warnings usually have to be supplemented by actual sightings or radar observations when a tornado is either about to form or already in progress. Yet, as a professional meteorologist, I would not only personally rely on, but strongly advocate for others, the use of one's own senses. Sky aspect prior to the outbreak of severe storms or tornadoes is often so characteristic that from 20 to 60 minutes of warning time is locally available.

If elementary education included a bit of sky watching and the use of slides and movies of clouds, as well as some instruction on the dangers of lightning, many unnecessary weather deaths could be eliminated.

H. E. LANDSBERG

*Institute for Fluid Dynamics and  
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University of Maryland,  
College Park 20742*

The article by Sims and Baumann on cultural attitudes and tornado deaths presents the argument that a higher proportion of Southerners are killed by tornadoes because of an implied set of typically Southern characteristics: "Fatalism, passivity and ... lack of trust in and inattention to society's organized systems of warning..." Millions of Southerners are apparently thus classified on the basis of 24 individuals from 4 counties in Alabama.

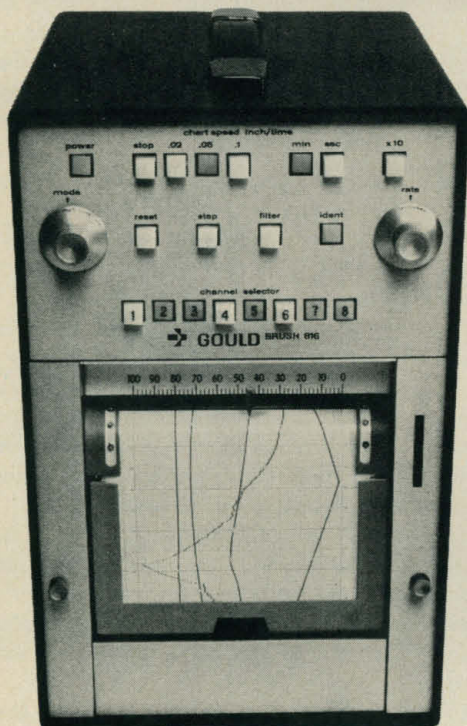
My thoughts go back to my childhood on a farm in Oklahoma. I wish Sims and Baumann could relive with me the experience of awakening at 2 a.m. to an incredible roar, running wildly for a storm cellar while parts of trees and clouds of dust swirl about your head, and finally sitting for part of the stormy night on a box in the damp cellar while fruit jars (and water moccasins) float about your feet. Fatalism? Passivity? Bunk!!

L. PEDERSEN

*Department of Chemistry,  
University of North Carolina,  
Chapel Hill 27514*

Davies-Jones, Golden, and Schaefer state that we "... attribute the remarkably high number of tornado deaths in the South to the psychology of the population." We do no such thing. In-

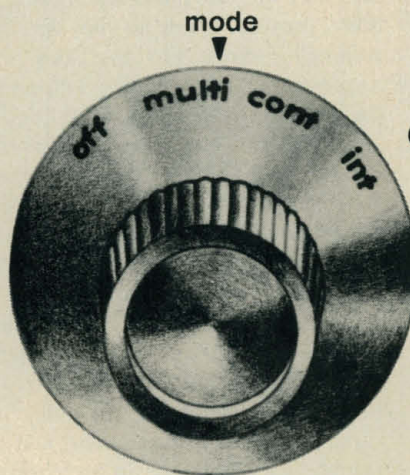
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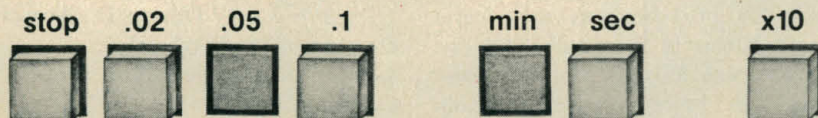


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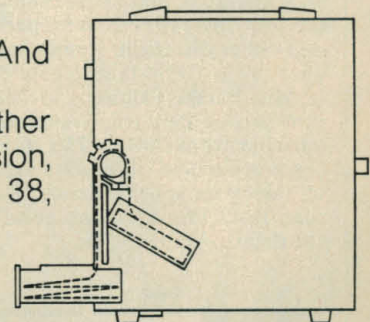
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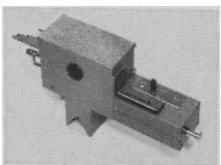
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deed, we carefully state that "... we are not, of course, arguing that the psychological dimension of internal-external locus of control is the sole, or even the primary, determinant of the tornado death rate. Almost certainly that phenomenon is a result of multi-various forces in combination, of which the sense of locus of control is but one." We then suggest that not only other *psychological* dimensions need exploration, but that "... traditionally considered factors, such as quality of housing and storm violence, need to be reexamined with more and better data." These statements were not ritualistic reservations; they were said because they were meant.

But if we insist upon being taken at our word, we pay these authors the same courtesy. Assuming the literature they cite is the "more and better data" needed to show that inferior housing and greater storm ferocity in the South are at work in determining the South's greater tornado death rate, we take it that they are *not* therefore arguing that this "proves" *them* to be the "controlling" factors, nor that this would disprove the *contributory* influence of the psychological factor we discuss. Our data remain, and as Davies-Jones, Golden, and Schaefer themselves avow: "... human response to potential danger is always a factor in survival."

We agree with Pine's main argument that there are more basements and root or storm cellars in the North (the implication being that fewer Southerners have an available refuge). But if so, isn't it important to ask why? Assuredly, climatic differences and corresponding differences in building costs would figure in determining the relative infrequency of basements as integral parts of homes in the South. But can such reasoning also account for fewer storm cellars? Were the once commonly found "cyclone" cellars in the rural North there because its farmers lived in a colder climate, were richer, or because they thought it would be a good idea to have a safe place to go to in case of a tornado?

Landsberg's letter rightly stresses both the diffusiveness of tornado forecasts and the usefulness of one's own senses in judging the local imminence of the danger. But we were not advocating the nonuse of one's ears and eyes, we were calling attention to the Southerners' seeming neglect of the benefits to be derived from their technological extension—the communications media.

The danger in exclusive reliance on one's own senses seems supported by Landsberg's argument that there is a need for proper education.

We fail to see the logic of Pedersen's argument. Are we to generalize to millions of Southerners both his parents' forethought in having a storm cellar and the good sense to use it? The point is that our Alabamians showed no inclination to join him in his uncomfortable but safe hole in the ground.

The considerable amount of mail we have personally received regarding this article comes in three kinds—complimentary, helpful (citing more references, suggesting other relevant variables, and so forth), and outraged. It is the strength of the anger expressed in these last which strengthens our conviction that the basic argument made in the article needs to be made again and again: the quality of man's interaction with nature is, in part, determined by forces within himself of which he is unaware. The fact that many find this thesis to be infuriating, repugnant, or humiliating is not new. In a lecture delivered in 1917, Freud, attempting to explain the antipathy to psychoanalysis, reviewed three blows to man's self-love: the realization that our earth was not the center of the universe, the realization that man was descended from the animal world, and finally, "... the third and most bitter blow from present-day psychological research which is endeavouring to prove to the 'ego' of each one of us that he is not even master in his own house" (1).

JOHN H. SIMS

Committee on Human Development,  
University of Chicago,  
Chicago, Illinois 60637

DUANE D. BAUMANN  
Department of Geography,  
Southern Illinois University,  
Carbondale 62901

## References

1. S. Freud, *A General Introduction to Psychoanalysis* (Washington Square Press, New York, 1966), p. 296.

## A Doctorate Earned

William D. Metz, in "Physics at a turning point?—Interview with Freeman Dyson" (Research News, 16 Mar., p. 1114) reports that "Freeman Dyson never earned a doctorate, but rose very rapidly. ..." The "never" clause is misleading, and the "but" should be "and."

Dyson was never *awarded* an earned doctorate, since he was obviously good enough that the incremental value to him of such credentials was trivial (or even negative). Dyson *earned* a doctorate many times, quite possibly more times than any other physical scientist in the generations since Debye, von Neumann, and Bethe.

ROBERT L. SPROULL  
University of Rochester,  
Rochester, New York 14627

### Computer Assisted Instruction

In his excellent editorial on computer assisted instruction (14 July 1972, p. 121), Philip Abelson says, "The new technology also seems to have good potential for off-campus instruction of adults." At Penn State we can endorse that notion with facts. For the past 26 months we have had a mobile CAI (computer assisted instruction) facility in the field, providing graduate level accredited courses to elementary school teachers and other educators, at convenient times and locations. Since December 1970 about 2500 Pennsylvania educators have taken the CAI course on early recognition of children's handicapping conditions (CARE I), at ten different locations. In addition, we have provided a "hands on" demonstration of quality CAI at three major conference sites, to a total of more than 15,000 persons.

We are encouraged by some favorable evidence on course achievement. Our students tell us that they very much enjoy this new method of updating and refurbishing their skills. In spite of the obvious success of CAI and the mobile delivery system for meeting the needs of teachers in an off-campus setting, it is proving difficult to expand and extend the service. The education enterprise, unlike business, is handicapped in responding to new technological opportunities, because it lacks experience in providing capital investments for necessary development and hardware costs of new programs. Government (state or federal) must play the role of "angel" for implementing the new computer technology in the service of better education, or we shall continue to experience overlong delays and stagnation.

HAROLD E. MITZEL  
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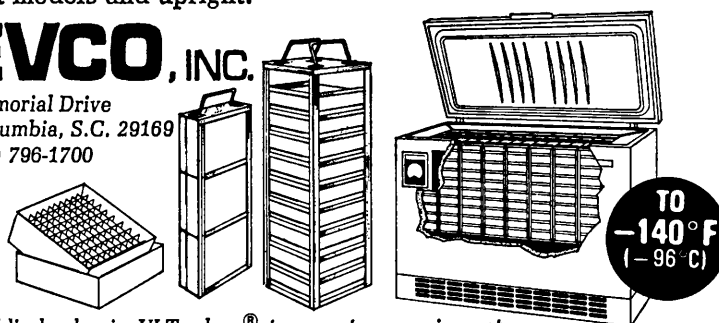
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## The Status of Intellectuals

The status of physicians and scientists in today's world is ambiguous. They share with other scholars, whom I shall collectively call "intellectuals," public suspicion of their motives, their usefulness, and their effect upon society. How do intellectuals fit into society? Into politics? What are the boundaries of their power in universities, and what are their rights and responsibilities in the public arena?

It is especially important to define how intellectuals fare in federal government, since it can no longer operate without their services. Involvement in government has taken varied forms, ranging from the highly exposed, as exemplified by John Gardner, to the cloaked Rand Corporation. When faced with particular problems, government has sought outside organizations of intellectuals, as when the Food and Drug Administration was charged by Congress with evaluating the efficiency and safety of drugs. Fortunately, the Food and Drug Administration turned to the National Academy of Sciences. This poses the question of whether government should mainly develop its own intellectual capabilities or seek such service outside. I favor the latter.

The problem, then, of how intellectuals fare in government has no simple answer. As a group they have no strong voice such as cabinet representation or political strength to influence important legislation concerning education, research, and medical practice.

Many intellectuals no longer willingly accept a passive role in government. But they eschew the aggressive patterns set by most labor union leaders, businessmen, and politicians, whose main goals often are political fame and power. With such different objectives and methods, how can they integrate into government? Should professionals be reorganized along conventional political lines, as is being suggested by the Federation of American Scientists? I fear the academic world would not accept this organization. But if intellectuals wish to maintain freedom and remain almost wholly disorganized, they must be prepared to accept the consequences.

The problem is so complex that I can only list a few suggestions on a very practical level to act as a nidus for penetrating thought and, even more important, for imagination.

1) Many problems of importance to intellectuals should be studied by such organizations as the National Institutes of Health, the Institute of Medicine, the National Academy of Sciences, the Association of American Medical Colleges, the American Medical Association, and the American Hospital Association.

2) Universities, clinics, group practices, and local medical societies should broaden their intellectual base.

3) The town-gown cleavage should be abolished, and the biomedical sciences and medicine should rejoin the universities to prevent even greater fragmentation of the intellectual's world.

4) Much stronger understanding than we now have should be forged between intellectuals and the world of business.

5) Intellectuals must avoid attitudes of superiority and snobbery as a cloak for inferiority while taking their rightful place in society. Anti-intellectualism should be combated not by confrontation, shows of violence, petulance, or unionization, but by counterposing organizations and strong individuals responsive to the needs of both intellectuals and the people.

6) The public and government must learn that intellectuals have an indispensable role in the affairs of man, nor should it be forgotten by intellectuals that this applies both ways.—IRVINE H. PAGE, *Editor*, *Modern Medicine*.

This editorial is adapted from I. H. Page, "The status of intellectuals and why," *Modern Medicine* (7 August 1972), pp. 41-43.



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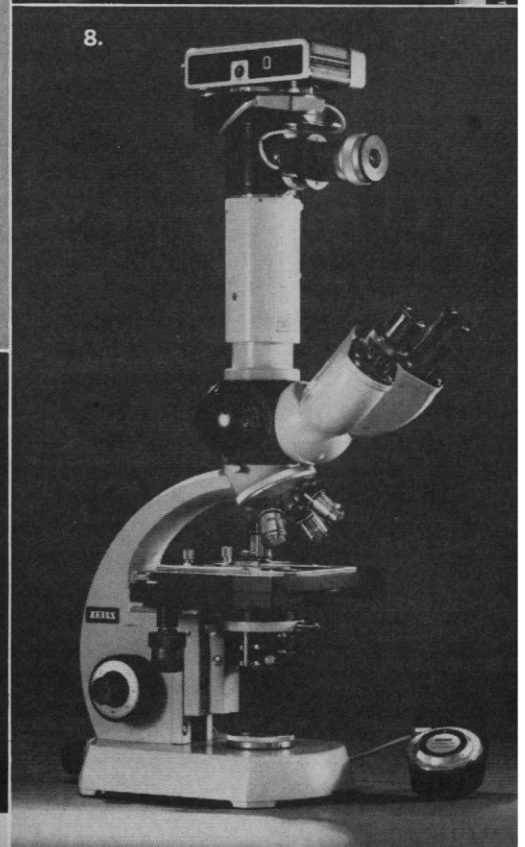
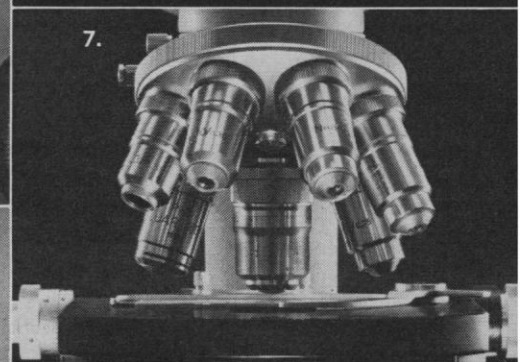
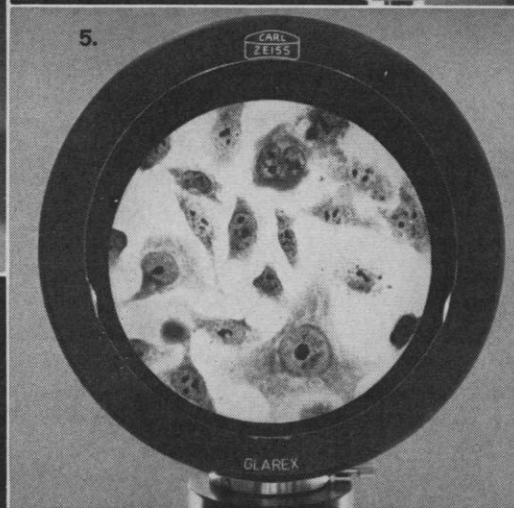
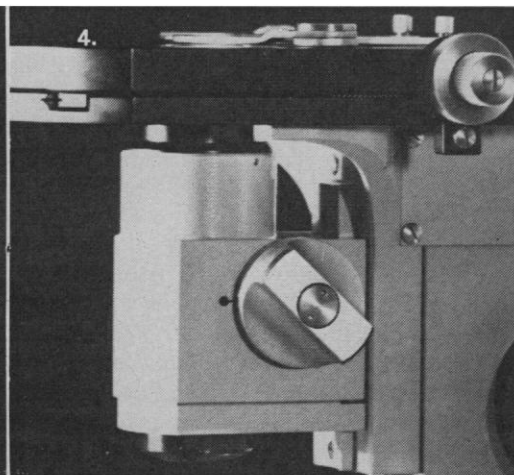
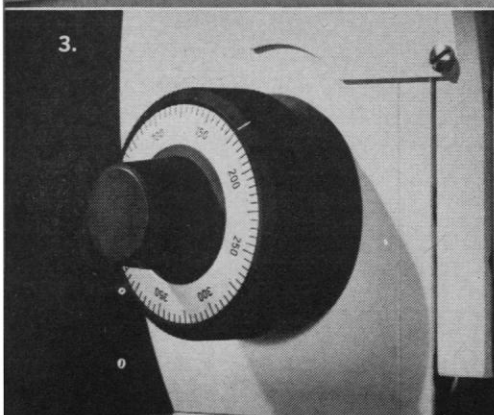
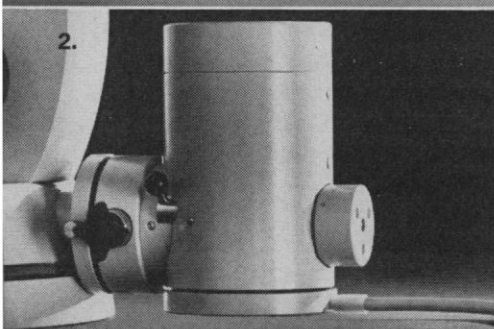
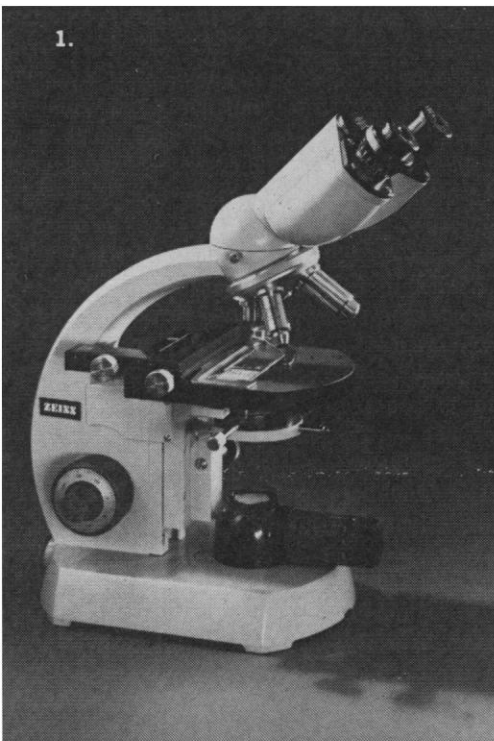
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# Registration and Travel Information—Mexico City

## *Important Information about Travel Arrangements*

This form goes to VIA CONVENTION PLANNERS, WASHINGTON, D. C.

### HELP US PLAN MEXICO CITY

To AAAS Members:

AAAS has appointed VIA CONVENTION PLANNERS as the Official Agent for the inter-American meeting in Mexico City (June 20-July 4, 1973). Together, AAAS and VIA plan to offer members a special service whereby you or your organization will save up to 50% in air fare costs to Mexico City.

The basic idea of the service is to combine the transportation purchasing power of everyone traveling to the meeting in such a way as to SAVE YOU OR YOUR ORGANIZATION \$120 in flying to and from Mexico City.

Following is a list of BASIC Travel dates, on which you can save as a participating member of a group, and spend a day or two longer in Mexico City before and/or after the meetings. Also listed are HOLIDAY travel dates, which allow a total of 12 days in Mexico with some of the time spent in Acapulco after the meetings.

#### BASIC TRAVEL DATES

Depart	Return	Depart	Return
June 19	June 24	June 23	July 1
June 19	July 1	June 23	July 5
June 19	July 5	June 28	July 5

#### HOLIDAY TRAVEL DATES

Depart	Return	Depart	Return
June 19	June 30	June 23	July 7
June 19	July 7	June 28	July 11

Should you choose to depart on any of the above dates, you will need to return to your departure city on the corresponding date of return shown, in order to take advantage of the Group fares. You may, however, choose to travel on dates not shown above; we will be happy to arrange such travel and hotel accommodations for you at the regular Excursion or Economy air fares available. Your costs for hotel accommodations would be the same whether you travel with a group or as an individual.

Following are the Group air fares available. Excursion and Economy air fares will be given on request.

CITY	BASIC AIR FARES (roundtrip Mexico City)	HOLIDAY AIR FARES (roundtrip, Mexico City with return from Acapulco)	CITY	BASIC AIR FARES (roundtrip, Mexico City)	HOLIDAY AIR FARES (roundtrip, Mexico City with return from Acapulco)
ATLANTA	\$149.48	\$163.48	KANSAS CITY	\$148.74	\$162.74
BANGOR	\$294.26	\$294.26	LOS ANGELES	\$153.74	\$167.74
BOSTON	\$215.74	\$215.74	LOUISVILLE	\$165.48	\$165.48
CEDAR RAPIDS	\$211.78	\$225.78	MIAMI	\$136.74	\$150.74
CHICAGO	\$164.74	\$178.74	NEW YORK	\$215.74	\$215.74
CINCINNATI	\$194.48	\$194.48	PHILADELPHIA	\$196.48	\$196.48
DALLAS	\$107.74	\$121.74	ST. LOUIS	\$149.48	\$163.48
DENVER	\$155.48	\$169.48	SAN FRANCISCO	\$180.48	\$180.48
DETROIT	\$194.48	\$194.48	SEATTLE	\$234.74	\$248.74
HOUSTON	\$ 79.74	\$ 93.74	TORONTO	\$195.74	\$195.74
INDIANAPOLIS	\$165.48	\$165.48	WASHINGTON, DC	\$195.74	\$195.74

**Important**—All of the above fares were quoted by the airlines involved and are subject to government approval and revision, however, we have extended every effort to quote the air fares which we believe will be in effect during the travel periods mentioned. All of the above fares are based on a group of fifteen passengers traveling together, roundtrip, however, VIA is responsible to form the group wherever applicable and you may join as an individual participant.

#### BASIC PLAN FEATURES

For your convenience, we have reserved a number of rooms in the hotels listed below for the duration of the meeting (June 19-July 5) and a lesser number for the period ending July 12. Although these hotels are usually grouped into three main categories, Deluxe, First Class and Tourist, we have further sub-divided them into Moderate classifications. Moderate hotels are generally older or not as centrally located, however, many are favorites of persons who have visited Mexico City in the past and are highly recommended by travel experts.

DELUXE	MODERATE DELUXE	FIRST CLASS	MODERATE FIRST CLASS	TOURIST
Camino Real	María Isabel	Holiday Inn	Hotel Reforma	J. Amazonas
Fiesta Palace	Hotel Alameda	(Zona Rosa)	Hotel Bamer	Hotel Francis
Aristos		Emporio	Hotel Del Prado	Hotel Metropol
		Kings Palace	Gran Hotel De La	Versailles
		Casablanca	Ciudad De Mexico	
			Majestic	



CATEGORY	TWIN ROOM, DAILY (per person)*	SINGLE ROOM, DAILY
Deluxe & Moderate Deluxe	\$17.50	\$29.30
First Class & Moderate First Class	\$ 9.20	\$17.30
Tourist	\$ 8.20	\$12.20

\* Triple rates on request

Features included in the BASIC PLAN (IT2AMYCT01)

- Roundtrip air transportation between the city of your choice and MEXICO CITY on the airfares shown for that city
- Hotel accommodations at the hotel of your choice at the rate shown
- Roundtrip transfers between airport and hotel in Mexico City and handling of two pieces of luggage per person
- Scheduled transfers (unlimited) between your hotel and the site of the meetings, CENTRO MEDICO and return
- Services of a travel escort for the duration of your visit
- Hospitality desk service at your hotel for the duration of your visit (for information about local events and facilities)
- Consultant services at the Centro Medico
- Reception at hotel for members during your stay
- List of participating persons from your departure city
- List of speakers for the Central Theme and/or Technical Symposium you will be attending (per your information on the accompanying reservation form)

### HOLIDAY PLAN FEATURES

The HOLIDAY PLAN hotels in Mexico are the same used in the BASIC PLAN, listed previously. The hotels in ACAPULCO are as follows:

DELUXE	FIRST CLASS	TOURIST
Holiday Inn	Hotel Maris	De Gante
Paraiso Marriott		El Cid
Elcano		
Condesa Del Mar		

Rates for the HOLIDAY PLAN differ according to the time spent in Mexico City and Acapulco, respectively. Generally speaking, Acapulco hotels are more expensive than hotels in Mexico City and longer periods in Acapulco will raise your costs.

#### DATE

Arrive Mexico City June 19  
Depart Mexico City June 24 (overnight in Taxco)  
Depart Acapulco June 30

Deluxe: Twin room, per person	\$270.15
Single accommodations	\$374.93
First Class: Twin room, per person	\$185.86
Single accommodations	\$255.88
Tourist: Twin room, per person	\$163.59
Single accommodations	\$185.95

Arrive Mexico City June 19  
Depart Mexico City July 1 (overnight in Taxco)  
Depart Acapulco July 7

Deluxe: Twin room, per person	\$397.70
Single accommodations	\$579.96
First Class: Twin room, per person	\$250.26
Single accommodations	\$376.98
Tourist: Twin room, per person	\$221.04
Single accommodations	\$296.76

#### DATE

Arrive Mexico City June 23  
Depart Mexico City July 1 (overnight in Taxco)  
Depart Acapulco July 7

Deluxe: Twin room, per person	\$322.70
Single accommodations	\$462.80
First Class: Twin room, per person	\$213.46
Single accommodations	\$307.78
Tourist: Twin room, per person	\$188.24
Single accommodations	\$247.96

Arrive Mexico City June 28  
Depart Mexico City July 5 (overnight in Taxco)  
Depart Acapulco July 11

Deluxe: Twin room, per person	\$305.20
Single accommodations	\$433.51
First Class: Twin room, per person	\$204.26
Single accommodations	\$290.48
Tourist: Twin room, per person	\$180.04
Single accommodations	\$235.76

Features included in the HOLIDAY PLAN (IT2AMYCT01—M)

- All features in Mexico City as outlined in BASIC PLAN, plus
- Roundtrip air transportation from the city of your choice to Mexico City and return from Acapulco
- Deluxe Motorcoach transportation between Mexico City and Taxco (overnight in Taxco) and between Taxco and Acapulco
- Transfer between hotel in Acapulco and airport for your return flight
- Hotel accommodations of your choice in Mexico City and Acapulco in one of the hotels listed in each city and overnight accommodations in Taxco at a similar hotel
- Three meals in Taxco and breakfast and lunch or dinner in Acapulco for the duration of your stay in that city
- Reception at hotel in Acapulco during your stay

Not included in either Basic or Holiday Plan are items of a personal nature, i.e., telephone and cable charges, room services, valet service, gratuities to hotel personnel and any other item not mentioned in the included features of each plan.

For returning this form to VIA immediately we will guarantee you first option on air transportation and hotel accommodations. All reservations will be confirmed on a first-come, first-served basis.

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# PRODUCTS and MATERIALS

## Ultraviolet-Visible Spectrophotometer

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square cover glasses. The system includes a quartz viewing window with its own light source, a pressure gauge (0 to 3000 pounds per square inch), a rupture disk in the manifold, and a 1200-milliliter heating beaker. Ivan Sorvall, Inc. Circle No. 142 on Readers' Service Card.

## Modular Microscope System

In the Axiomat system, the axis of symmetry of the instrument coincides with the optical axis. This return to the oldest of concepts of microscope design provides unusual mechanical stability. The construction also allows better insulation for sources of illumination, thus increasing the thermal stability of the system. The system con-

sists of five modules: stage, objective, observation, camera, and illumination. The modules can be arranged in several fashions for various applications; this includes inverting them to increase the number of configurations (Fig. 1). The camera module includes provision for both 35-millimeter and 4 by 5 inch photographs, and cinemicrography can be effected through a port in the observation module. Other features of the observation module include a 4 to 1 zoom system which, in conjunction with the objectives, gives a range of magnification with no gaps from 1 power to the limits of light microscopy. There are also three beam splitters. The instrument is parfocal among all image planes, cameras, photometer, and observation tubes. The field of view is wide and numerical apertures are as high as 1.6. Infrared and ultraviolet illumination may be used simultaneously. There are many accessories available for adaptation to different techniques; they are inserted in the light path as cassettes at appropriate spots. Brightfield, darkfield, and phase-contrast microscopy, polarography, the use of transmitted or reflected light, and many other techniques are possible with the Axiomat. Carl Zeiss, Inc. Circle No. 141 on Readers' Service Card.

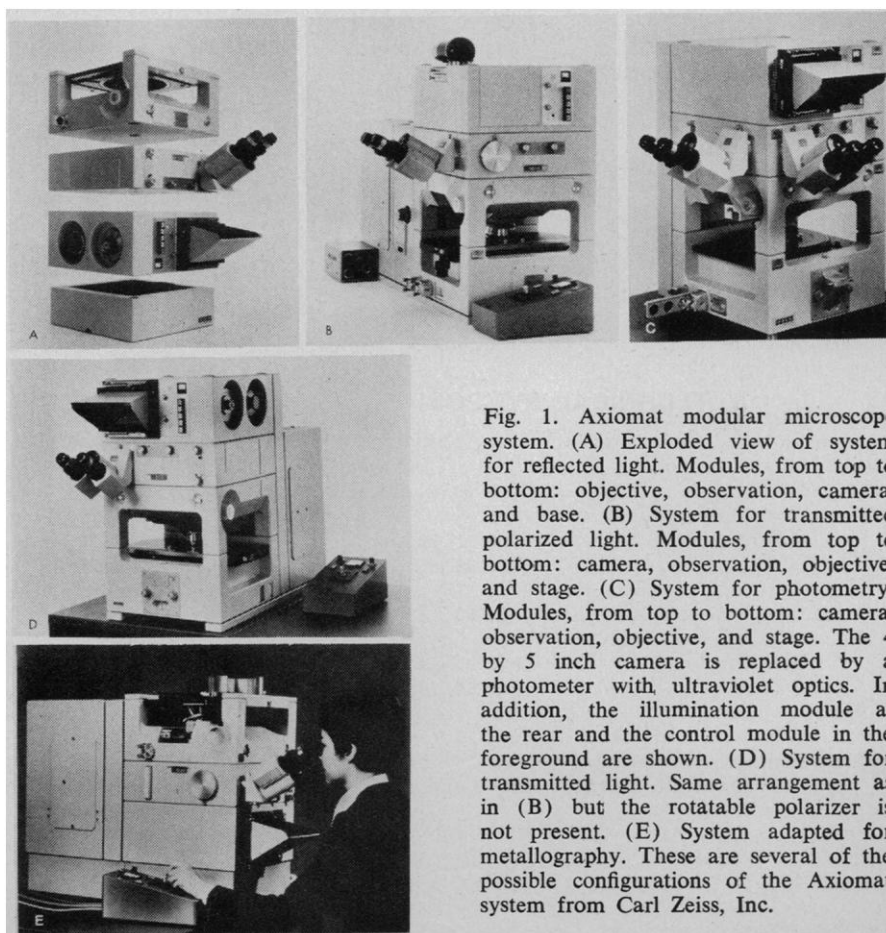
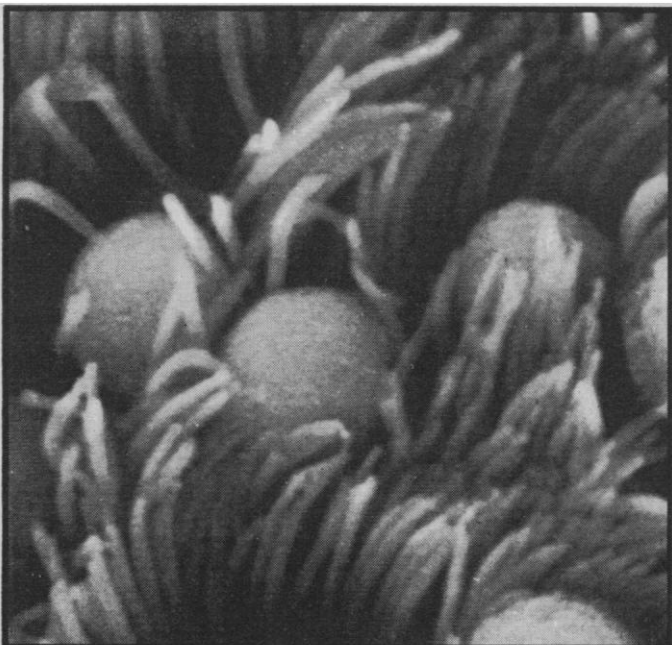


Fig. 1. Axiomat modular microscope system. (A) Exploded view of system for reflected light. Modules, from top to bottom: objective, observation, camera, and base. (B) System for transmitted polarized light. Modules, from top to bottom: camera, observation, objective, and stage. (C) System for photometry. Modules, from top to bottom: camera, observation, objective, and stage. The 4 by 5 inch camera is replaced by a photometer with ultraviolet optics. In addition, the illumination module at the rear and the control module in the foreground are shown. (D) System for transmitted light. Same arrangement as in (B) but the rotatable polarizer is not present. (E) System adapted for metallography. These are several of the possible configurations of the Axiomat system from Carl Zeiss, Inc.

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Readers' Service Card (see pages 542A and 654C) and placing it in the mailbox. Postage is free.—Richard G. Sommer

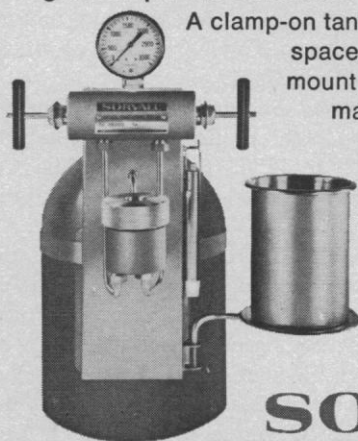




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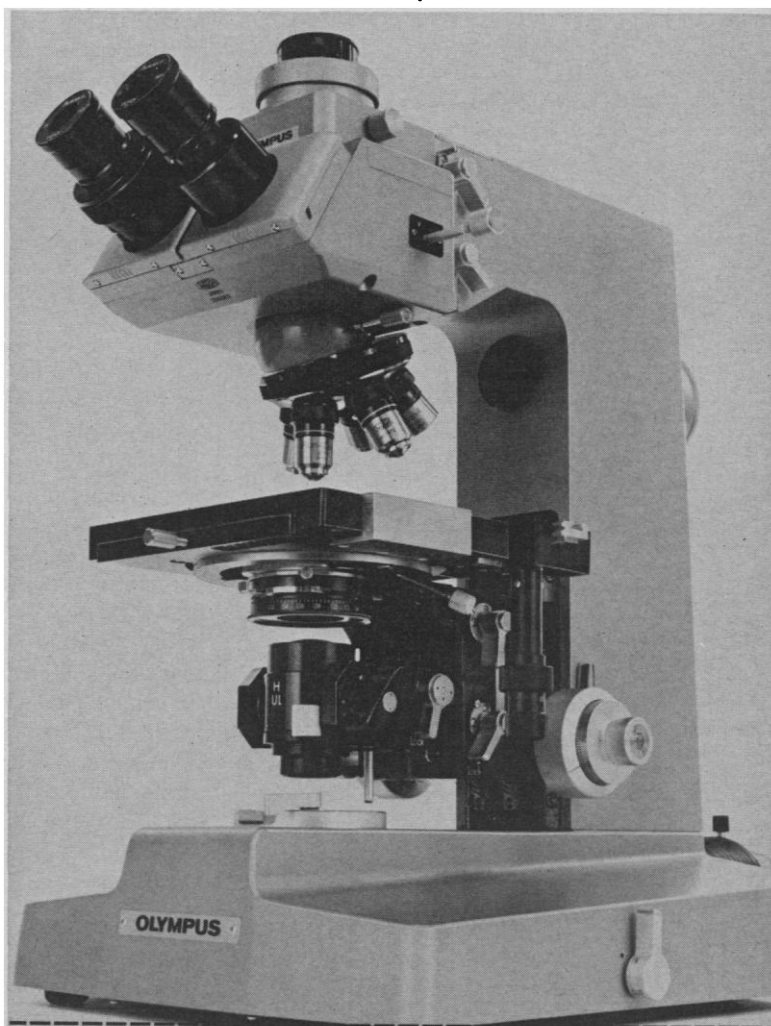
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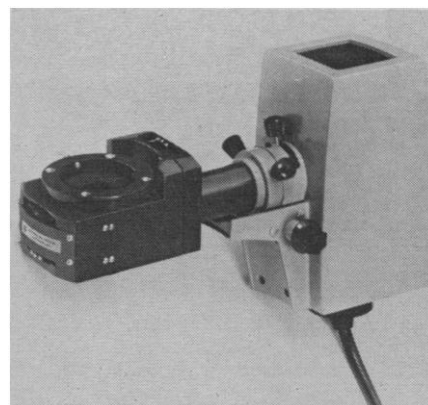


Fig. 2. American Optical 2070C vertical illuminator is constructed to present no problems of alignment and to offer full numerical aperture and full-field coverage. Dial settings on filter and dichroic may be identified by touch with the half-relief beads.

the longer wavelength fluorescence emitted from the specimen is transmitted to a barrier filter. The light source is a mercury vapor lamp enclosed in a cool, light-tight housing. The exciter, dichroic, and barrier filters are turret mounted and the dials on the filter and dichroic permit identification by touch. The illuminator features full numerical field aperture for excitation and viewing and full-field coverage even with a 10-power objective and a 10-power wide-field eyepiece. American Optical Corporation. Circle No. 144 on Readers' Service Card.

## Literature

*Instruments for Chemical and Biochemical Research.* This is a 56-page general catalog. Instrumentation Specialties Co. Circle No. 146 on Readers' Service Card.

*1973 Bolex 16-Millimeter Product Buying Guide* describes cameras and optional accessories to comprise combinations of cameras, lenses, and motors. Paillard, Inc. Circle No. 147 on Readers' Service Card.

*Certified Buffers* catalogs a line of buffers, each certified to be accurate to  $\pm 0.02$  at 25°C. Fisher Scientific Co. Circle No. 149 on Readers' Service Card.

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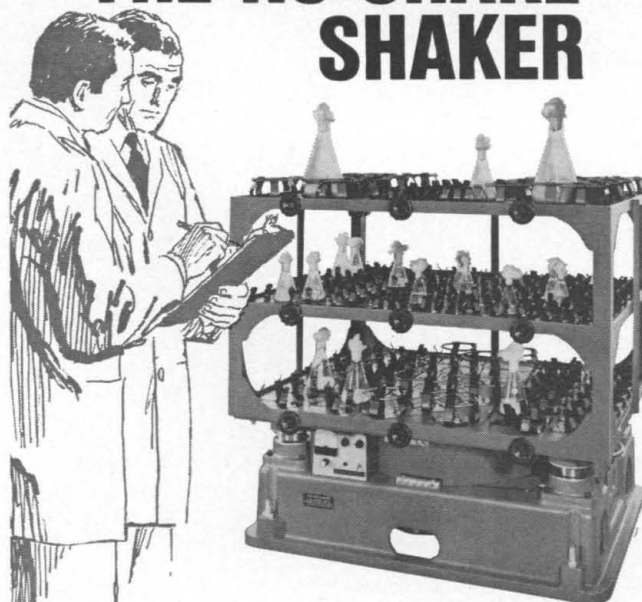
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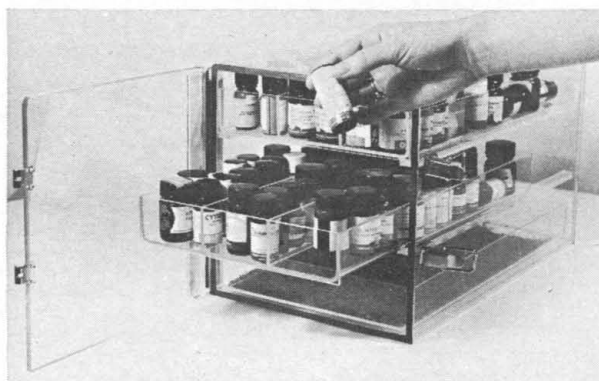
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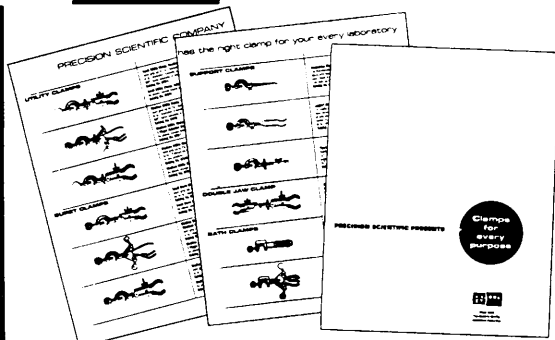
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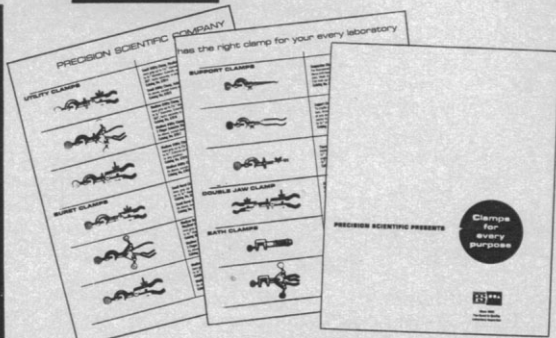
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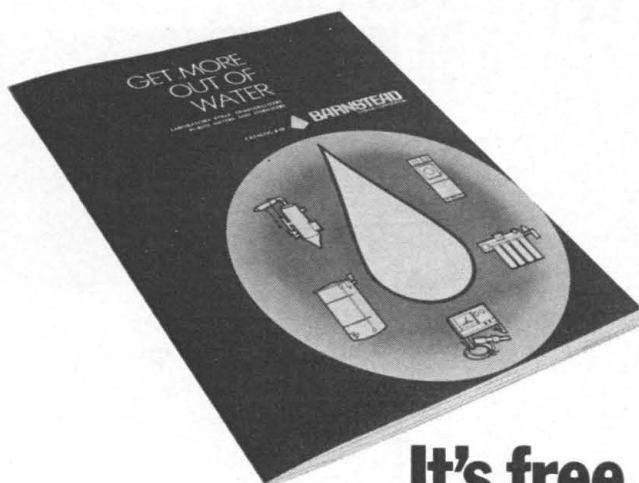
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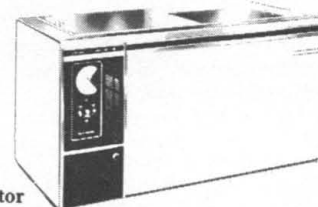
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