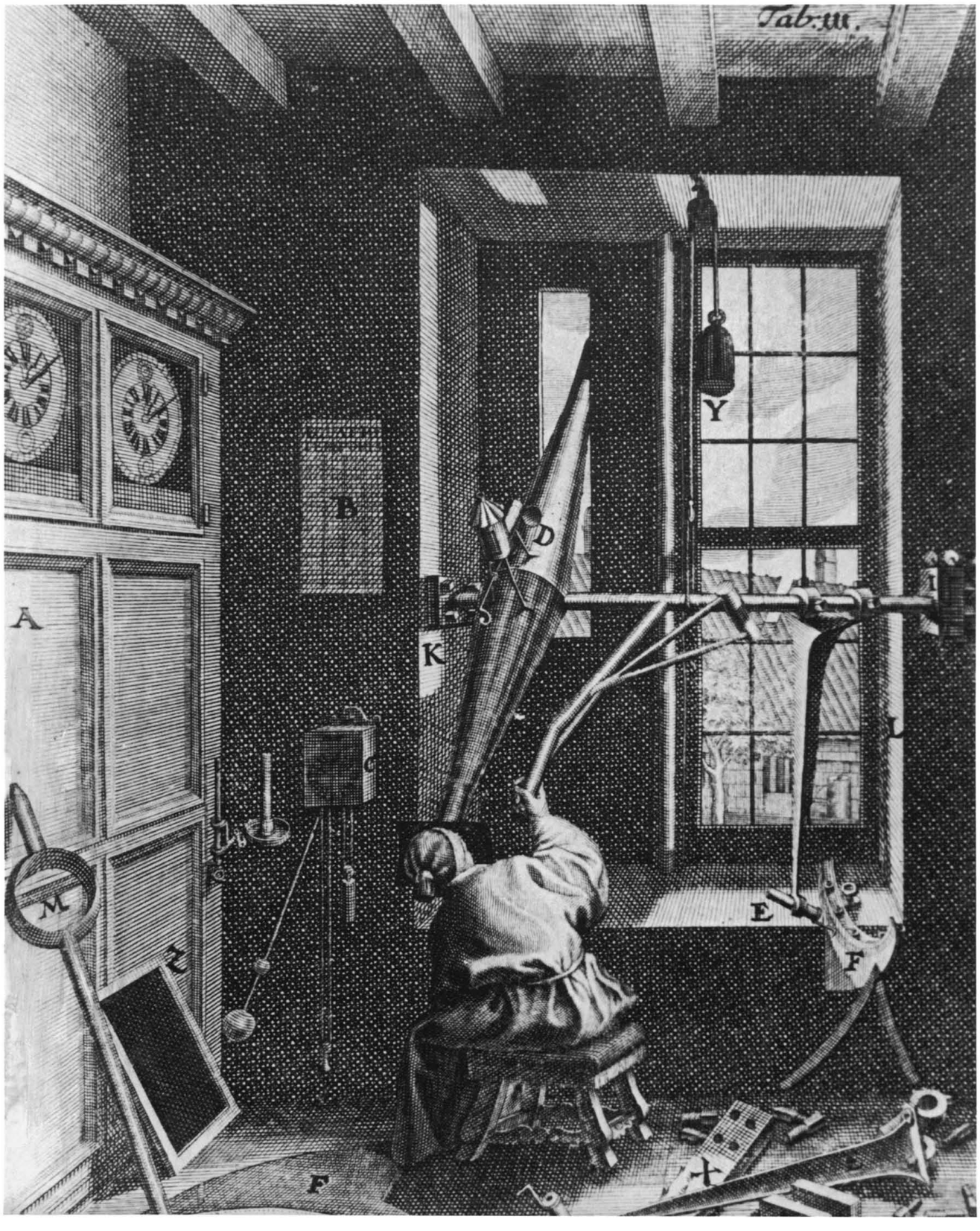
SCIENCE

18 June 1976

Volume 192, No. 4245

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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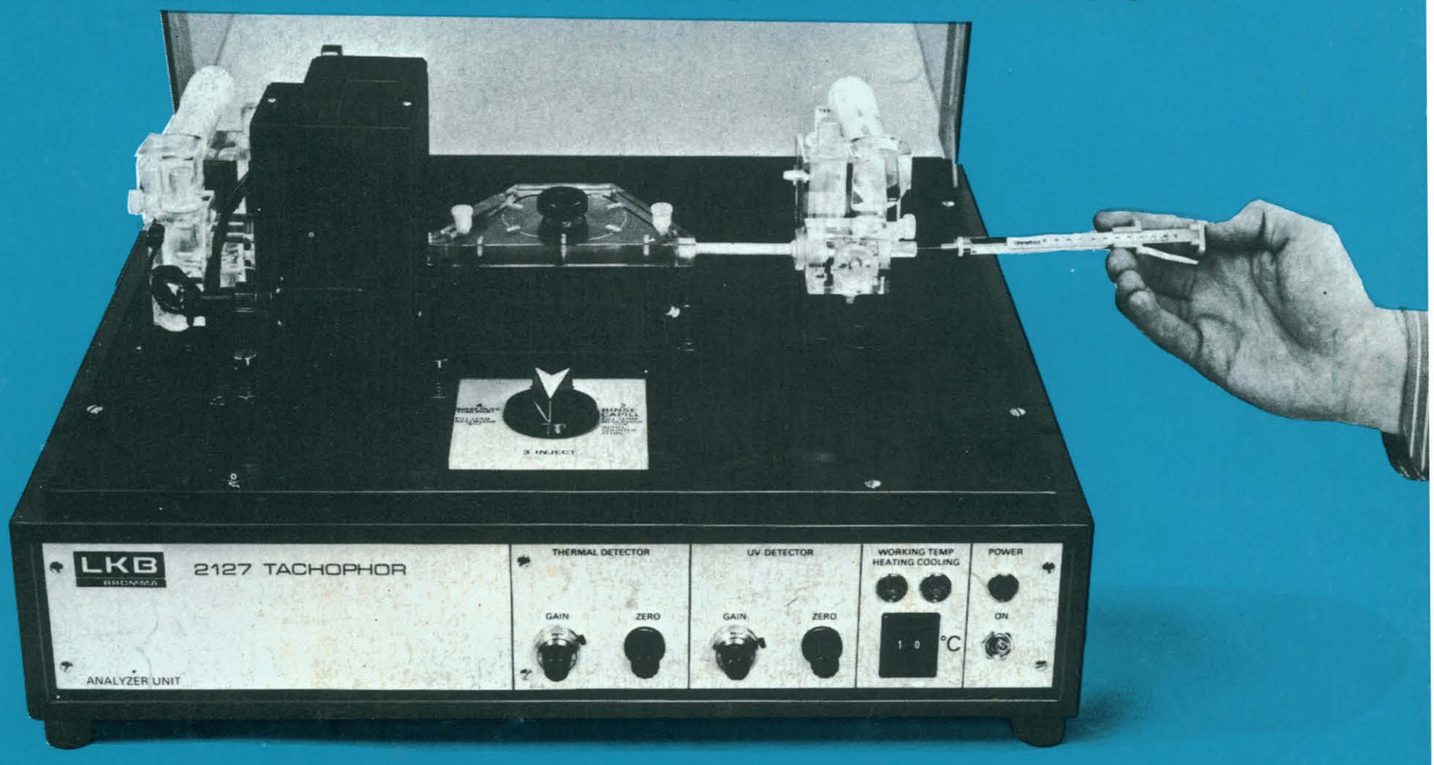

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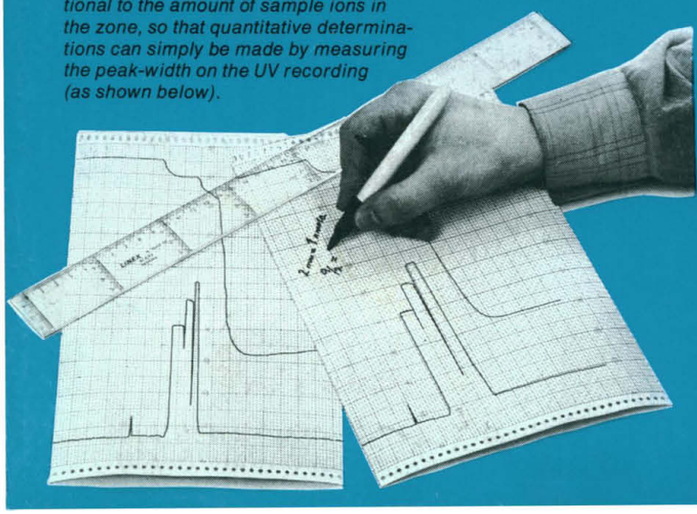

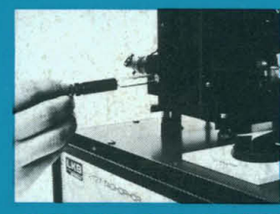

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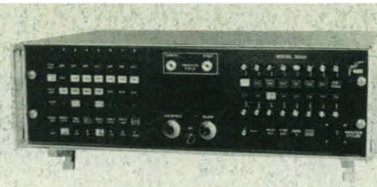

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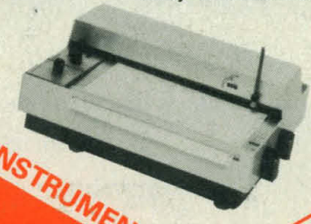

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18 June 1976

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SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Danish astronomer Olaus Römer sweeps the sky with a meridian telescope in 1689, in the middle of a 70-year span of anomalous solar behavior. See page 1189. [From Peder Horrebow, *Basis Astronomiae*, 1735; permission of the Houghton Library, Harvard University, Cambridge, Massachusetts]

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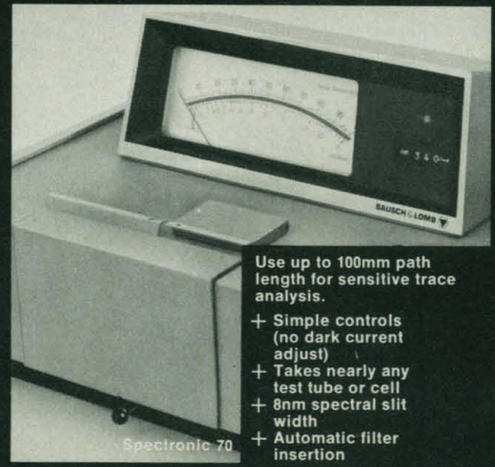

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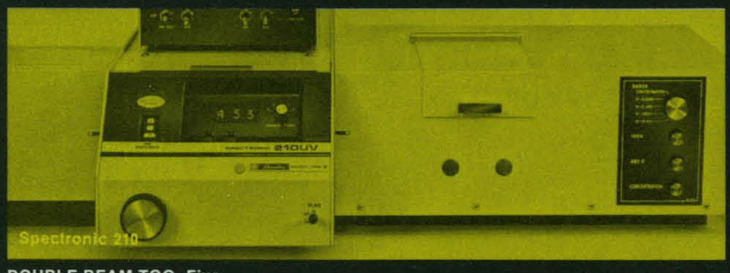

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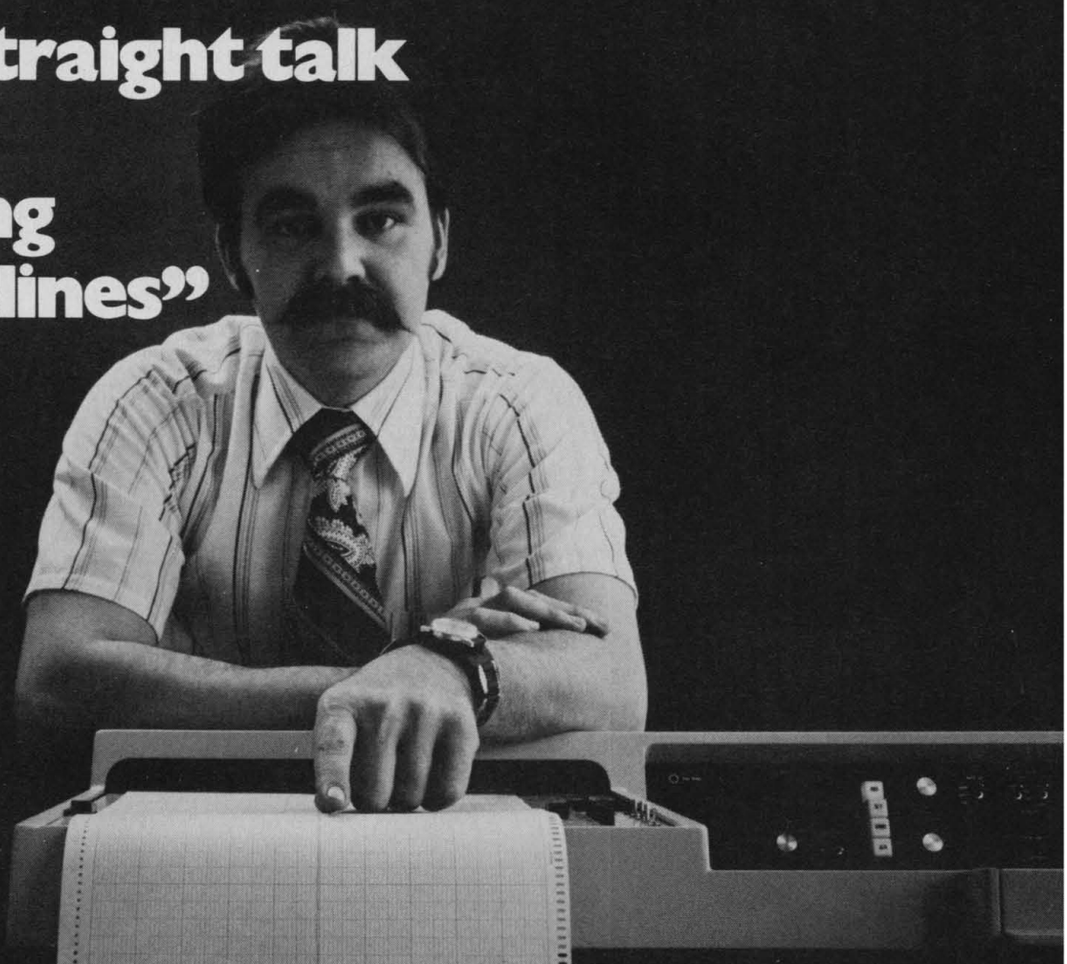
"Still twiddling 'pots'?

Here's straight talk about flattening UV baselines"

—Tom Novak
Project Engineer
The Perkin-Elmer Corporation



"We're all used to twiddling dozens of 'pots' when we want a flat baseline. And we all know we need a flat baseline because without it, cell mismatch can create large errors. But does the correction process have to be so infernally time-consuming?

"Happily enough, no. We at Perkin-Elmer have been working on simplification of the task. Now it's possible to get flattened baselines at the *push of a button,* thanks to the Background Corrector accessory available with the Model 57 spectrophotometer series.

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"So now, whether you want to correct for cell or sample mismatch, or even want to compensate for spectral characteristics, you can forget about 'pots'. Just touch a button and get on to more interesting things. The Perkin-Elmer Background Corrector accessory makes it all possible".

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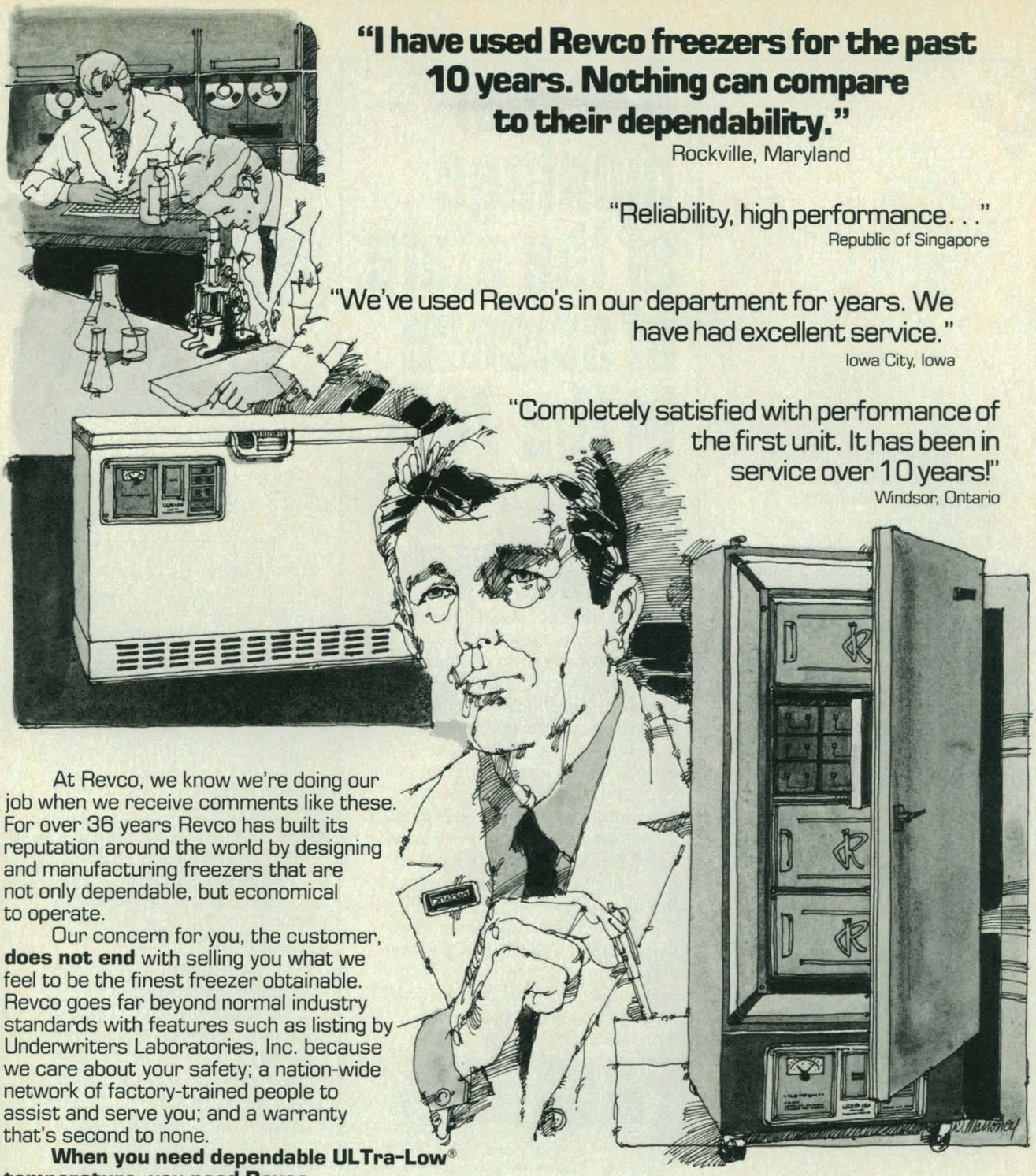

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(The comments appearing above were unsolicited and are on file at Revco for inspection.)

A verbal montage of the state of science in the 70's

"Science is a constantly changing series of approximations," a scientist-philosopher pointed out.

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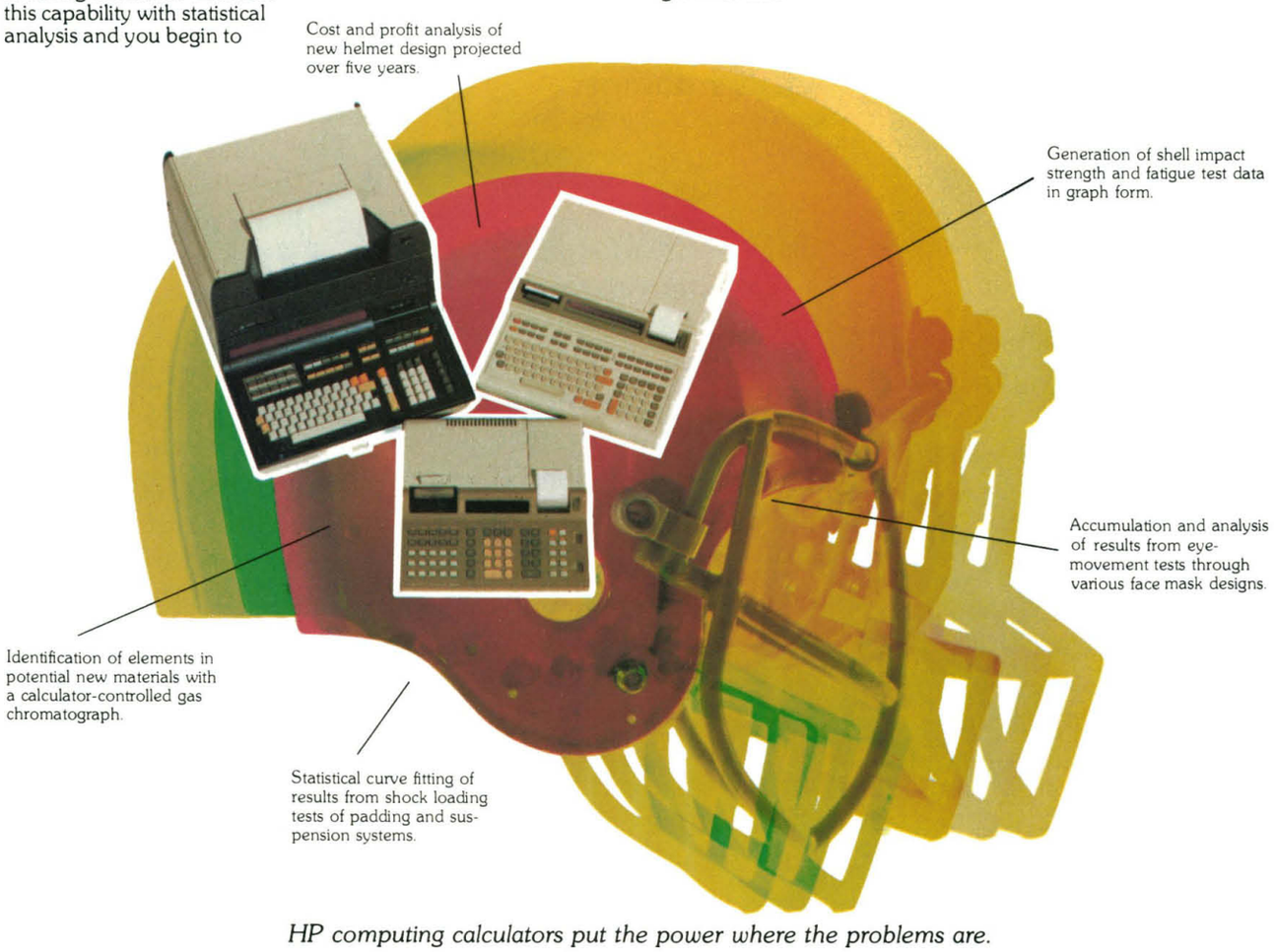

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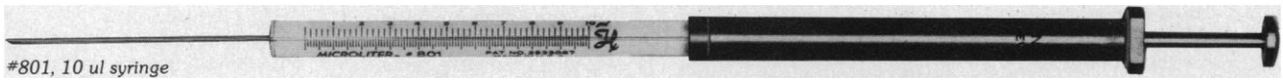
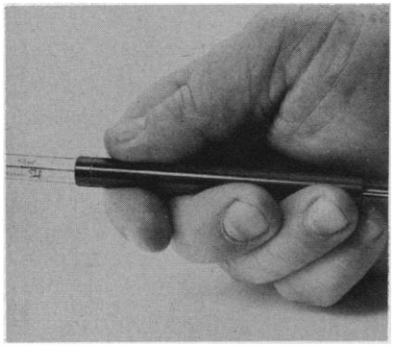


#801, 10 ul syringe

If you've never considered the construction of a syringe, this syringe might look a little awkward. But it's far from it.

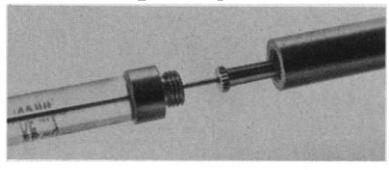


It is really comfortable to hold and convenient to use a syringe with a metal handle. The weight balances nicely in your hand and allows you to hold the syringe without the heat of your body affecting the sample.

The flange in the handle contains a friction ring that gives you an adjustable drag on the stem — plunger, providing resistance against high pressure inlets.

Prevents the bends

Another major attraction of the metal handle is that it practically eliminates plunger bending. A heavy metal stem travels through the handle and acts as a sturdy guide for the smaller plunger.



The stem threads onto the plunger, stabilizing it and helping to prevent the plunger from bending.

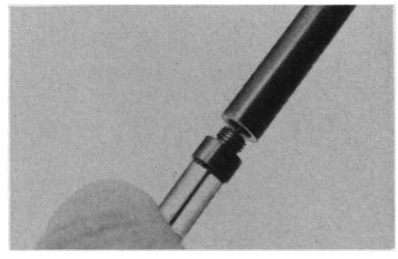
The same old precision

These syringes are essentially the tried and true Hamilton 700 Series Syringes, with accurate delivery to ±1%.

We've just added the metal handle to make them more convenient and versatile.

It's easy to change syringes

If you damage the glass, needle or plunger, you don't have to throw the whole syringe away. Just replace the syringe assembly.



The glass barrel threads into the metal handle to give you a solid connection. It's easy to make replacements.

The syringe with a handle. It comes in 5 μl and 10 μl capacities, with a fixed needle or a replaceable needle. They're available from authorized dealers. For more information and literature on our 800 Series Syringes, write to John Nadolny, Hamilton Company, Post Office Box 10030, Reno, Nevada 89510.

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"A serious perusal of these papers, in all their variety, should lead to some very throught-provoking consideration of how an inter-disciplinary and international approach might begin to give us a firmer grip on the problems of population balance . . ."

Margaret Mead, from the preface

These words bring into focus the unique contribution of *Population: Dynamics, Ethics, and Policy,* a new compendium of articles, research reports, and policy debates that originally appeared in *Science* during a 10-year time span beginning in 1966. Together these papers give you

- a close look at population research as conducted and reported by such American scientists as Bernard Berelson, Ansley Coale, Kingsley Davis, Garrett Hardin, Amos Hawley
- a glimpse at the continuing debate between those who advocate the dissemination of contraceptives and those who advocate more drastic methods of population control

But perhaps even more important, this compendium vividly reveals the ethnocentrism that has pervaded the American population debate.

If we want to solve the problems of population growth and control, we must recognize and deal with the extraordinary complexity of relationships between culture, nationhood, type of technological change, and ideological preoccupations . . .

If we want to go beyond where we are today, we must recognize and correct the defective theoretical basis on which national and international action has been taken for more than four decades . . .

If you want to know more about these and other aspects of population research and policy planning, be sure to read *Population: Dynamics, Ethics, and Policy.* Send for your copy today, available in your choice of casebound or paperbound editions. Preface by Margaret Mead. Edited and with an introduction by Priscilla Reining and Irene Tinker. Retail price $12.95 casebound, $4.95 paperbound; AAAS member price, prepaid $11.95 casebound, $4.45 paperbound.

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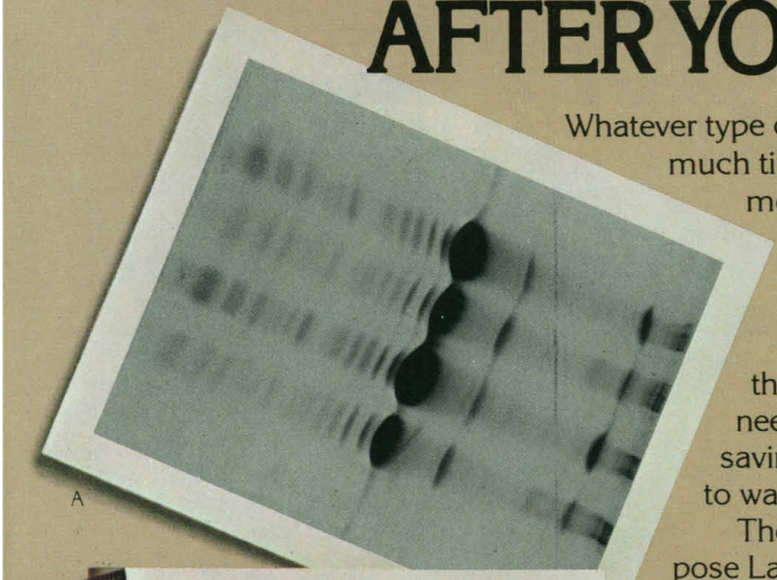

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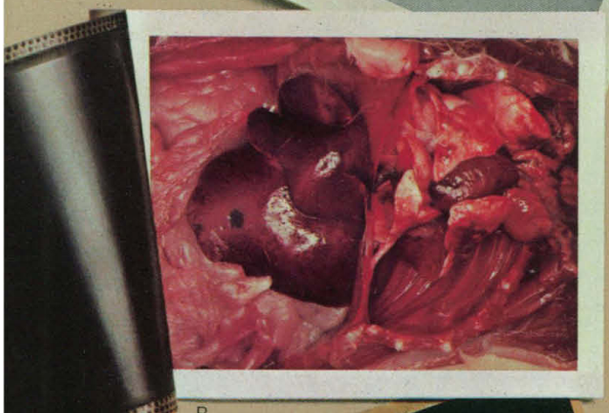

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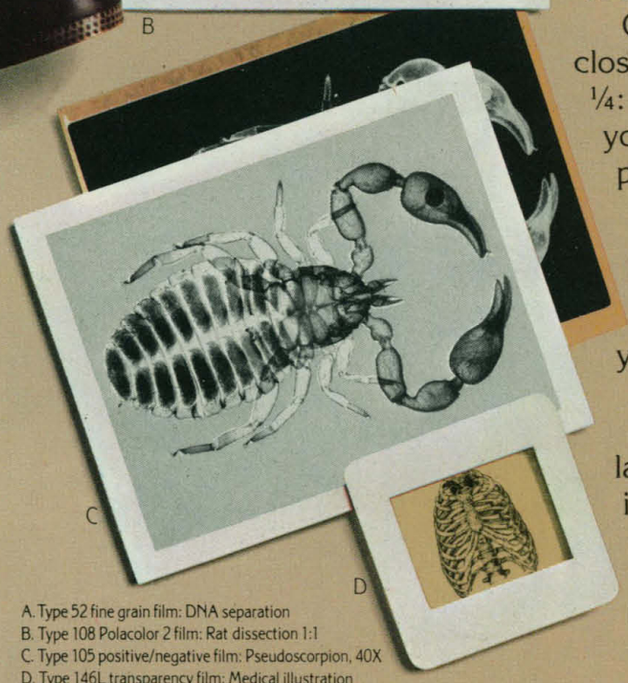

C

D

A. Type 52 fine grain film: DNA separation
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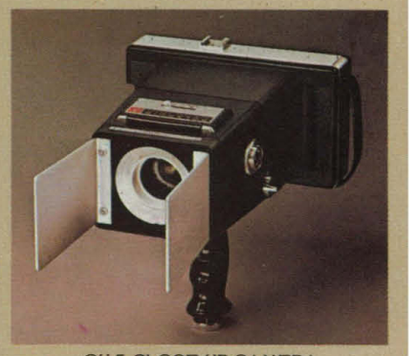

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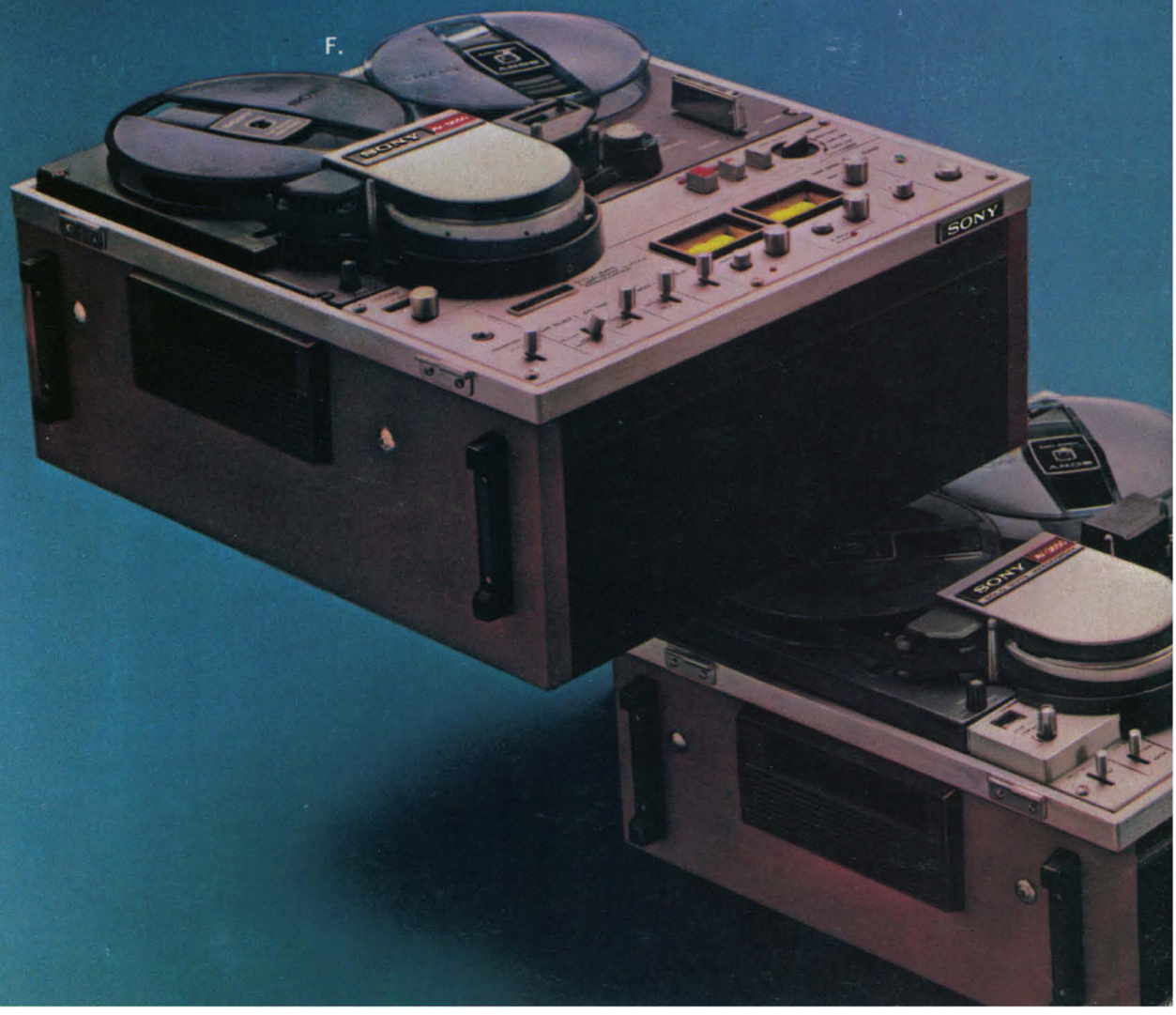

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LETTERS

Hayflick's Tragedy

I read Nicholas Wade's article "Hayflick's tragedy: The rise and fall of a human cell line" (News and Comment, 9 April, p. 125) with great astonishment. The "fall" of this particular cell line was predictable, simply because of Hayflick's most important discovery in aging research—that cell cultures, which preserve all the specificity of normal human cells, age and die. Hayflick's tragedy is not related to the fact that he did not preserve unlimited supplies of early passages; 15 years ago, when in vitro aging was discovered in this cell culture, nobody could predict how many ampules might be needed in the future. One strain would probably be finished sooner or later, but other, similar strains could be developed and are indeed already available. It was the discovery, not the particular cells, which was important. Nor is the tragedy in the fact that some samples happen to be unsterile (one might expect this, when storage is made after several passages), when the question is really about pioneering work. Nor is the tragedy in the commercial side of the problem, or in the dispute about the ownership of samples; they actually belong to science, like the double helix of DNA or the genetic code. Few people are more interested in the practical use of new methods and better qualified in the use of the samples than Hayflick himself.

The tragedy, as I see it, lies in the surprisingly tendentious approach of *Science* and some other publications about this case. Wade's article describes the conflict between National Institutes of Health accountant James W. Schriver and a prominent scientist concerning research work. Much more publicity is given to the accountant's point of view than to the scientist's, and the scientist himself is not given a real chance to explain his own version of the events. It is a tragedy that an outstanding scientist can be forced to resign his professorship at a university without discussion of his case by his colleagues. Wade's picture of the events, like other press accounts of this conflict, tries to raise doubts about Hayflick's moral and ethical behavior. I think it relevant for me to acknowledge that, during my long struggle for human rights and scientific freedom in the Soviet Union, I was supported and helped by many colleagues and friends abroad. This help saved my freedom and probably my life, first when I was forcibly put into a mental hospital in 1970 and later when I was arrested in 1972 in Kiev

during the 9th International Gerontological Congress. But nobody helped me more than Leonard Hayflick, whom I had known through correspondence since 1963 and first met in Moscow in 1966. When I was dismissed from my position as head of the Laboratory of Molecular Radiobiology in Obninsk in 1969 (after my book about T. D. Lysenko was published in the United States), Hayflick offered me a position as senior scientist in his department at Stanford University. In 1972 I arrived in Kiev to participate in the Gerontological Congress and to give a lecture, as announced in the program of the International Association of Gerontology. I was unexpectedly arrested on the street near the Congress Hall on the opening day. It was Leonard Hayflick who immediately organized a strong lobby group and made an uncompromising demand—either I was to be released immediately and harassment stopped, or most of the Western gerontologists would not participate in the Congress and would leave the Soviet Union the next day. Hayflick's conditions were reluctantly accepted by Soviet officials, who faced him in person at an unprecedented "closed" meeting held in the hotel room of the president of the International Association of Gerontology, N. Shock, when they realized that Hayflick and his group really meant business. It was a unique case of Russian scientific officials making a recorded concession after a serious confrontation. If other foreign scientists were to act similarly on behalf of Soviet or other colleagues who are in trouble, the scientific community would be much better protected against bureaucratic or political intervention.

After the Kiev episode and the official Soviet promise to stop harassment (to enable the Congress to continue), my research was quietly resumed and I was even permitted in 1973 to accept an invitation for a 1-year official visit to the National Institute for Medical Research in Britain. After 6 months in Britain I was unexpectedly deprived of my citizenship, and the Soviet bureaucracy gained revenge for my dissent. When I found myself stateless and jobless in Britain in 1973, Leonard Hayflick was again the first who offered me a helping hand and invited me to take an official position in his laboratory. However, my British colleagues also offered me a position and let me continue my research work uninterrupted. If I had not been able to get a position in Britain, I would certainly have accepted Hayflick's invitation and started aging research with him. And I would certainly have resigned after my

friend to express my protest at the injustice and harassment he is now suffering, which is of a much more sophisticated form than I experienced.

ZHORES A. MEDVEDEV
Division of Genetics,
National Institute for Medical Research,
Mill Hill, London NW7 1AA, England

Project Seafarer

We on the National Research Council committee studying the biological and ecological effects of the extremely low frequency radiation associated with the Navy's Project Seafarer are very much aware of public concern over Seafarer's proposed construction.

We are interested in gathering and examining all relevant scientific data and ask that such materials or references be submitted to us in writing as soon as possible.

J. WOODLAND HASTINGS
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JOHN A. GRUNAU
JOHN W. DRAKE
Department of Microbiology,
University of Illinois,
Urbana 61801

References

1. W. F. Hemmens, *Biochim. Biophys. Acta* **68**, 284 (1963); R. Shapiro and C. N. Gordon, *Biochem. Biophys. Res. Commun.* **17**, 160 (1964).
2. Private communications from the Nutritional Biochemicals Company (now ICN Pharmaceuticals, Inc.) and the Schwarz/Mann Division of Becton, Dickinson and Company.

Health Care: Service or Business?

Philip H. Abelson's editorial "Cost-effective health care" (14 May, p. 619) contains much wisdom. A mysterious facet of human nature is the inability to learn from experience. The greater the separation between "providers" and "utilizers" of a service, the more expensive and less appropriate the service will be. Every intervening step reduces the accountability of the server and the ability of the served to obtain what they want. A major effort should be made to develop a system of adequate medical care for all coupled with an awareness that care does in fact cost money, and that it is, therefore, in the patient's interest to utilize the least expensive service that is satisfactory.

It is clearly cheaper and more efficient to add oil to an automobile's engine than to keep putting in new engines when the old one runs dry. We don't seem to have the same understanding about the human machine. Those of us with responsibility for health care must try to persuade individuals to utilize that which is already known regarding health maintenance. Such an effort would be both cheap and effective.

One matter is not touched on in Abelson's editorial. This is the effect on the medical care system of being transformed into a "business operation." Properly, the goal of medical practice is the provision of a service; the result, due to the gratitude of those served, is the remuneration of the individual providing the service. The introduction of business techniques tends to reverse this situation; the goal becomes the production of a profit. This methodology, in which strikes and boycotts are used as negotiation devices, is antithetical to the essence of medical care, which is a completely voluntary contract between two individuals. The transformation of the medical care system by the methodology of business is leading to the demise of medicine as a healing art.

We have several options regarding health care. We can embalm ourselves in our unrealistic system that treats obesity with pills, employs pills as contraceptives, and flattens ears in the name of psychological support. Or we can realize that how we live largely determines what we become and how we shall die. I wonder if the American people are willing to take the economic and psychological risks of the latter choice.

GEORGE L. SPAETH
Glaucoma Services, Wills Eye Hospital,
Thomas Jefferson University,
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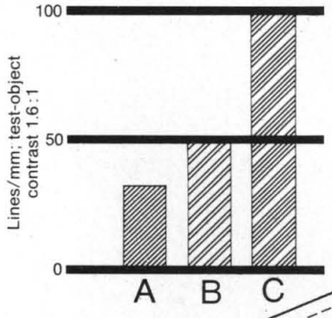

A comparison of the resolving power of three color transparency films. A is KODAK High Speed EKTACHROME Film; B is KODACHROME 25 Film; C is KODAK 2483 Film.

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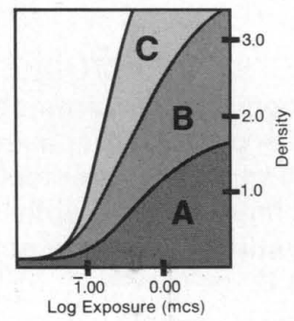

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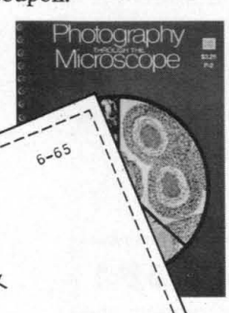

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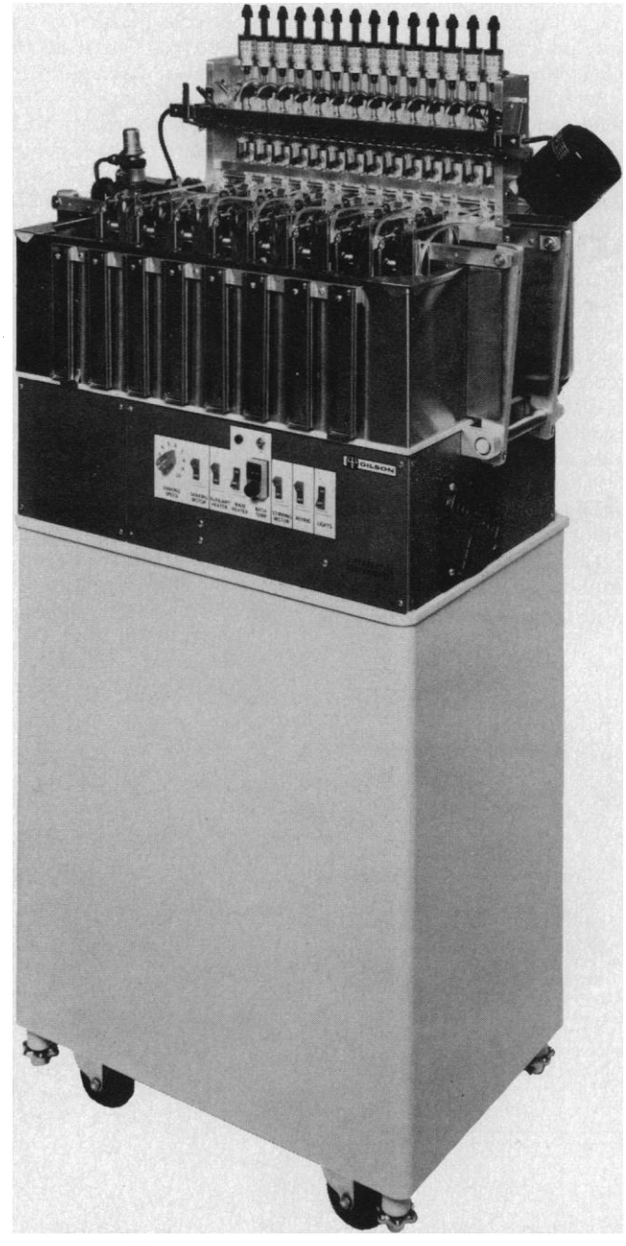

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18 June 1976, Volume 192, Number 4245 **SCIENCE**

Adjusting to Change

These days a college diploma in itself is not very helpful or much in demand. However, the graduate who has worked for and experienced some of the great intellectual growth possible at a university will achieve both future economic benefits and a better life. In the uncertain days ahead, involving changes that can only be dimly perceived, the truly educated person will meet vicissitudes with enhanced poise and equanimity.

Some of the values of higher education cited in a recent article* were such achievements as the ability to clearly define a problem and know how to go about trying to solve it, and a sense of our cultural and intellectual heritage that makes it possible to view the present and to face the future with a perspective that fosters confidence and maturity of judgment.

Today, two of the most difficult qualities to attain are perspective and good judgment. We are flooded, even overwhelmed, by communication from the mass media. Trying to attain perspective and judgment under this stimulus is like trying to do creative thinking while a dozen people are shouting at you. In the search for perspective and judgment, little of substance can be found in the excitement of the moment. Rather, one should continue practices fostered during undergraduate days and look for more scholarly inspiration.

If one views the passing scene from a standpoint that disregards the excitement of the moment, it is much easier to identify major significant changes. One's clarity of vision is also improved by the knowledge that while circumstances change, many important facets of humans do not. Many if not all of the traits that make humans human have persisted through the ages: the strengths and virtues, the weaknesses and follies. In our own way we are superstitious, are prone to believe in miracles, are willing to be swayed by demagogues, are ready to engage in forms of mob action, including witch-hunts. We are forever trying to eat our cake and have it, and to get something for nothing.

A further aid to identifying the really significant changes, so that one may adjust to them, is to analyze the source of the forces producing them. There is a mysterious chemistry of human interaction that gives rise to unexpected manifestations. These may be short-lived phenomena such as streaking on campus. Or they may be of substantial duration and have large-scale effects at the time—for example, the Crusades around A.D. 1100 and the tulip craze in Holland around 1630. During the past two decades there has been a series of what seemed at the time very important events, such as disorders on campus. With the passage of time, the emotions that create such manifestations fade away, and often little remains.

There are important changes arising out of human interaction that have enduring consequences, and these are changes that merit careful attention. An example from the past is the Industrial Revolution. An example from the present is the continuing scientific-technological revolution. Our recent experience in coping with energy and environmental problems illustrates a need for individuals and for society as a whole to develop better ways of adapting to changes resulting from the scientific-technological revolution. To most people science is a form of magic capable of producing miracles both good and bad. Unable to make judgments about it, they alternate between excessive faith and feeling helpless and acutely uncomfortable.

In the future, applications of science and technology inevitably will have an increasing role in affecting people's lives. One can choose to live in ignorance and hence be subject to blind fear, or one can enjoy through knowledge a more relaxed attitude. One can live in a state of helpless confusion about the changing world or one can perceive more clearly than most the outlook for the future, the better to adjust to it and shape it.

—P. H. ABELSON†

*J. F. Padgett, *Liberal Education*, vol. 51, pp. 473–477 (December 1975). †This editorial was adapted from a commencement address by P. H. Abelson at Tufts University, Medford, Mass., May 1976.

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Annual Meeting Denver 20-25 February 1977

Call for Contributed Papers

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—ARTHUR HERSCHMAN

Instructions for Contributors

Type abstracts on ordinary white bond paper (21.5cm×28cm) according to the format shown on the right (the example is reduced to approximately one half of the ordinary linear dimension). Indicate at the top of the page the kind of session it is intended for (*poster* or *slide*) and the letter of the AAAS Section to which its subject matter makes it most appropriate (see the bottom of the contents page of any issue of *Science*). Type the title and author block using the typography indicated in the example *and a column width of 12 cm*, continue with the abstract and footnote blocks. *Note that your original copy will be our camera-ready copy for reproduction*; therefore type as carefully and cleanly as you can and hand letter (where necessary) as carefully as you can. The total length of the abstract (from the top of the title to the bottom of the footnotes) should *not exceed 12 cm*.

At the bottom of the page type the name and affiliation of the AAAS member who is contributing the abstract and have this member sign the page. *The contributor need not be an author; however, the privilege of contributing an abstract for one of these sessions is limited to AAAS members (or fellows).*

Send the original together with two copies of your abstract to:

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NO LATER THAN 15 October 1976. Dr. Dunford will send you further instructions after he receives your abstract.

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Abstract is for poster session.

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—RICHARD G. SOMMER

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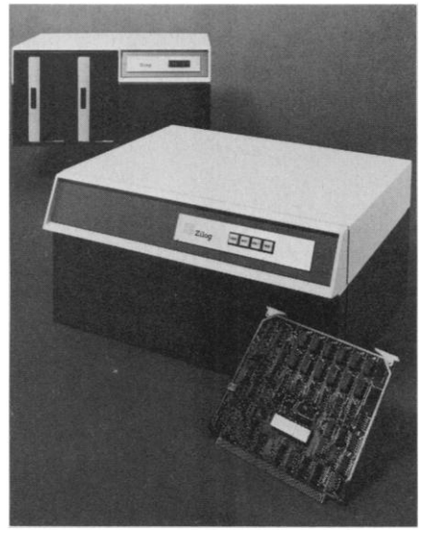

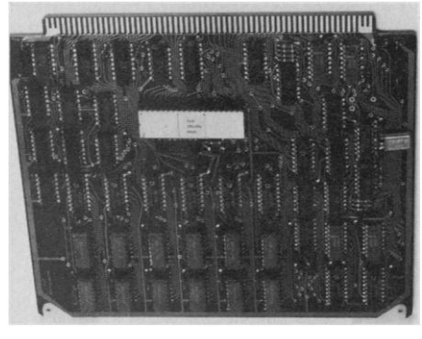

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The model S-603 separates carboxylic acids by ion exchange chromatography and detects them by a specific color reaction. Carboxylic acids are reacted with dicyclohexylcarbodiimide to form an active intermediate, which then reacts with hydroxylamine to form hydroxamic acids and dicyclohexylurea. The hydroxamic acids then react with ferric ion to form chelates which produce characteristic colors. Kikkoman International. Circle 724.

Portable Infusion System

This system allows continuous dosage without restricting the patient's movements. Flow rates as low as 0.16 milliliter per hour (4 milliliters per day) are possible. The rechargeable power supply lasts up to 7 days. The 50-milliliter medication bags and tubing sets are sterile and disposable. The pump is a miniature peristaltic device and there is a plug-in meter to calibrate the rate of flow. Cormed. Circle 726.

Survey of Serum Protein Concentrations

A survey for normal ranges of 12 serum proteins is now available. The data were accumulated from 23 major community hospitals and medical centers located in the United States and Canada. Data from 1720 healthy blood donors from age 18 to 55 are included. The ranges are broken down in tables by race, sex, and geographic region. Meloy Laboratories. Circle 727.

Literature

Cages lists a line of enclosures for all types of laboratory animals. Unifab. Circle 729.

NIH/Tungsten Syringe Shield is the subject of a data sheet. Atomic Products. Circle 730.

Learning about Liquid Chromatography is a brochure about a school on the practical applications of this separatory technique. Waters. Circle 731.

35-Gigahertz Electron Paramagnetic Resonance Systems are described in a four-page brochure devoted to the E-line Century Series. Varian Instrument Division. Circle 718.

Analtechniques compares conventional and hard-layer thin-layer chromatographic plates in urine analysis for drugs. Analtech. Circle 719.

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(Continued from page 1228)

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