SCIENCE 14 December 1973
Vol. 182, No. 4117
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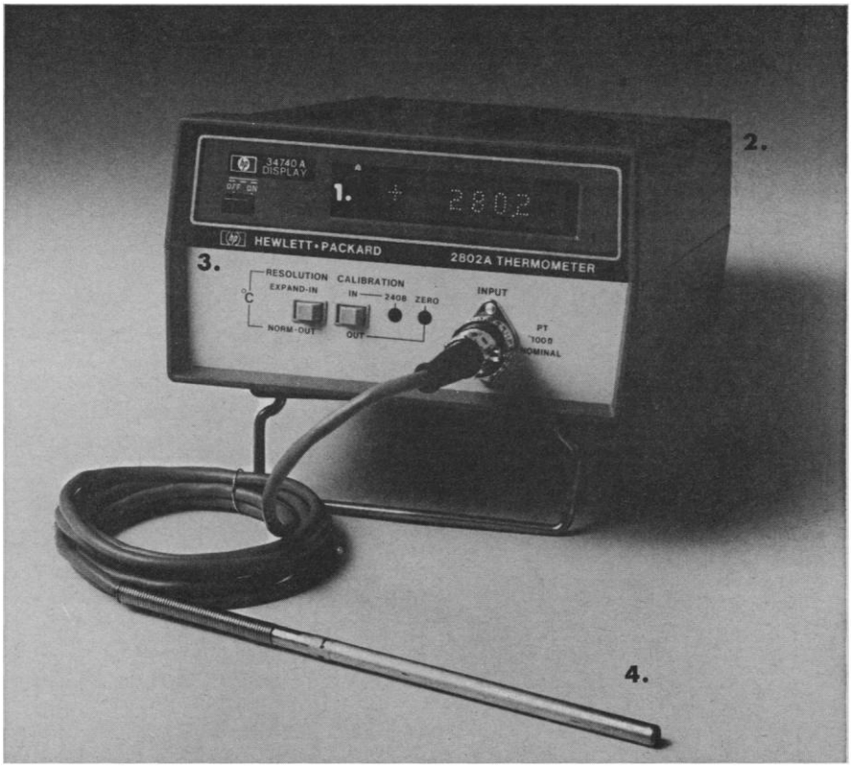

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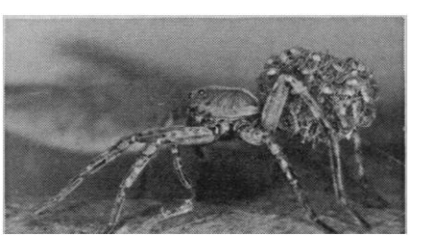
COVER

(Cover) Abdominal surface of female wolf spider, *Lycosa punctulata* (× 600). [Scanning electron micrograph by Rainer Foelix, North Carolina Department of Mental Health, Raleigh] (Below) Lycosid spiderlings grasp the mother's specialized abdominal hairs and ride on her as she wanders. See page 1153. [Jerome Rovner, Ohio University, Athens]



the digital processing oscilloscope...

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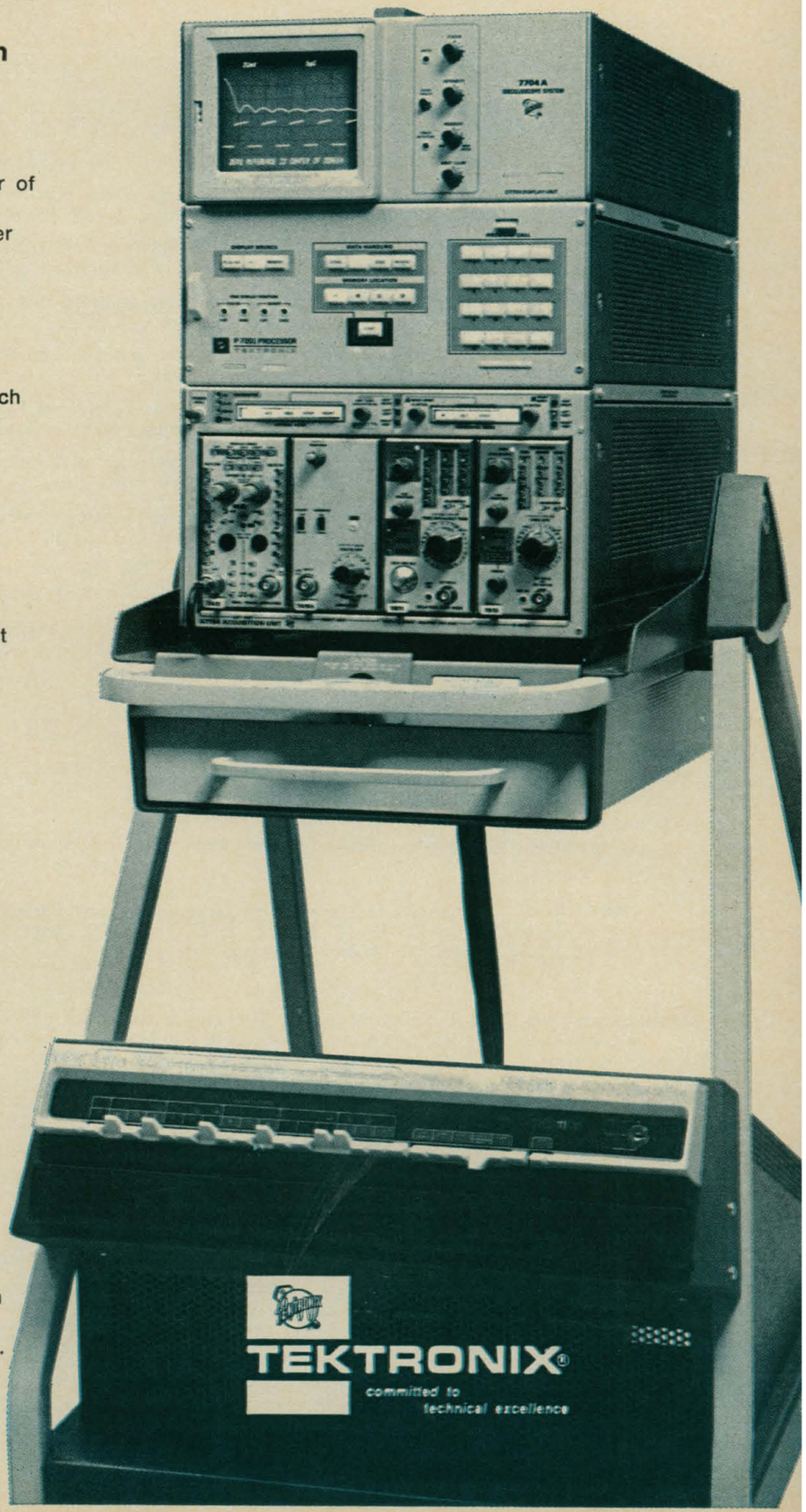
Processing means the user is no longer limited to 'scope waveforms for his information. The conventional display is usually of amplitude vs time (YT) format.

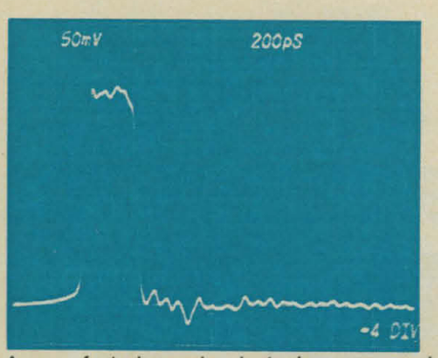
Suppose that the desired data is really of the dV/dt form. The derivative of a waveform can be calculated manually (providing that the waveform can be expressed as a math equation). *BUT* the Digital Processing Oscilloscope will perform the desired operation *AND* display the result at the press of a button. For this application and others see the illustrations at right.

The Digital Processing Oscilloscope is available in packages complete with Oscilloscope, plug-ins, Processor, minicomputer and APD Basic Software. For complete information contact your local Tektronix field engineer or write Tektronix, Inc., P. O. Box 500, Beaverton, Oregon 97005 for your copy of the "Digital Processing Oscilloscope" brochure.

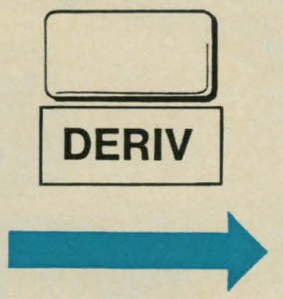


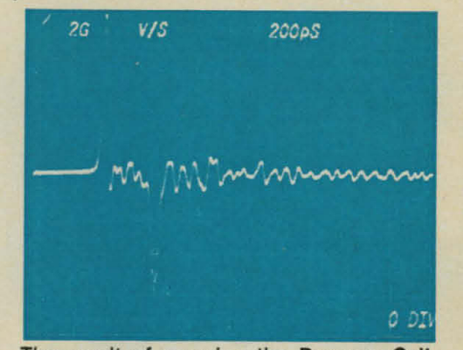
what it means to you...

...a few examples of the new measurement capabilities available at the press of a button.

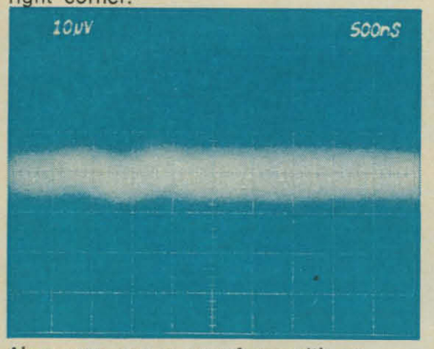


A very fast rise pulse is to be processed. The ground level is 4 divisions below the center line as indicated in the lower right corner.

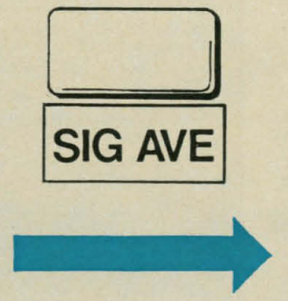




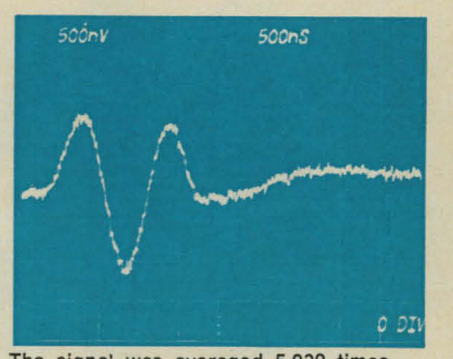
The result of pressing the Program Call button gives dV/dt for the waveform.



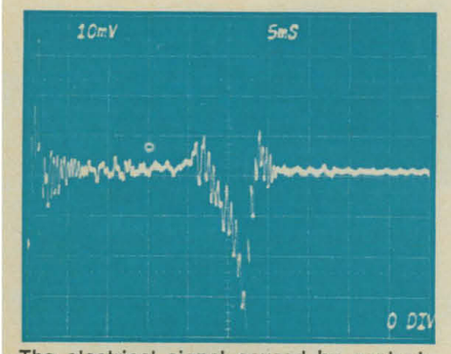
Above we see a waveform with so much noise present that no meaningful information is visible.



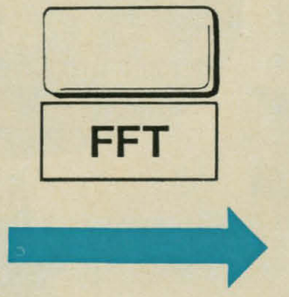
After pressing the SIG AVE (Signal Averaging) button the resultant waveform appears.

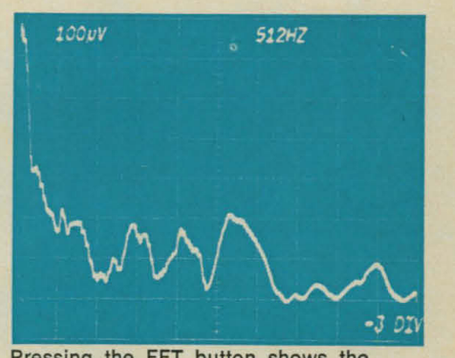


The signal was averaged 5,000 times and automatically rescaled for this display. Note the vertical sensitivity for this display is 500 nV/div.



The electrical signal caused by contact bounce in a switch is stored on a single shot sweep of the time base.

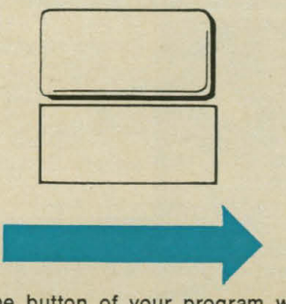




Pressing the FFT button shows the frequency distribution of the switch contact bounce with a frequency span of 512 Hz/div.

your waveform here

What is your measuring requirement?



Press the button of your program which you wrote for your requirement.

your **processed** waveform here

The answer will appear above.

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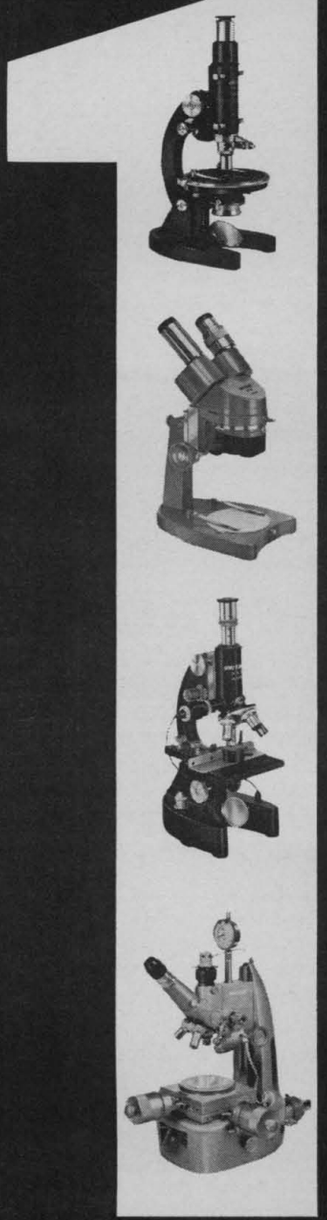

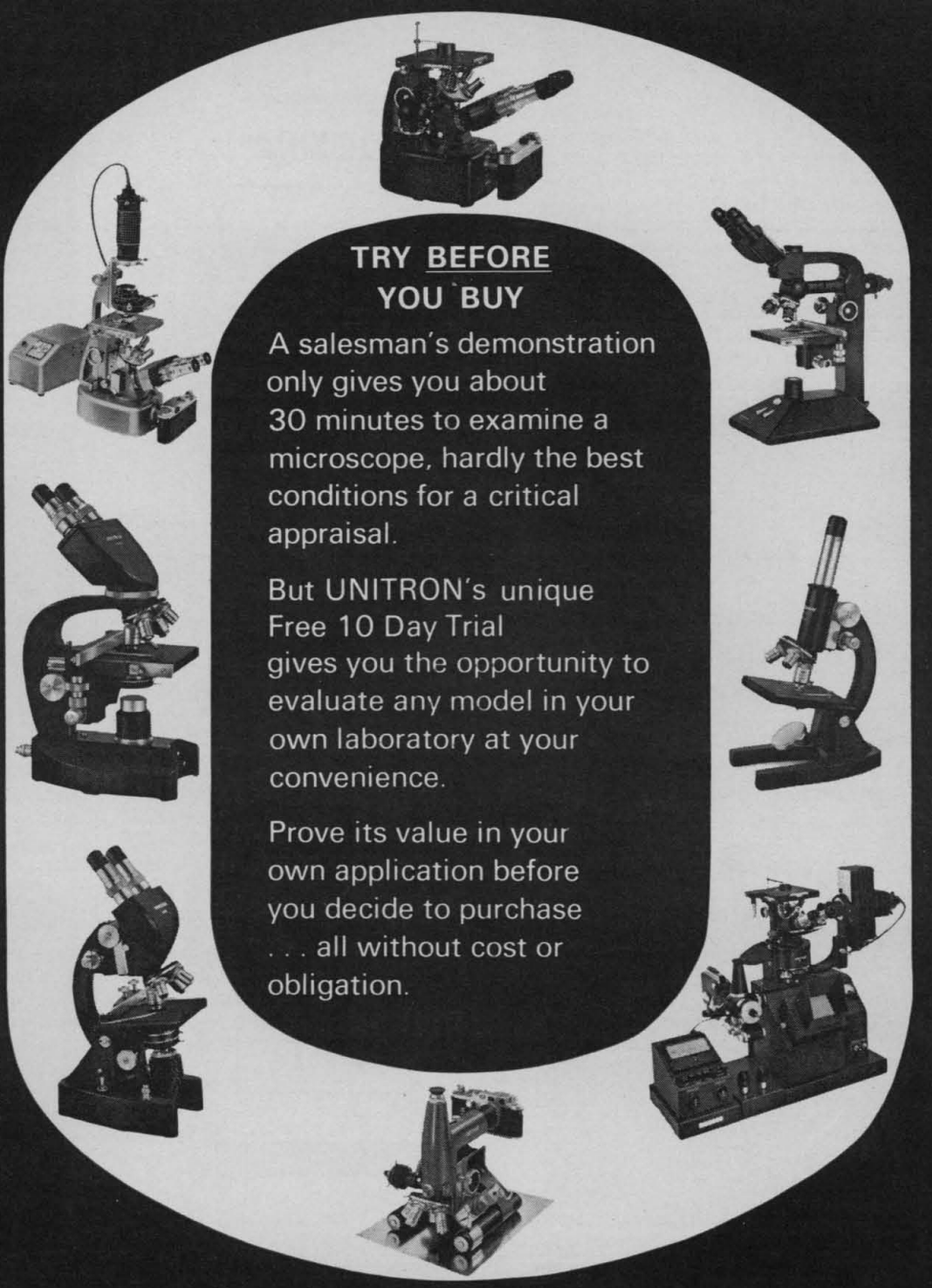

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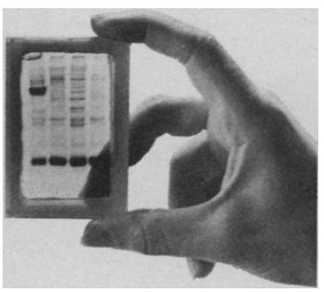
For a complete list of these products including prices and package sizes, request Kodak Publication No. JJ-11, *Reagents for Acrylamide Gel Electrophoresis.*



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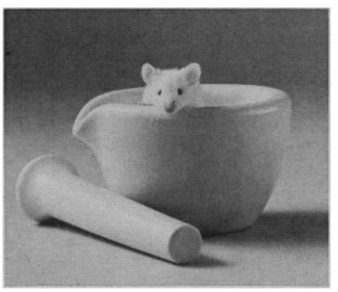

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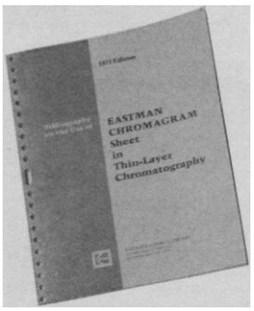
For TLC

Kodak Publication No. JJ-7, *Bibliography on the Use of EASTMAN CHROMAGRAM Sheet in Thin-Layer Chromatography,* has been revised and updated. With the addition of many new abstracts, the current edition contains 213 references to the use of EASTMAN CHROMAGRAM Sheet in TLC. References are divided into 34 categories, from "alcohols" to "vitamins," and from "apparatus" to "techniques and methods." If you have an earlier version of JJ-7, let us bring you up to date. If you are involved in TLC and don't yet have a copy, use the coupon to request Kodak Publication No. JJ-7.



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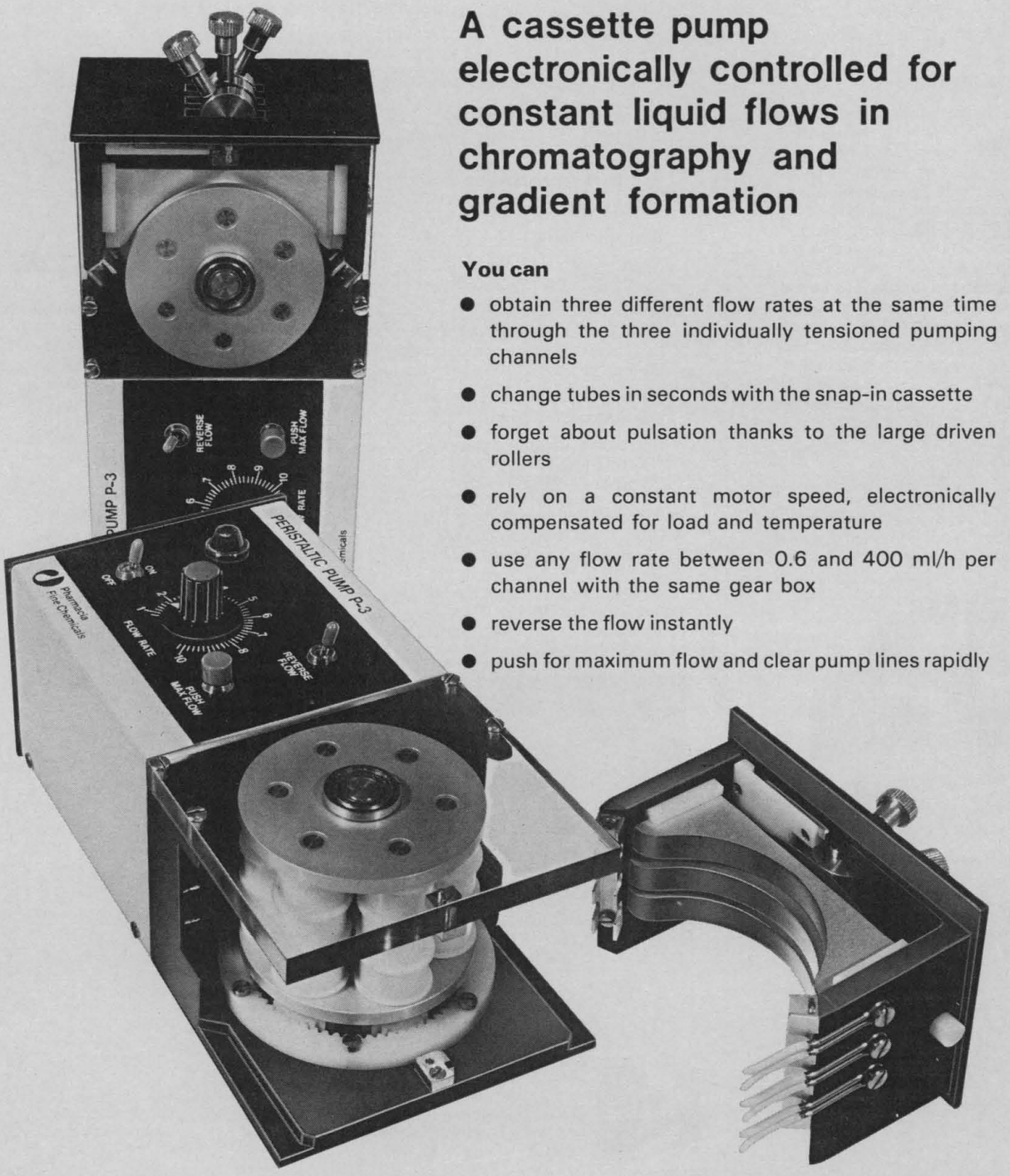

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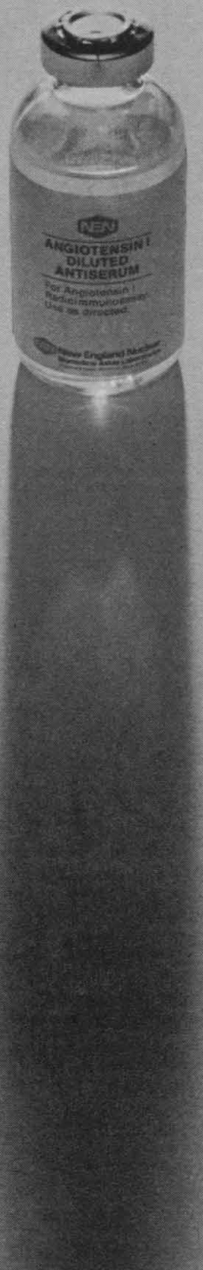

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300) R. H. Smith and R. C. von Borstel, "Genetic Control of Insect Populations," 5 Dec. 1972
301) Z. Stein *et al.*, "Nutrition and Mental Performance," 17 Nov. 1972
303) A. Yoshida, "Hemolytic Anemia and G6PD Deficiency," 9 Feb. 1973

Psychology

255) S. Gorowitz, "Reflections on Campus Pessimism," 10 Nov. 1972
266) W. T. Powers, "Feedback: Beyond Behaviorism," 26 Jan. 1973
270) R. Roy, "University-Industry Interaction Patterns," 1 Dec. 1972
271) S. Scott, "Lessons from the History of American Broadcasting," 22 Dec. 1972
292) M. Lewis and H. McGurk, "Evaluation of Infant Intelligence," 15 Dec. 1972

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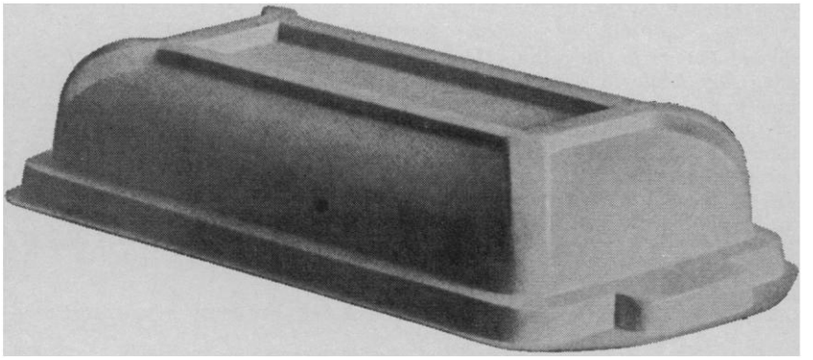

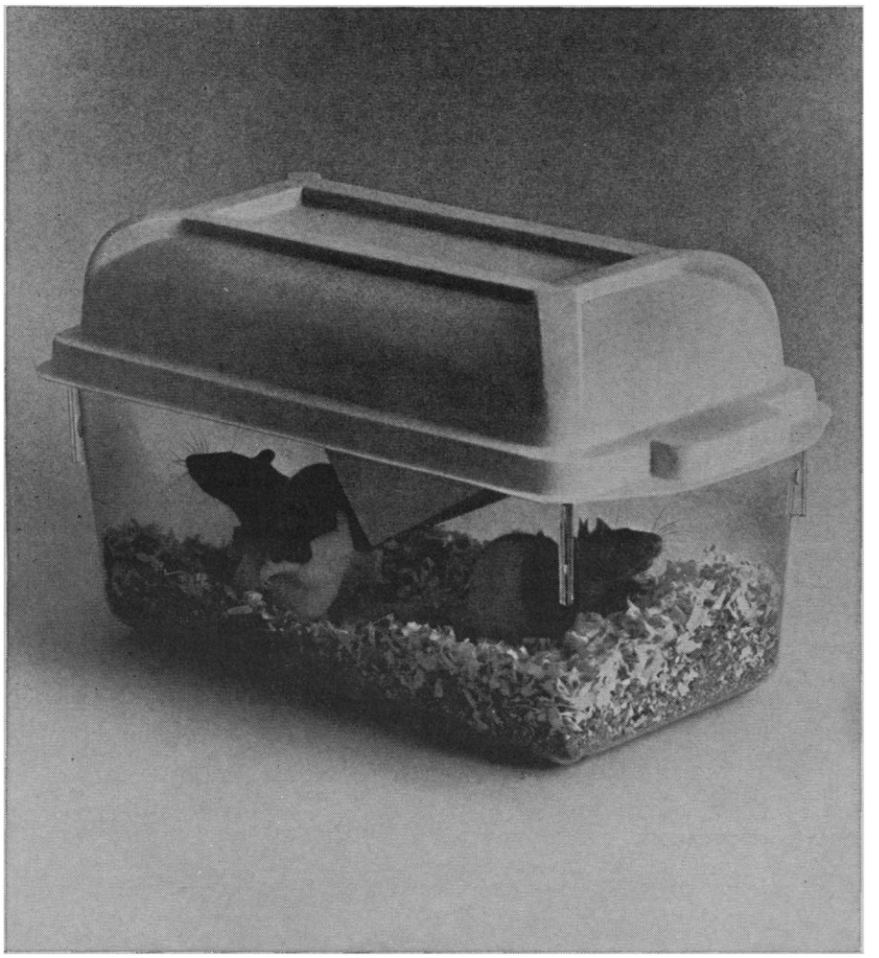

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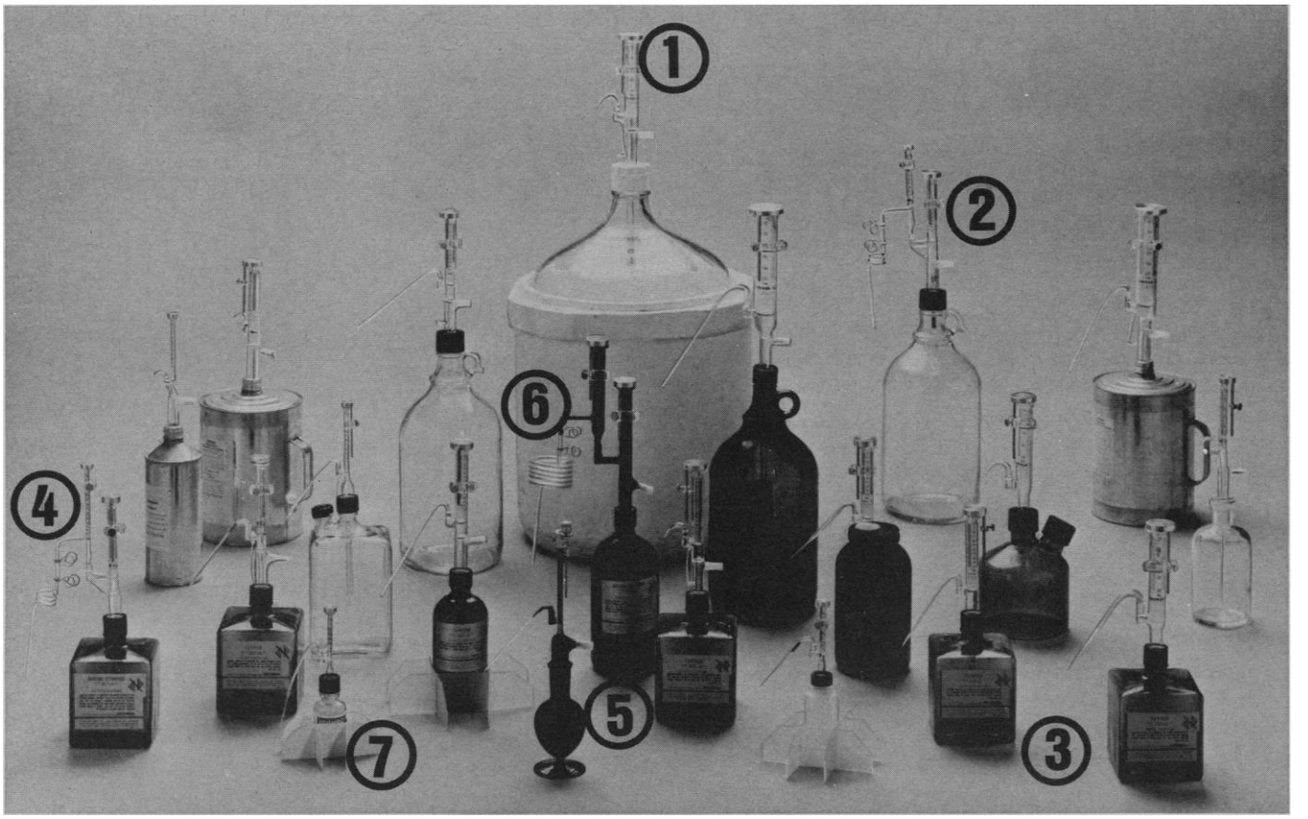

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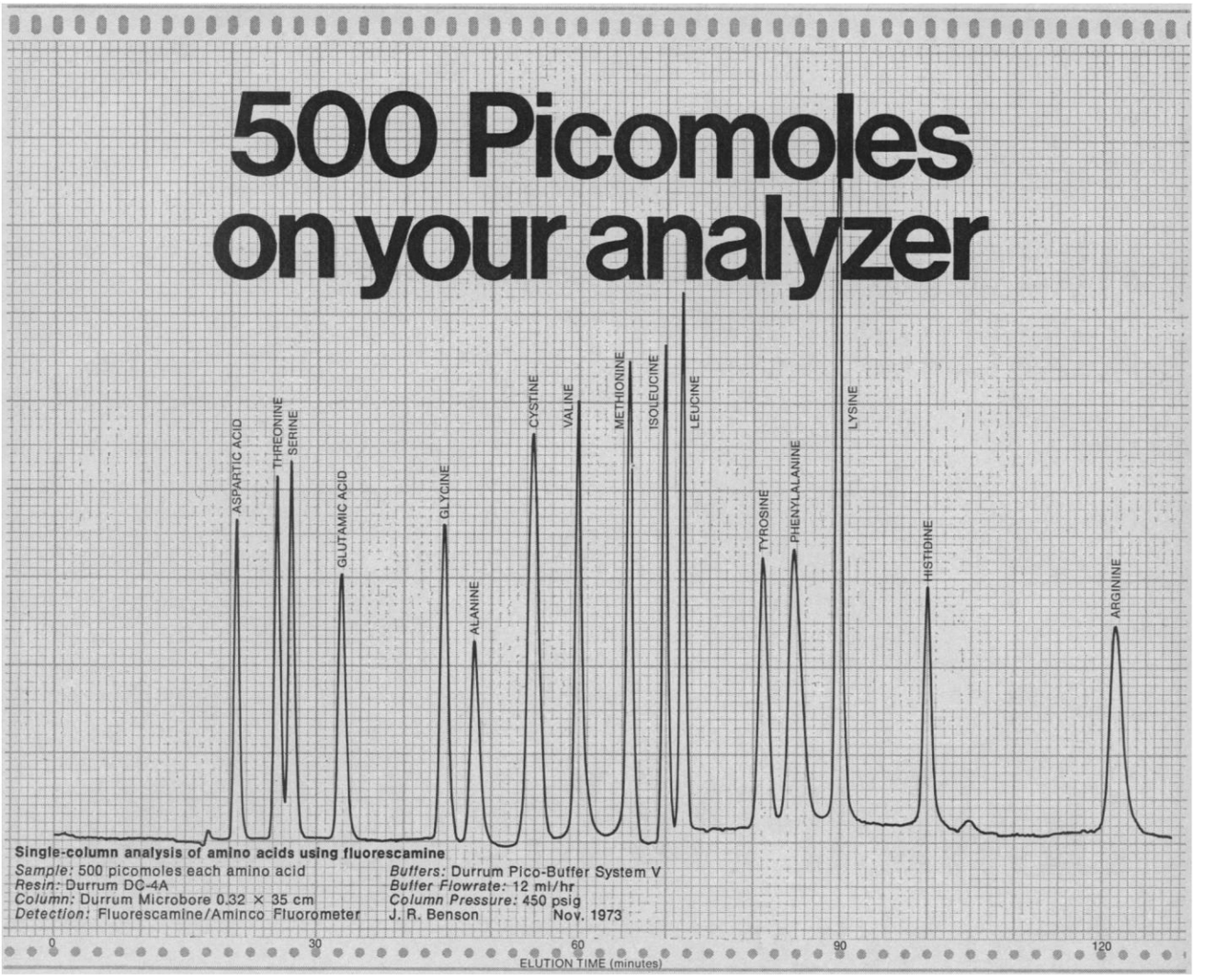

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1. S. Udenfriend, S. Stein, P. Bohlen, W. Dairman, W. Leimgruber, M. Weigele, *Science 178*, 871 (1972).
2. S. Stein, P. Bohlen, J. Stone, W. Dairman, S. Udenfriend, *Arch. Biochem. and Biophys. 155*, 203 (1973).
3. S. Udenfriend, S. Stein, P. Bohlen, W. Dairman, *Third American Peptide Symposium, Boston, June 1972*, J. Meienhofer, Ed., (Ann Arbor—Humphrey Science, Ann Arbor, Michigan).
4. A. G. Georgiadis, J. W. Coffey, *Anal. Biochem.* (in press).
5. P. E. Hare, *Carnegie Institution in Washington Yearbook 1972* (in press).

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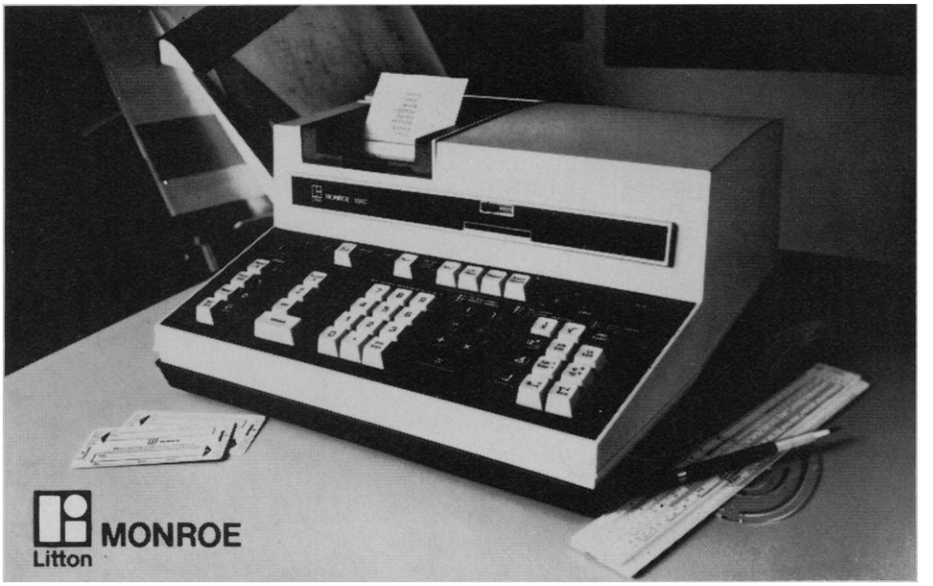

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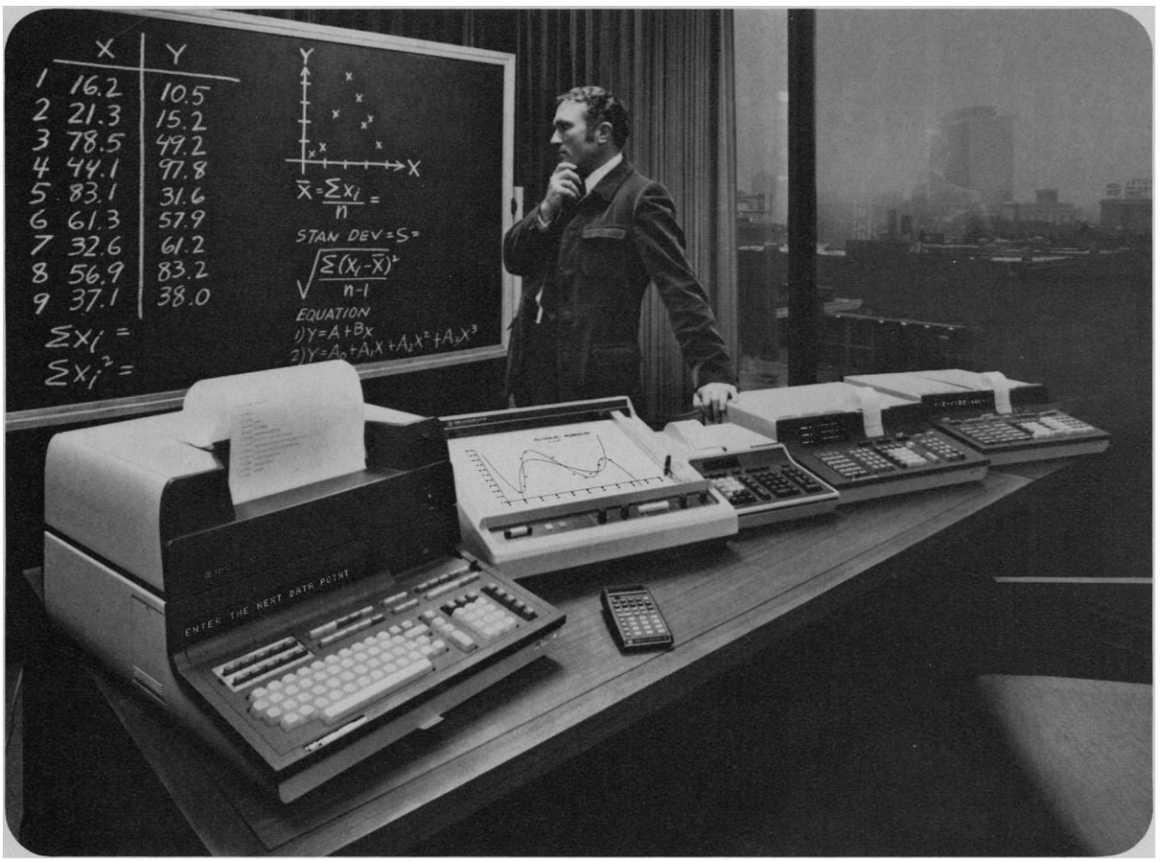

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*(1) Chey, W.Y., Recent advances in Gastrointestinal Hormone Research, Rochester, New York. August 25, 1973.

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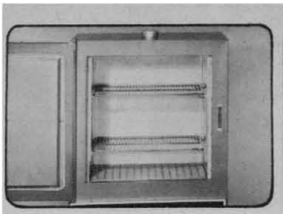

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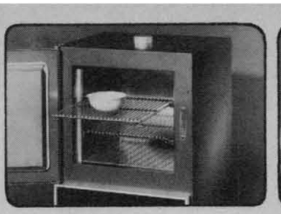

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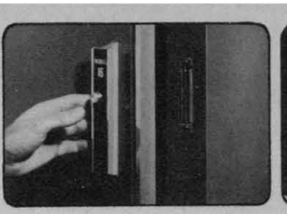

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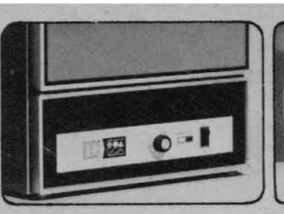

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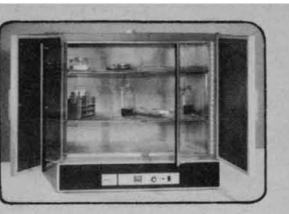

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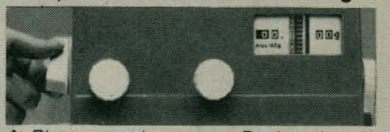

1. Place sample on pan. Push 'release' lever up. Optical scale now indicates weight to nearest gram. (32-33 g)

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3. Push 'release' lever down. Set micrometer, read final weight. (32.2921 g)

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dental ingestion of cosmetics reported in 1968 (*6*) resulted in hospitalization.

More meaningful estimates should emerge from the National Electronic Injury Surveillance System (NEISS), which has recently published its first year's summary of injuries associated with selected consumer products (*7*). Although NEISS has not yet published any extrapolation of its data, the notes on the data state: "Statistically valid projections of all data may be made . . ." (*8*). My own review of their data suggests the following estimates of the number of injuries related to (but not necessarily caused by) cosmetics in fiscal year 1973:

Injuries related to accidental misuse	2100
Injuries related to container	2400
Injuries related to product	9700

This is a remarkable record of safety for an industry that distributes an estimated 6 billion units of thousands of different products each year. In addition, the NEISS figures on accidental ingestion suggest a national total of 15,700 injuries from cosmetics, rather than the estimate of 60,000 injuries from HEW.

MURRAY BERDICK

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References and Notes

1. *Congr. Rec.*, 31 July 1973, p. S-15135.
2. *Cosmetic Safety Act of 1973* (U.S. Senate Bill S.863, 1973).
3. National Commission on Product Safety, *Final Report* (Government Printing Office, Washington, D.C., 1970).
4. National Commission on Product Safety, *Supplemental Studies*, Vol. 1, *Product and Injury Identification* (Government Printing Office, Washington, D.C., 1970).
5. J. H. Morrison, Jr., personal communication. Morrison was, at the time of the study, Chief of Descriptive Epidemiology, Injury Control Program, National Center for Urban and Industrial Health, Department of Health, Education, and Welfare, Washington, D.C.
6. *Bull. Natl. Clgh. Poison Control Cent.*, entire issue (Sept.–Oct. 1969).
7. *NEISS* (*Natl. Electron. Inj. Surveil. Syst.*) *News* **1**, No. 6 (Aug. 1973).
8. *Ibid.*, No. 5 (July 1973).

Exercise and Heart Disease

As a compulsive runner (averaging 5 or 6 miles a day, every day), I want very much to believe that "when the level of vigorous exercise is raised high enough, the [cardiovascular] protection appears to be absolute" (T. J. Bassler, Letters, 12 Oct., p. 113).

Unfortunately, in spite of "the American Medical Joggers Association [having] been unable to document a single death resulting from coronary heart disease among marathon finishers of any age," I can cite at least one. Paavo Nurmi, the "Flying Finn," who won the marathon in the 1928 Olympics and, in the process, set 28 world distance marks, died recently from heart disease (*1*).

Granted, such causality of death is *almost* unheard of. But almost nothing is so absolute as is being contended by Bassler.

DONALD H. PURETZ

Department of Health Education,
Dutchess Community College,
State University of New York,
Poughkeepsie 12601

References

1. *Time* **102**, 110 (15 Oct. 1973).

I agree with T. J. Bassler that the key to prevention of coronary artery disease is exercise, not cessation of coffee drinking. However, Bassler's statement concerning the association between levels of vigorous exercise (marathon running) and apparent absolute protection against heart disease needs to be qualified on at least two points.

1) Marathon runners possess a tremendous aerobic and cardiovascular capacity, with large stroke volumes evident at rest and during exercise (*1*). This capacity is surely the result of vigorous exercise, but additional characteristics of a marathoner's life-style lack any correlation with factors considered to be etiologic in the development of coronary heart disease. In general, marathon runners are nonobese, with 9 percent less fat than normally active people of comparable age (*2*). They do not smoke, do not suffer from hypertension, and do not consume large quantities of alcohol, coffee, or cholesterol-rich foods.

2) The absoluteness of protection marathon running affords against coronary heart disease is related to an individual's ability to maintain some degree of physical activity during the years after finishing the marathon running. Physical fitness is analogous to a tire with a slow leak; as long as one continues to replace the air periodically, one can maintain a certain reserve capacity and avoid flatness (infarction). If done properly and with some degree of regularity, vigorous exercise can have the same high measure of prophylaxis for heart disease that the "pill" has for pregnancy.

DAVID M. YOUNG

9 Columbia Court,
Rockville, Maryland 20850

References

1. D. L. Costill, *J. Am. Med. Assoc.* **221**, 1024 (1972).
2. ———, R. Bowers, W. F. Krammer, *Med. Sci. Sports* **2**, 93 (1970).

As a jogger, I was interested in Bassler's statement that exercise, if sufficiently vigorous, provides "absolute" protection against coronary heart disease. To support this contention, he reports that "the American Medical Joggers Association [AMJA] has been unable to document a single death resulting from coronary heart disease among marathon finishers." But the conclusions to be drawn from this finding are seriously limited by a host of selective factors, both medical and psychological, which might induce a person to participate in marathons.

Since Bassler's statement does not brook exception, one cannot resist bringing up the case of the *first* marathon finisher, sometimes identified as Pheidippides, an Athenian courier. Tradition has it that after the Athenian victory over the Persians on the Plain of Marathon, he ran the more than 22 miles to Athens, cried out in the marketplace, "Rejoice, we conquer," and fell dead. A complicating factor in Pheidippides' demise is that the week before his marathon run, he was called upon to run from Athens to Sparta (in an unsuccessful search for aid in the forthcoming battle), a distance of 150 miles, which he reportedly completed in 36 hours. Since, in this case, documentation of the exact cause of death is unavailable, I, for one, am willing to give Bassler and the AMJA the benefit of the doubt.

ALAN BARON
Department of Psychology,
University of Wisconsin,
Milwaukee 53201

Transplantation of Cultured Tissue

The report "Tissue cultures: Transplantation without immune suppression" by Thomas H. Maugh II (Research News, 7 Sept., p. 929) does not refer to published reports regarding the failure of animals to reject transplants of cultured cells. In 1966, while in the laboratory of the late I. L. Chaikoff at the University of California, Berkeley, I demonstrated (*1*) that cells dispersed from the thyroid glands of adult rats by treatment with proteolytic enzymes and cultured as monolayers for 3 days are readily accepted when implanted subcutaneously into the backs of thyroidectomized, outbred rats. The implanted cells undergo a complete reorganization, aggregating into follicles identical in structure with those seen in the normal rat thyroid gland, complete with colloid formation. The implants appeared to be in excellent condition as many as 151 days after implantation (the longest interval studied), which indicates that the implanted cells did not elicit an immune response in the recipient animals. However, fresh thyroid tissue implanted into rats thyroidectomized by the same procedure was rejected.

The glands formed from the cultured cells were completely functional, as indicated by their capacity to utilize injected radioiodine in a manner essentially similar to that of the thyroid tissue of normal control rats, even maintaining the same concentration of isotopically labeled thyroxine in the circulation. Normal follicular structure was restored after complete dispersal of adult thyroid tissue by proteolytic enzymes, and normal thyroid function was reinstituted in the recipients.

This work has been presented in seminars at a number of universities and research institutions in the United States, Canada, and England, and was included in the 1966–1967 *Year Book of Endocrinology* (2).

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References

1. P. R. Kerkof and I. L. Chaikoff, *Endocrinology* **78**, 1177 (1966).
2. ———, in *Year Book of Endocrinology, 1966–1967*, T. B. Schwartz, Ed. (Year Book, Chicago, 1967), p. 99.

Administration of Grant Funds

The tight situation with respect to grant money has made it difficult for my bright, younger colleagues to obtain funding for research at a critical time in their careers. This makes it imperative that appropriations to the granting agencies be as effectively allocated as possible. Every dollar should go into the research for which Congress approved it. In these lean times, the investigator cannot support an institutional bureaucracy with his research funds. It is undeniable that the universities need and deserve federal assistance. However, this should come from programs specifically for such purpose, not from research funds.

I review proposals to the National Science Foundation and am upset by the large slice of potential research funds taken by institutions to administer the grants. These are calculated as a percentage of "salaries and wages," from 45 percent for on-campus research and from 30 percent for off-campus research. I am told that this is necessary to cover the expense of the paperwork.

This summer I had the enlightening experience of receiving a modest grant from a nongovernment organization. A check for the entire grant sum was sent to me. Thus I had all the administrative burdens of handling the paperwork, paying an assistant, and ordering supplies. I found that writing a letter and a check to cover a purchase took much less time than filling out a request form, having a requisition form typed, signing it, routing it for the signatures of three officials, and awaiting the happy day, a week or more later, when a purchase order finally made it off campus. Obviously my supplies arrive sooner if I do not have the expensive "help" of university red tape.

The message should be clear. Limited research funds could be spread productively to more investigators if grants could be awarded directly to the principal investigator to administer. If an institutional framework is necessary to prevent dishonesty or incompetence on the part of scientists, does the institution not receive sufficient reward in the form of recognition of its faculty's research, the intellectual sharpening of a faculty actively pursuing new knowledge, and the capital equipment it obtains for the research?

Even if a case could be made for indirect costs, some bureaucracies appear to be more efficient than others. My institution "gets by" on 46 percent of salaries and wages, while others need 60 to 65 percent. Does this not suggest that some red tape could be eliminated, permitting more research per dollar awarded?

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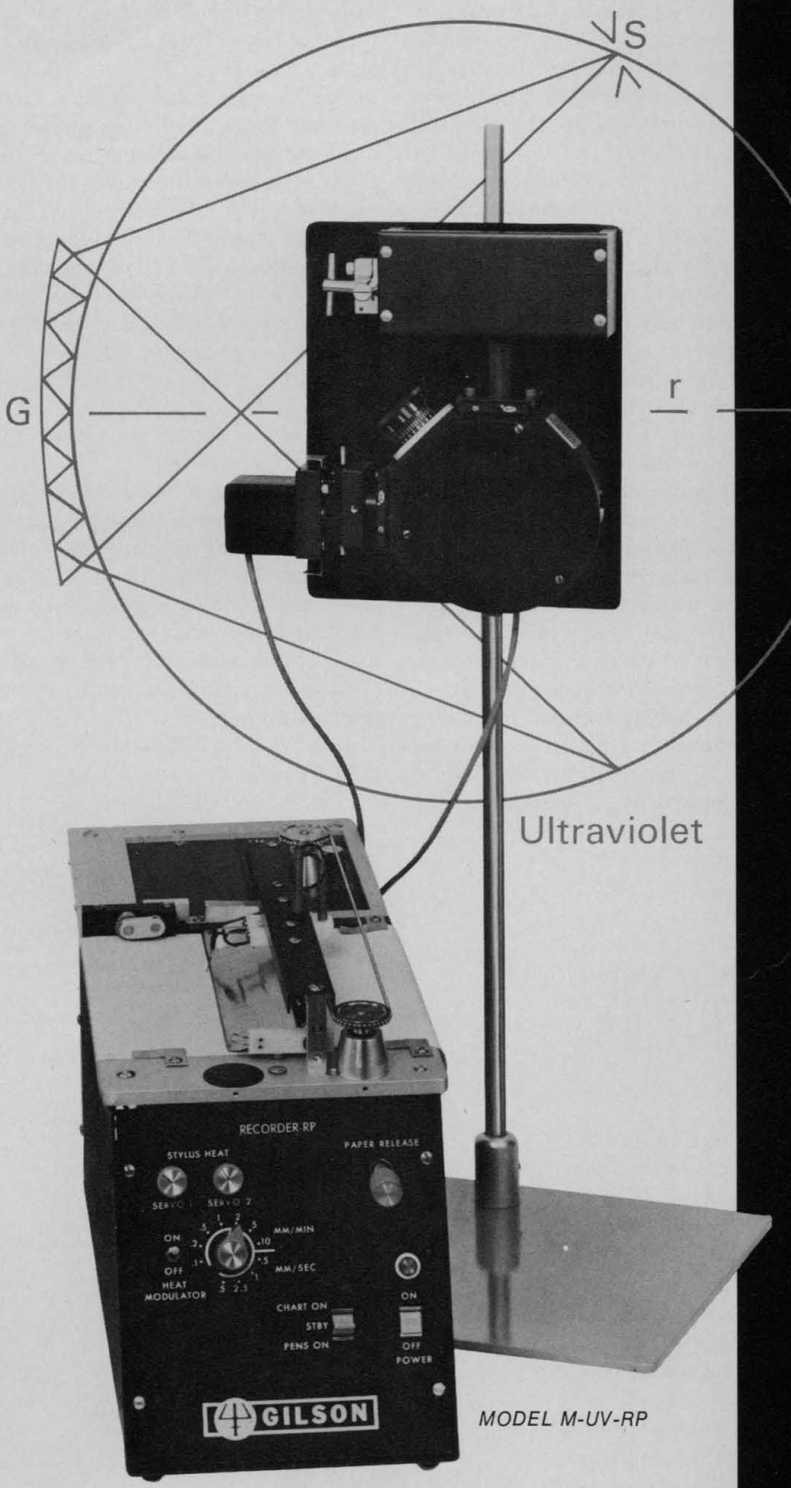

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14 December 1973, Volume 182, Number 4117 **SCIENCE**

Increasing World Energy Supplies

Even were the Middle East conflict to end tomorrow, even were Israel to vanish, the world would not resume the relationships of early 1973. The oil-consuming nations have become aware of their vulnerability. The oil-producing and exporting countries have learned that they have the power to drive up the price for oil while making erstwhile great nations subservient.

Up to a point, the producing countries have justice on their side. Until recently, they received about $2 a barrel (42 gallons, or about 159 liters) for their nonrenewable resources. Western Europe and Japan enjoyed great prosperity, in part at the expense of the oil producers. A readjustment in relationships was inevitable. The price increases, which began to quicken 2 years ago, then had a doubling time of about 2 years. Recently, the doubling time has been on the order of weeks, and a news account says that the Russians sold a shipment of oil to the Danes for $30 a barrel. How far will the oil producers go? A price adjustment and more sparing use of energy is one thing. Economic chaos for Western Europe and Japan and hardship for other consuming nations is another. The situation could deteriorate to the kind of disaster that the Russians have longed for.

Prospects are grave enough to make it desirable for the United States urgently to consider how it might exercise world leadership.

For its part, the United States has enormous resources of industrial, technological and scientific capability. It also has oil shale and coal whose total potential is more than ten times that of the Middle East oil fields. Conventional U.S. sources of petroleum on land and on the continental shelves are substantial and could be expanded rather quickly if the social and financial climate were favorable. However, we should not assume the burden alone. The Canadians possess the great Athabasca Tar Sands, with oil potential perhaps twice that of the Arabs. The Japanese and the Western Europeans could contribute hardware and technological skills toward development of the Tar Sands.

A combination of rigorous conservation and additional sources of hydrocarbons could free the world of the threat of chaos and place limits on the price the oil-producing countries could exact. Even the prospect that the United States and others were moving decisively together would have a moderating effect on Arab behavior.

Such an effort would require the expenditure of $100 billion or more by industry and governments as well as superb organization. Given a performance comparable to our best in World War II, large additional amounts of hydrocarbons could be available in 2 or 3 years.

The technology for producing oil from the Athabasca Tar Sands is already tested. Costs are about $4 per barrel. Conventional earth-moving equipment is used to mine the oil sands. The crude oil is separated from sand by treatment with hot water. A vast increase in production would require leadership by the Canadians and suitable arrangements for providing the production equipment.

The development of the potential for very large additional hydrocarbon production in the United States would entail innovation. Underground retorting of the Green River Shale could permit large-scale production of oil with minimal environmental impact at costs of $4 a barrel or less.

To date, our approach to the energy problem has been self-centered and weak. We have talked of energy independence in 1980, and the Atomic Energy Commission has produced a report that is not even a blueprint for such a limited objective. We are capable of greatness, and we should demonstrate it.—PHILIP H. ABELSON

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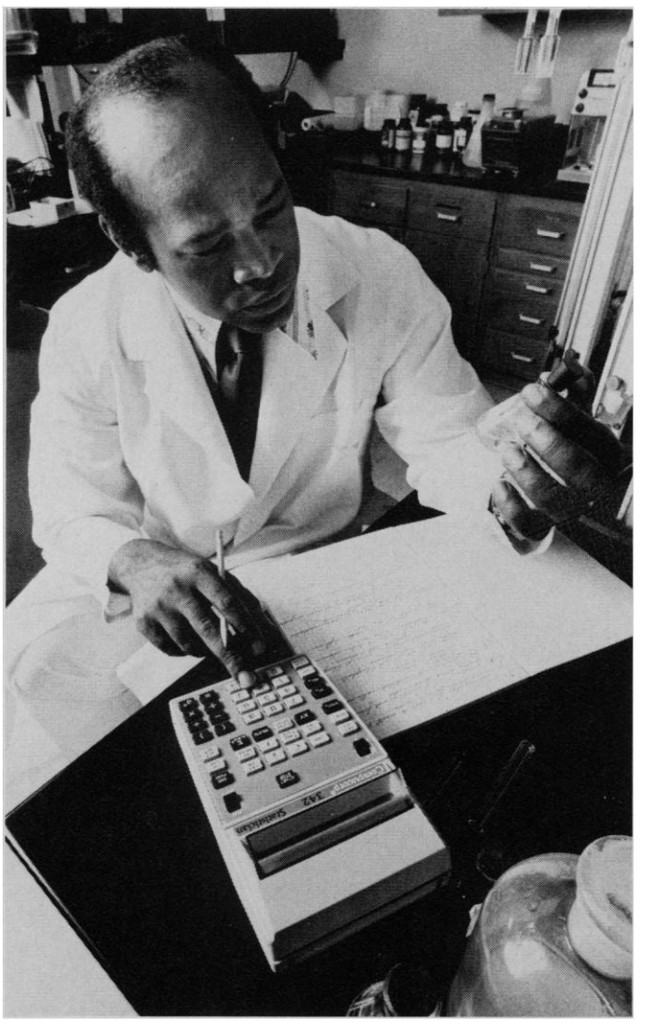

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ribosomal RNA in amphibian oocytes and HeLa cells presented one interesting feature. Neighboring ribosomal precursor RNA genes in a cluster were separated by segments of DNA that apparently are not transcribed.

Richard Losick (Harvard University) discussed the changes in RNA polymerase in sporulating *Bacillus subtilis*. Along with an early change in template specificity and a subsequent replacement of one β-subunit of the RNA polymerase, an additional sigma-like protein appears which may direct the transcription of sporulating genes. Henry Paulus (Harvard Medical School) described a similar sporulating system, that of *Bacillus brevis*, where the antibiotic tyrothricin and other small molecules like cyclic 3′,5′-guanosine monophosphate, adenosine triphosphate, deoxyadenosine triphosphate, and nicotinamide adenine dinucleotide might be involved in control of transcription. A. M. Chakraborty (General Electric Research and Development Center) described the expression of plasmid genes in *Pseudomonas* capable of breaking down hydrocarbons and indicated that these bacteria may be useful in sewage treatment and in keeping the oceans free of oil sludge. U. N. Singh (Tata Institute of Fundamental Research, Bombay) presented a theoretical analysis of stringent coupling between transcription, translation, and degradation of messenger RNA (mRNA) in an inducible system. Andrew Travers (Medical Research Council Laboratory of Molecular Biology, England) discussed open and closed conformations of promoters in *Escherichia coli*. Interaction with other protein effectors like the protein synthesis elongation factors Tu and Ts may regulate the conformation of RNA polymerase itself and control the initiation specificity of the enzyme with respect to different promoters.

On the subject of bacteriophage, E. K. F. Bautz (University of Heidelberg, West Germany) compared RNA initiation by T3 RNA polymerase, which consists of one subunit only, and by host RNA polymerase. Umadas Maitra (Albert Einstein College of Medicine) showed that T3 specific RNA polymerase initiates RNA chains exclusively with guanosine triphosphate and can terminate RNA chains faithfully without any additional factors in vitro. Audrey Stevens (Oak Ridge National Laboratory) indicated that some small proteins coded by T4 bacteriophage might be involved in late production of T4 mRNA. Salil K. Niyogi (Oak Ridge National Laboratory) discussed the use of specific dinucleoside monophosphates in the elucidation of RNA initiation sequences during in vitro transcription of T4 DNA. Mituru Takanami (Kyoto University, Japan) discussed the physical mapping of transcribed regions of coliphage fd by cleaving its RF-DNA (replicate form of DNA) with restriction enzymes. Maharani Chakravorty (Banaras Hindu University, Varanasi) implicated the *sie* and m_3 genes of phage P22 in the control of transcription in host *Salmonella typhimurium*. R. K. Poddar (Saha Institute of Nuclear Physics, Calcutta) described some changes in induced enzyme synthesis in *E. coli* infected with ϕX 174 phage.

A number of speakers dealt with the bacteriophage lambda, which is the most well studied system with respect to control of transcription. Waclaw Szybalski (University of Wisconsin) elaborated on the multielement structure of the sites of initiation of transcription in lambda phage and on its positive and negative controlling elements. The transcriptional controls operating during development of lambda phage are strongly interlocked and coupled to DNA replication. Sushil Kumar (Indian Agricultural Research Institute, New Delhi) implicated two *E. coli* functions *tra*L and *tra*R in the control of the leftward and rightward transcription of lambda DNA. Sudhamoy Ghosh (Bose Institute) described a DNA-binding protein factor (factor D) that could improve the initiation fidelity of lambda DNA transcription. Sankar Adhya (National Cancer Institute) discussed the possible role of the gene *N* product of lambda as antiterminator of the phage versus host RNA transcription by counteracting the effect of the bacterial rho factor.

Joe Sambrook (Cold Spring Harbor Laboratory) discussed the control of transcription of SV40 DNA. Most cell lines transformed by SV40 contained three types of virus-specific RNA's which might be involved in maintaining the transformed character. Amiya K. Banerjee (Roche Institute of Molecular Biology) described the transcription of the reovirus that contains double-stranded RNA as its genome. A. S. Bhagwat (Bhabha Atomic Research Centre, Bombay) described the isolation of two protein fractions that may act as repressors for specific RNA synthesis during growth of *Neurospora crassa*.

The control of transcription in eukaryotes presents much more complex problems because of the structural

and functional complexity of chromosomes. W. J. Rutter (University of California at San Francisco) compared the properties of multiple RNA polymerases 1, 2, and 3 from different eukaryotic organisms and their organelles. Pierre Chambon (Institut de Chimie Biologique, Strasbourg) described the characterization of RNA products synthesized on circular SV40 DNA by A and B RNA polymerases of rat liver, calf thymus, and *E. coli*. The most interesting point was that, while *E. coli* holoenzyme transcribes SV40 DNA asymmetrically, the animal enzymes do it symmetrically, apparently indicating that the animal enzymes lacked the sigma-like discriminatory factor. P. H. W. Butterworth (University College, London) discussed the importance of selecting suitable DNA templates whose integrity affects the activity of different RNA polymerases. The only report of a sigma-like factor from any eukaryotic system was made by B. B. Biswas (Bose Institute), who studied multiple RNA polymerases and two protein factors from plant cell nuclei. He also presented evidence that an indoleacetic acid acceptor protein from the same source can modulate RNA synthesis in vitro in a completely homologous system. R. K. Mandal (Bose Institute) indicated that the low transcriptional activity of avian erythrocyte nuclei might be due to the absence of factors of RNA polymerase although the enzymes and templates were there. G. P. Talwar (All India Institute of Medical Sciences, New Delhi) discussed the expression of the phosvitin-synthesizing gene in chickens by the action of estradiol, which favors clonal proliferation and also effects transcription of the competent genes.

The transport of mRNA in eukaryotes presents a special problem in that their sites of synthesis and function are separated. E. M. Lukanidin (Academy of Sciences, Moscow) dealt with the regulation of precursor mRNA biosynthesis and transport. He implicated special protein particles (termed informofers) in the processing and transfer of mRNA across the nuclear membrane. Mary Edmonds (University of Pittsburgh) discussed the isolation and characterization of poly A sequences covalently linked to polysomal mRNA and heterogeneous nuclear RNA, thus indicating their precursor-product relation.

Reverse transcription, that is, RNA-dependent DNA synthesis, was the topic of discussion by three speakers. Robert C. Gallo (National Cancer In-

stitute) described the RNA-directed DNA polymerase in human leukemic cells. M. R. Das (Tata Institute of Fundamental Research, Bombay) discussed the same enzyme in viruslike particles in the milk of women with breast cancer. Inder M. Verma (Massachusetts Institute of Technology) described the use of reverse transcriptase to synthesize DNA complementary to mRNA's. This may be a useful step in producing specific eukaryotic genes.

A symposium on transcription would not, perhaps, be complete without a discussion of the role of transcription in DNA replication. Sankar Mitra (Oak Ridge National Laboratory) dwelt on the transcriptional control of M13 phage DNA synthesis. R. B. Wickner (Albert Einstein College of Medicine) described two enzyme systems in *E. coli* which are required for conversion of fd DNA to the replicative form, in addition to DNA polymerase 2. One of these systems might involve RNA polymerase. The same was not true for ϕX 174 DNA. W. Szybalski (University of Wisconsin) discussed a primer RNA 81 nucleotides in length which plays a role in the initiation of phage lambda DNA replication.

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Forthcoming Events

January

14–18. **Biology and Chemistry of Eucaryotic Cell Surfaces** Conf., 6th, Intern. Union of Biochemistry, Miami, Fla. (Miami Winter Symposia, P.O. Box 906, Biscayne Annex, Miami 33152)

14–18. International Soc. of **Magnetic Resonance**, 5th, Bombay, India. (D. Fiat, Weizmann Inst. of Science, Rehovot, Israel)

14–25. International Assoc. of **Meteorology and Atmospheric Physics**, Melbourne, Australia. (G. B. Tucker, Commonwealth Meteorology Research Centre, P.O. Box 5089AA, Melbourne 3001)

15–17. American Soc. for **Surgery of the Hand,** Dallas, Tex. (J. A. Boswick, Jr., 4200 E. Ninth Ave., Denver, Colo. 80220)

15–19. American **Mathematical** Soc., San Francisco, Calif. (E. Pitcher, Dept. of Mathematics, Lehigh Univ., Bethlehem, Pa. 18015)

15–19. National Soc. of **Professional Engineers**, Biloxi, Miss. (P. H. Robbins, NSPE, 2029 K St., NW, Washington, D.C. 20006)

17–18. Symposium on **Blood**, 22nd, Detroit, Mich. (E. F. Mammen, Dept. of Physiology, Wayne State Univ., School

of Medicine, Gordon H. Scott Hall of Basic Medical Sciences, Detroit, Mich. 48201)

17–19. International Conf. of **Communications**, Inst. of Electrical and Electronics Engineers, Minneapolis, Minn. (M. S. Ulstad, ICC, P.O. Box 35366, Minneapolis 55435)

17–19. **Mathematical** Assoc. of America, San Francisco, Calif. (H. L. Alder, Dept. of Mathematics, Univ. of California, Davis 95616)

19–23. American Acad. of **Allergy**, Bal Harbour, Fla. (J. O. Kelley, AAA, 225 E. Michigan St., Milwaukee, Wis. 53202)

19–24. American Acad. of **Orthopaedic Surgeons**, Dallas, Tex. (C. V. Heck, AAOS, 430 N. Michigan Ave., Chicago, Ill. 60611)

20–23. International Conf. on **Metric Education**, Univ. of Southern Mississippi, Biloxi. (G. Tinnon, Southern Station, Box 56, Hattiesburg, Miss. 39401)

20–25. Regional **Hospital** Conf. in Latin America, 4th, Caracas, Venezuela. (Intern. Hospital Federation, Pan-American Office, 1 Farragut Square S, Washington, D.C. 20006)

20–26. American **Library** Assoc., Chicago, Ill. (D. H. Clift, ALA, 50 East Huron St., Chicago 60611)

20–1. **Dermatology**, intern. conf., Nairobi, Kenya. (E. F. Finnerty, North American Clinical Dermatologic Soc., 510 Commonwealth Ave., Boston, Mass. 02215)

21–23. **Hemophilia—Recent Advances in Biochemistry, Physiology, and Therapy**, New York Acad. of Sciences and the Natl. Hemophilia Foundation, New York, N.Y. (G. R. Gruber, NYAS, 2 E. 63 St., New York 10021)

21–23. International Conf. on **Metric Education**, Biloxi-Gulfport, Miss. (G. Tinnon, Dept. of Confs. and Workshops, Southern Station, Box 56, Hattiesburg 39401)

21–25. **Highway Research** Board, Washington, D.C. (W. N. Carey, 2101 Constitution Ave., NW, Washington, D.C. 20418)

23–24. American Assoc. of **Small Research Companies**, Washington, D.C. (S. Z. Cardon, General Technical Services, Inc., 8794 Chester Pike, Upper Darby, Pa. 19082)

23–27. American College of **Angiology**, Phoenix, Ariz. (A. Halpern, ACA, 381 Park Ave., S., New York 10016)

25. **Bibliographical** Soc. of America, New York, N.Y. (C. Hover, Box 397, Grand Central Sta., New York 10017)

25–27. Southern **Radiological** Conf., Point Clear, Ala. (M. Eskridge, P.O. Box 7544, Mobile, Ala. 36607)

25–3. North American Conf. on **Fertility and Sterility**, Caracas, Venezuela. (U.S. Intern. Foundation for Studies in Reproduction, Inc., 112-44 69th Ave., Forest Hills, N.Y. 11375)

27–1. Institute of Electrical and Electronics Engineers, **Power Engineering** Soc., New York, N.Y. (J. W. Bean, Tech. IEEE, 345 E. 47 St., New York 10017)

28–30. American Inst. of **Aeronautics and Astronautics**, Washington, D.C. (J. J. Harford, AIAA, 1290 Avenue of the Americas, New York 10019)

28–30. Conference on **Structure-Property Relationships in Thick Film and Bulk Coatings,** Vacuum Metallurgy Div., American Vacuum Soc., Inc., San Francisco, Calif. (R. F. Bunshah, 6532 Boelter Hall, Univ. of California, Los Angeles 90024)

28–30. Society of **Thoracic Surgeons,** Los Angeles, Calif. (W. G. Purcell, STS, 111 E. Wacker Dr., Chicago, Ill. 60601)

28–1. Asia and Oceania Congr. of **Endocrinology,** 5th, Chandigarh, India. (G. K. Rastogi, Endocrinology Sect., Postgraduate Medical Inst., Chandigarh-11)

29–30. Academy Forum on **Energy,** Natl. Acad. of Sciences, Washington, D.C. (R. R. White, NAS, 2101 Constitution Ave., NW, Washington, D.C. 20418)

29–31. **Reliability and Maintainability** Symp., American Soc. of Mechanical Engineers, Los Angeles, Calif. (P. Drumond ASME, 345 E. 47 St., New York 10017)

29–1. Association for **Development of Computer-Based Instructional Systems,** Washington, D.C. (R. Pengov, Div. of Computing Services, Ohio State Univ. College of Medicine, 376 W. 10 Ave., Columbus, Ohio 43210)

30–1. Western **Spectroscopy** Assoc., 21st annual conf., Pacific Grove, Calif. (G. R. Haugen, L-404, Lawrence Livermore Lab., Univ. of California, Livermore 94550)

February

1–3. American **Medical** Assoc., 70th annual, Chicago, Ill. (C. H. W. Ruhe, AMA, 535 N. Dearborn St., Chicago 60610)

3–7. American Soc. of **Heating, Refrigerating and Air-Conditioning Engineers,** semiannual mtg., Los Angeles, Calif., (J. H. Cansdale, ASHRA-CE, United Engineering Center, 345 E. 47 St., New York 10017)

3–8. Society for **Range Management,** Tucson, Ariz. (F. T. Colbert, 2120 South Birch St., Denver, Colo. 80222)

4–7. American **Physical** Soc., Chicago, Ill. (W. W. Havens, Jr., APS, 335 E. 45 St., New York 10017)

4–7. American Assoc. of **Physics Teachers,** Chicago, Ill. (A. A. Strassenburg, AAPT, Drawer AW, Stony Brook, N.Y. 11790)

4–9. East African Medical Research Council Conf. on the **Growth, Development and Survival of the Child in the African Environment,** Kampala, Uganda. (F. Kamunvi, P.O. Box 1002, Arusha, Tanzania)

4–9. World Congr. of **Sports Medicine,** 19th, Melbourne, Australia. (A. H. Toyne, WCSM, 61 Collins St., Melbourne)

5–7. Interdisciplinary National Conf. on **Biomedical Research Problems in a Changing World,** Washington, D.C. (R. Friedenberg, Suite 807, Medi-Science, Inc., 7979 Old Georgetown Rd., Bethesda, Md. 20014)

6–9. American Inst. of **Mining, Metallurgical and Petroleum Engineers,** 77th natl., Denver, Colo. (A. R. Scott, AIMMPE, 345 E. 47 St., New York 10017)

7–8. **Applied Vacuum Science and Technology** Symp., Southeastern Regional Administrative Group, American Vacuum Soc., Tampa, Fla. (J. L. Provo, AVS,

P.O. Box 11508, St. Petersburg, Fla. 33733)

7–9. **World Population** Soc., Inst. for Global Dynamics, Washington, D.C. (C. M. Cargille, WPS Soc., American Univ., Washington, D.C. 20016)

9–14. **Environmental Engineering in Food Industry,** 4th conf., Pacific Grove, Calif. (Engineering Foundation, 345 E. 47 St., New York 10017)

10–16. American Soc. of **Contemporary Medicine and Surgery,** Miami Beach, Fla. (V. Kendall, Room 1506, 30 N. Michigan Ave., Chicago, Ill. 60602)

10–16. American Soc. of **Contemporary Ophthalmology,** Miami Beach, Fla. (V. Kendall, Room 1506, 30 N. Michigan Ave., Chicago, Ill. 60602)

11–14. American College of **Cardiology,** New York, N.Y. (W. D. Nelligan, ACC, 9650 Rockville Pike, Bethesda, Md. 20014)

11–14. Symposium on **Physical Exercise in Health and Disease,** Wellington Postgraduate Medical Soc., Inc., Wellington, New Zealand. (WPMS, Inc., Wellington Hospital, Wellington)

12–14. **Aerospace and Electronic Systems** Conf., Inst. of Electrical and Electronic Engineers, Los Angeles, Calif. (Los Angeles Council Office, 3600 Wilshire Blvd., Los Angeles 90010)

12–14. **Computer Science** Conf., Assoc. for Computing Machinery, Detroit, Mich. (S. J. Wolfson, CSC, Computer Sciences Section, Wayne State Univ., Detroit 48202)

12–14. International Inst. for **Sugar Beet Research,** 37th winter congr., Brussels, Belgium. (O. J. Kint, Baudouinstraat 150, Tienen, Belgium)

13–15. Society of **Photographic Scientists and Engineers,** Houston, Tex. (R. H. Wood, SPSE, 1330 Massachusetts Ave., NW, Washington, D.C. 20005)

13–15. International **Solid State Circuits** Conf., Inst. of Electrical and Electronic Engineers, Philadelphia, Pa. (Office of Technical Activities Board, IEEE, 345 E. 47 St., New York 10017)

13–16. American Acad. of **Forensic Sciences,** Dallas, Tex. (H. L. Kimball, P.O. Box 302, New Hartford, Conn. 06057)

13–16. National Assoc. of **Medical Examiners,** Dallas, Tex. (W. G. Ecker, Laboratory, St. Francis Hospital, Wichita, Kan. 67214)

14–16. Society of **University Surgeons,** St. Louis, Mo. (E. W. Fonkalsrud, Dept. of Surgery, Univ. of California Medical Center, Los Angeles 90024)

14–18. American **Group Psychotherapy** Assoc., New York, N.Y. (M. Keefe, AGPA, 1865 Broadway, New York 10023)

15–20. **Biofeedback Research** Soc., 5th annual mtg., Colorado Springs, Colo. (F. Butler, Dept. of Psychiatry, #202, Univ. of Colorado Medical Center, 4200 E. Ninth Ave., Denver 80220)

19–23. American College of **Surgeons,** San Juan, P.R. (S. H. Fromm, 117 San Pedro, Urb. Horizon, Rio Piedras, P.R. 00926)

20–23. Society of **Professors of Education,** Chicago, Ill. (R. E. Bayles, School of Education, Atlanta Univ., Atlanta, Ga. 30314)

21–23. Texas **Junior College Teachers**

Assoc., San Antonio. (G. Burrier, TJCTA, South Plains College, Levelland, Tex. 79336)

23–28. American Inst. of **Mining, Metallurgical and Petroleum Engineers,** Dallas, Tex. (J. B. Alford, AIMMPE, 345 E. 47 St., New York 10017)

24–26. Canadian **Ceramic** Soc., Montreal, P.Q. (H. L. Taylor, Suite 110, 2175 Sheppard Ave., Willowdale, Ont., Canada)

24–28. **Medical** Soc. of the State of New York, New York. (H. I. Fineberg, 420 Lakeville Rd., Lake Success, N.Y. 11040)

24–1. American Association for the **Advancement of Science,** annual mtg., San Francisco, Calif. (E. Zeutschel, AAAS Meetings Office, 1515 Massachusetts Ave., NW, Washington, D.C. 20005)

25–27. **Physical Electronics** Conf., 34th annual, American Physical Soc., Murray Hill, N.J. (H. D. Hagstrum, Bell Labs., 600 Mountain Ave., Murray Hill 07974)

25–2. American **Nature Study** Soc., San Francisco, Calif. (B. McKnight, Faculty of Education, State University College, New Paltz, N.Y. 12561)

26–28. **Flow Measurements as Related to National Needs** Conf., Mechanics Div., Inst. for Basic Standards, and Natl. Bureau of Standards, Gaithersburg, Md. (L. K. Irwin, Mechanics Div., Physics Bldg. B214, Natl. Bureau of Standards, Washington, D.C. 20234)

26–1. **Climatic Impact Assessment** Program, 3rd conf., U.S. Dept. of Transportation, Cambridge, Mass. (E. F. Rice, Code AMR, Transportation Systems Center, Kendall Sq., Cambridge 02142)

26–1. Symposium on **Fundamental Cancer Research,** 27th, Houston, Tex. (J. Brandenberg, M.D. Anderson Hospital and Tumor Inst., Houston 77025)

27–2. Association for **Children with Learning Disabilities,** 11th annual intern. conf., Houston, Tex. (L. I. Lock, ACLD, 2200 Brownsville Rd., Pittsburgh, Pa. 15210)

27–2. **Pediatric Neurology and Neurosurgery,** intern. mtg., Mexico City, Mexico (F. Rueda-Franco, Neurology and Neurosurgery Service, Hospital de Niño IMAN, Ave., Insurgentes Sur 3700-C, Mexico, 22, D.F.)

March

1–3. **Student American Medical** Assoc., Dallas, Tex. (C. C. Hewitt, 1400 Hicks Rd., Rolling Meadows, Ill. 60008)

1–8. American Soc. of **Clinical Pathologists,** Los Angeles, Calif. (J. Graves, Intersociety Committee on Pathology Information, Inc., 9650 Rockville Pike, Bethesda, Md. 20014)

2–6. California **Medical** Assoc., San Francisco. (R. L. Thomas, 693 Sutter St., San Francisco 94102)

3–9. Noah Worcester **Dermatological** Soc., Marco Island, Fla. (H. Poltnick, 1553 Woodward, Detroit, Mich. 48226)

4–8. **Medical Data Processing** Symp., French Inst. for Research in Information and Automation, Toulouse. (E. E. Van Brunt, Project Chief, Medical Data System, Medical Methods Research, 3779 Piedmont Ave., Oakland, Calif. 94611)

5. **Computerized Laboratory Systems** Symp. American Soc. for Testing and Materials, Cleveland, Ohio. (J. B. Wheeler, ASTM, 1916 Race St., Philadelphia, Pa. 19103)

6–7. Conference on **Use of Wastewater in the Production of Food and Fiber,** Oklahoma City, Okla. (R. L.-R. Carpenter, Oklahoma State Dept. of Health, NE 10th and Stonewall, Oklahoma City 73105)

7–8. American **Psychopathological** Assoc., 64th annual, Boston, Mass. (J. Cole, Boston State Hospital, 591 Morton St., Boston 02124)

7–9. Central **Surgical** Assoc., Cincinnati, Ohio. (A. J. Walt, 540 E. Canfield Ave., Detroit, Mich. 48201)

9–12. American Assoc. of **Pathologists and Bacteriologists,** San Francisco, Calif. (A. J. French, 1335 E. Catherine St., Ann Arbor, Mich. 48104)

9–16. International Acad. of **Pathology,** San Francisco, Calif. (L. D. Stoddard, Medical College of Georgia, Augusta 30902)

10–14. International **Anesthesia Research** Soc., 48th congr., San Francisco, Calif. (B. B. Sankey, 3645 Warrensville Center Rd., Cleveland, Ohio 44122)

10–14. Society of **Toxicology,** Washington, D.C. (R. A. Scala, Medical Research Div., Esso Research and Engineering Co., Linden, N.J. 07036)

10–15. American Soc. of **Photogrammetry,** St. Louis, Mo. (L. P. Jacobs, 105 N. Virginia Ave., Falls Church, Va. 22046)

11–14. American Soc. of **Neurochemistry,** 5th annual, New Orleans, La. (S. H. Appel, Duke Univ. Medical Center, Durham, N.C. 27706)

11–15. Symposium on **Isotope Techniques in Groundwater Hydrology,** Intern. Atomic Energy Agency, Vienna, Austria. (J. H. Kane, Office of Information Services, U.S. Atomic Energy Commission, Washington, D.C. 20545)

12–14. National Federation of **Abstracting and Indexing** Services, Chicago, Ill. (S. Keenan, NFAIS, 3401 Market St., Philadelphia, Pa. 19104)

13. Symposium on **Sickle Cell Anemia and Other Hemoglobinopathies**—Teaching Day in Hematology, Research Foundation of the State Univ. of New York, Brooklyn, N.Y. (B. Kearney, Box 20, Downstate Medical Center, 450 Clarkson Ave., Brooklyn 11203)

13–15. American Acad. of **Occupational Medicine,** San Francisco, Calif. (J. M. MacMillan, Reynolds Metals Co., P.O. Box 27003, Richmond, Va. 23261)

15–19. National **Science Teachers** Assoc., Chicago, Ill. (R. H. Carleton, NSTA, 1201 16th St., NW, Washington, D.C. 20036)

17–20. American Assoc. of **Dental Schools,** Atlanta, Ga. (B. F. Miller, AADS, 1625 Massachusetts Ave., NW, Washington, D.C. 20036)

20–22. International Topical Conf. on **Tetrahedrally Bonded Amorphous Semiconductors,** Yorktown Heights, N.Y. (M. H. Brodsky, IBM Corp., T. J. Watson Research Center, Yorktown Heights, 10598)

21–22. Symposium on the **Preventability of Perinatal Injury,** Natl. Foundation–March of Dimes, New York, N.Y. (Coordinator, SPPI, NF–MD, 315 Park Ave., S., New York 10010)

21–23. Florida **Acad. of Sciences,** Or-

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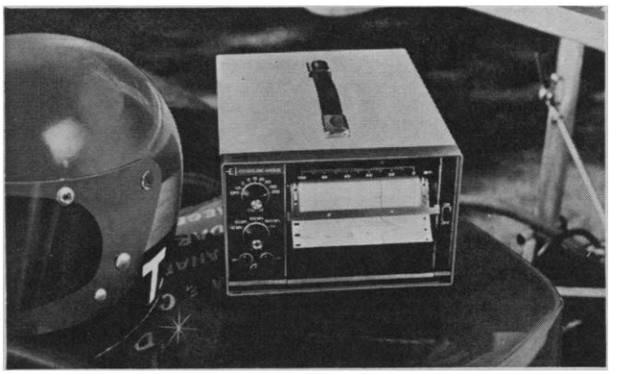

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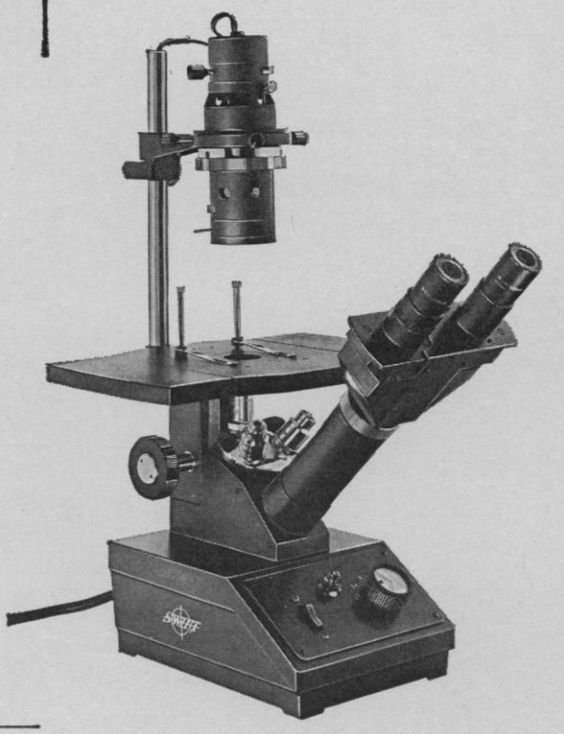

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21–23. Mississippi **Acad. of Sciences**, Biloxi. (C. L. Dodgen, University Medical Center, Jackson, Miss. 39216)

21–24. International Assoc. for **Dental Research**, North American Div., Atlanta, Ga. (A. R. Frechette, IADR, 211 E. Chicago Ave., Chicago, Ill. 60611)

22–23. Michigan **Acad. of Science, Arts and Letters**, East Lansing. (D. Stokes, 1006 Rackham Bldg., Univ. of Michigan, Ann Arbor 48104)

25–26. State **Medical** Soc. of Wisconsin, Milwaukee. (E. R. Thayer, Box 1109, Madison, Wis. 53701)

25–28. American College of **Surgeons**, Houston, Tex. (E. W. Gerrish, ACS, 55 E. Erie St., Chicago, Ill. 60611)

25–28. Institute of **Electrical and Electronics Engineers**, New York, N.Y. (D. G. Fink, IEEE, 345 E. 47 St., New York 10017)

25–29. **Molecular Biology and Mechanisms of Virus Disease**, winter confs., Intern. Chemical and Nuclear Corp. and the Univ. of California at Los Angeles, Squaw Valley, Calif. (Conf. Office, Virus Research, c/o Dept. of Bacteriology, Univ. of California, Los Angeles 90024)

26–27. **Reducing Fuel Consumption and Emissions by Combustion Modifications**, Central States Section, Combustion Inst., Madison, Wis. (G. Borman, Univ. of Wisconsin, 1513 University Ave., Madison 53706)

27. American Soc. of **Clinical Oncology**, Houston, Tex. (A. Evans, Children's Hospital of Philadelphia, 1740 Bainbridge St., Philadelphia 19146)

27–29. **Nuclear Structure and High Energy Physics** Conf., Inst. of Physics, Glasgow, Scotland. (IP, 47 Belgrave Sq., London, SW1X 8QX, England)

27–29. **Textile Research** Inst., 44th annual, New York, N.Y. (TRI, 601 Prospect Ave., P.O. Box 625, Princeton, N.J. 08540)

28–29. American Board of **Medical Specialties**, Chicago, Ill. (J. C. Nunemaker, Suite 1160, 1603 Orrington, Evanston 60201)

28–30. American Assoc. for **Cancer Research**, 65th annual, Houston, Tex. (H. J. Creech, AACR, Inst. for Cancer Research, Fox Chase, Philadelphia, Pa. 19111)

28–30. South Carolina **Acad. of Science**, Hartsville. (J. M. Barry, College of General Studies, Univ. of South Carolina, Columbia 29208)

29–30. New England **Bioengineering** Conf., 2nd annual, American Soc. of Engineering Education and the Inst. of Electrical and Electronics Engineers, Worcester, Mass. (R. A. Peura, Worcester Polytechnic Inst., Worcester 01609)

29–31. American **Psychosomatic** Soc., 31st, Philadelphia, Pa. (D. Oken, 265 Nassau Rd., Roosevelt, N.Y. 11575)

29–31. **Seismological** Soc. of America, Las Vegas, Nev. (W. K. Cloud, SSA, P.O. Box 826, Berkeley, Calif. 94701)

29–31. National **Wildlife Federation**, Denver, Colo. (T. L. Kimball, NWF, 1412 16th St., NW, Washington, D.C. 20036)

29–3. American Soc. of **Abdominal Surgeons**, Las Vegas, Nev. (B. F. Alfano, 675 Main St., Melrose, Mass. 02176)

30–4. **Gas Turbine** Conf., American Soc. of Mechanical Engineers, Zurich, Switzerland. (M. Churchill, ASME, 345 E. 47 St., New York 10017)

31–3. International Soc. for **Experimental Hematology**, 3rd, Houston, Tex. (J. J. Trentin, Div. of Experimental Biology, College of Medicine, Texas Medical Center, Houston 77025)

31–5. American College of **Physicians**, New York, N.Y. (E. C. Rosenow, Jr., 4200 Pine St., Philadelphia, Pa. 19104)

April

1–3. American Assoc. of **Petroleum Geologists**, San Antonio, Tex. (T. L. Bear, Bear & Kistler, 1052 W. 6 St., Los Angeles, Calif. 90017)

1–3. Society of **Economic Paleontologists and Mineralogists**, San Antonio, Tex. (R. Tener, Box 979, Tulsa, Okla. 74101)

1–4. American Assoc. of **Anatomists**, Cleveland, Ohio. (J. E. Pauly, Univ. of Arkansas, School of Medicine, Little Rock 72201)

1–4. **Industrial Water and Pollution** Conf., Water and Wastewater Equipment Manufacturers Assoc., Detroit, Mich. (R. C. Hughes, WWEMA, 744 Broad St., Newark, N.J. 07102)

1–4. **Geochemical Exploration**, 5th intern. symp., Vancouver, B.C., Canada. (J. J. Barakso, Mineral Environment Labs. Ltd., 705 W. 15 St., North Vancouver)

1–5. **Farm and Agricultural Industries**, 11th intern. conf., Intern. Commission of Agriculture and Food Industries and the Greek Chemists' Assoc., Athens. (L. de Saint Rat, ICAFI, 24, rue de Teheran, 75008 Paris, France)

1–5. American College of **Radiology**, New Orleans, La. (W. C. Stronach, ACR, 20 N. Wacker Dr., Chicago, Ill. 60606)

2–4. **Fast Reactor Safety** Conf., American Nuclear Soc., Beverly Hills, Calif. (J. B. Moore, Southern California Edison, P.O. Box 800, Rosemead, Calif. 91770)

2–4. **Mechanical Properties of Materials at High Rates of Strain**, Inst. of Physics, Oxford, England. (J. Harding, Dept. of Engineering Science, Parks Rd., Oxford, OX1 3PJ)

2–5. American **College Health** Assoc., Dallas, Tex. (J. W. Dilley, 2807 Central St., Evanston, Ill. 60201)

3–4. **Railroad** Conf., American Soc. of Mechanical Engineers and Inst. of Electrical & Electronics Engineers, Pittsburgh, Pa. (E. K. Farrelly, Port Authority of New York and New Jersey, World Trade Center, New York 10047)

3–4. **Metal Semiconductor Contacts** Conf., Inst. of Physics, Manchester, England. (Meetings Officer, IP, 47 Belgrave Sq., London, SW1X 8QX, England)

3–5. American Soc. for **Artificial Internal Organs**, Chicago, Ill. (K. K. Burke, ASA10, Box 777, Boca Raton, Fla. 33432)

3–7. International Union of **Angiology** Congr., 9th, Florence, Italy. (F. Pratesi, Via della Robbia 5, Florence 50132)

4–7. American **Fertility** Soc., Miami, Fla. (H. H. Thomas, 1801 Ninth Ave., S. Birmingham, Ala. 35205)

4–7. Missouri State **Medical** Assoc., Kansas City. (R. McIntyre, P.O. Box 1028, Jefferson City, Mo. 65101)