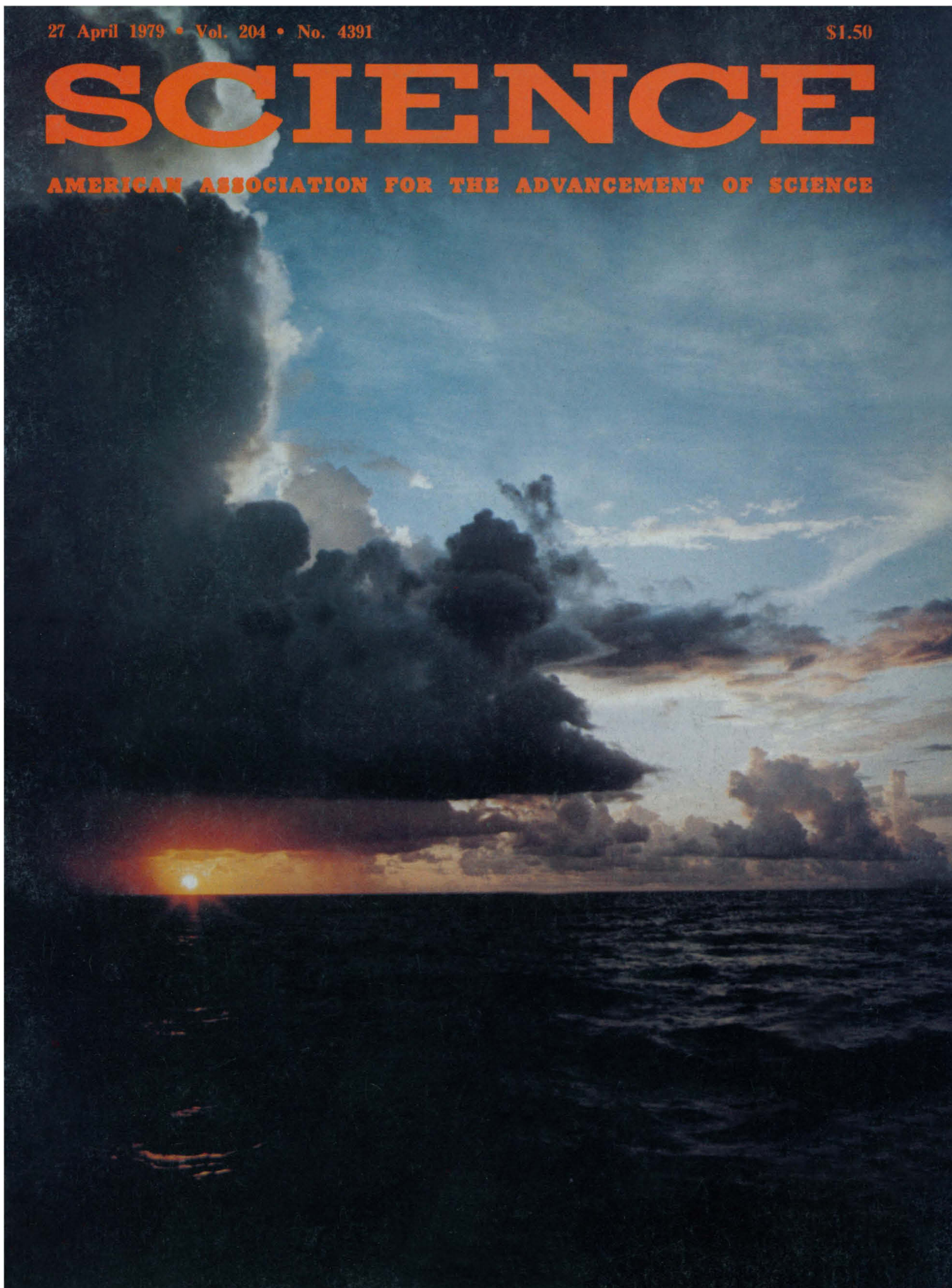


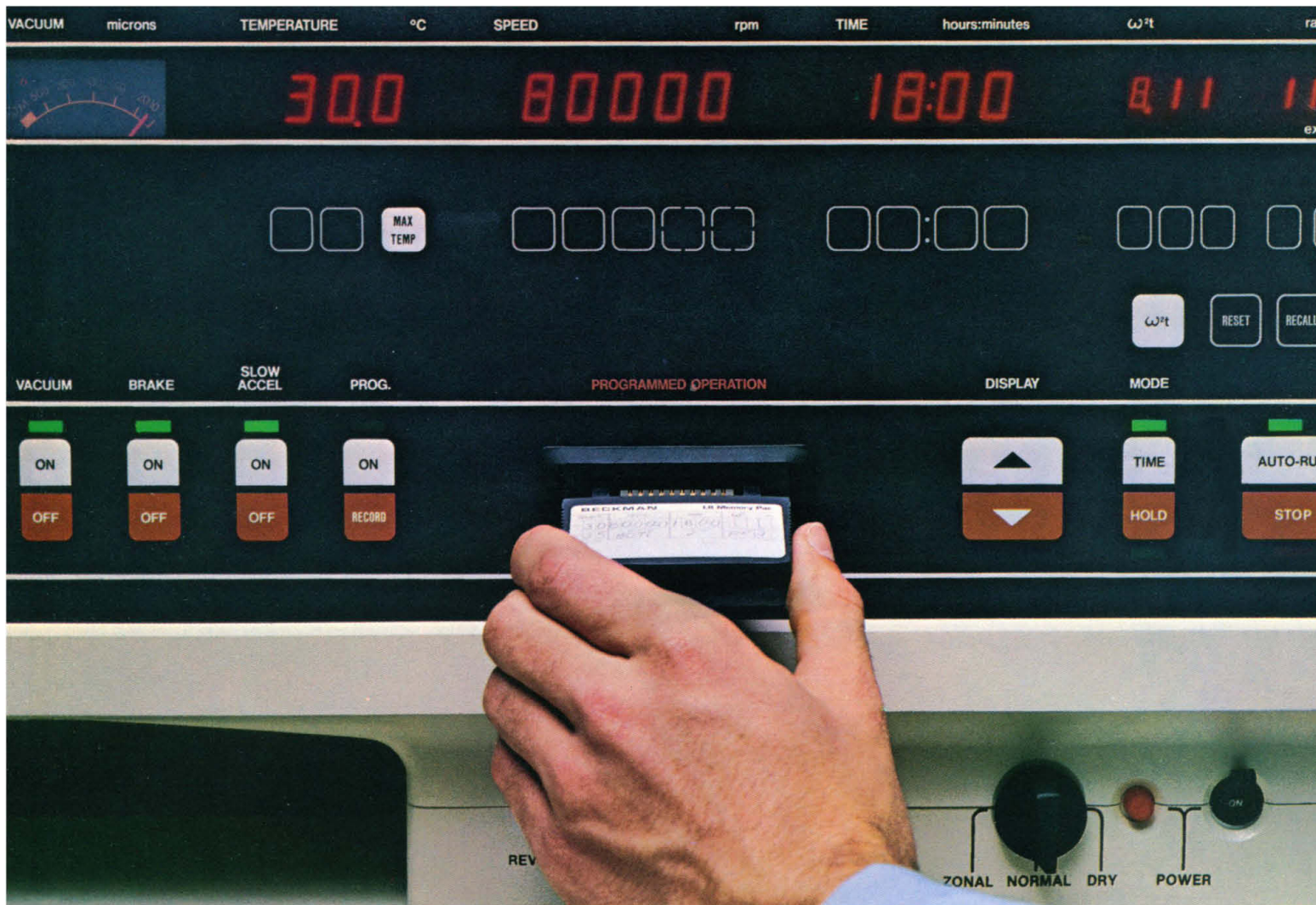
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SCIENCE

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Photomicrograph of villus in section of small intestine, 125X magnification, is a simulated video image. Photomicrograph by Jack Kath, from Nikon's Small World Contest.

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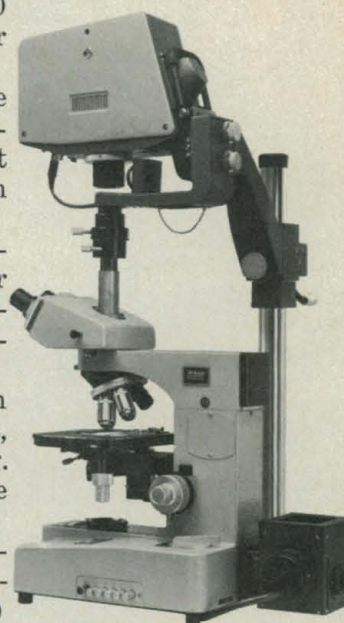
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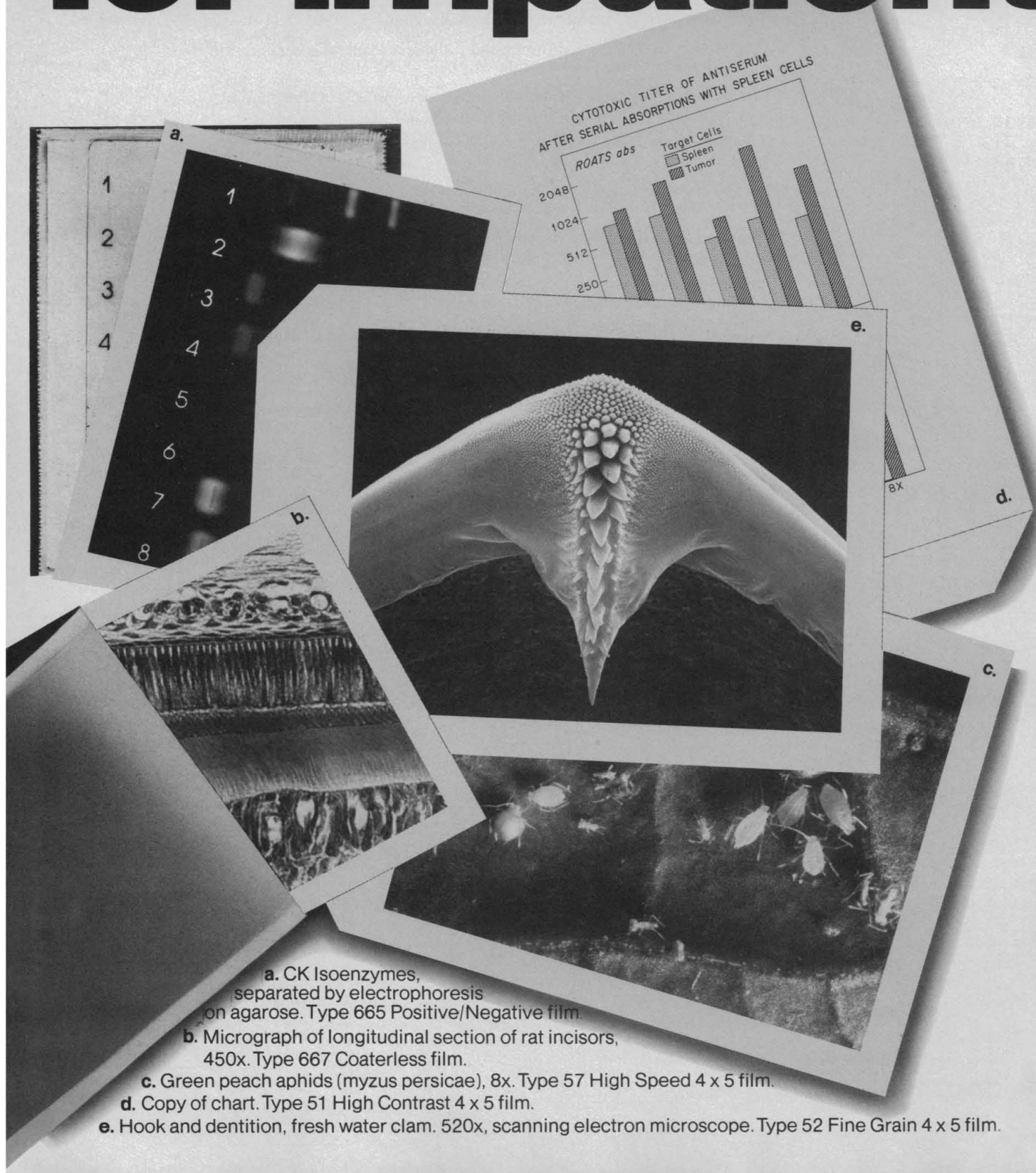
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COVER

Atlantic seascape. The Virginia barrier islands are the most rapidly changing section of the Atlantic Coast. These islands are undergoing rapid and systematic changes in shoreline configuration that may lead to the development of two capelike features in the next 100 years. See page 401. [B. J. Nixon, Missouri City, Texas]

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Research for impatient



a. CK Isoenzymes, separated by electrophoresis on agarose. Type 665 Positive/Negative film.

b. Micrograph of longitudinal section of rat incisors, 450x. Type 667 Coaterless film.

c. Green peach aphids (*myzus persicae*), 8x. Type 57 High Speed 4 x 5 film.

d. Copy of chart. Type 51 High Contrast 4 x 5 film.

e. Hook and dentition, fresh water clam. 520x, scanning electron microscope. Type 52 Fine Grain 4 x 5 film.

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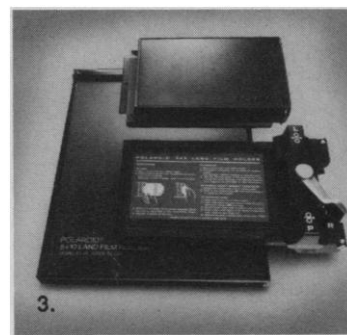
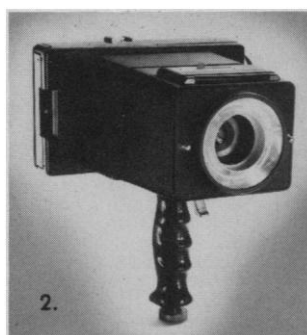
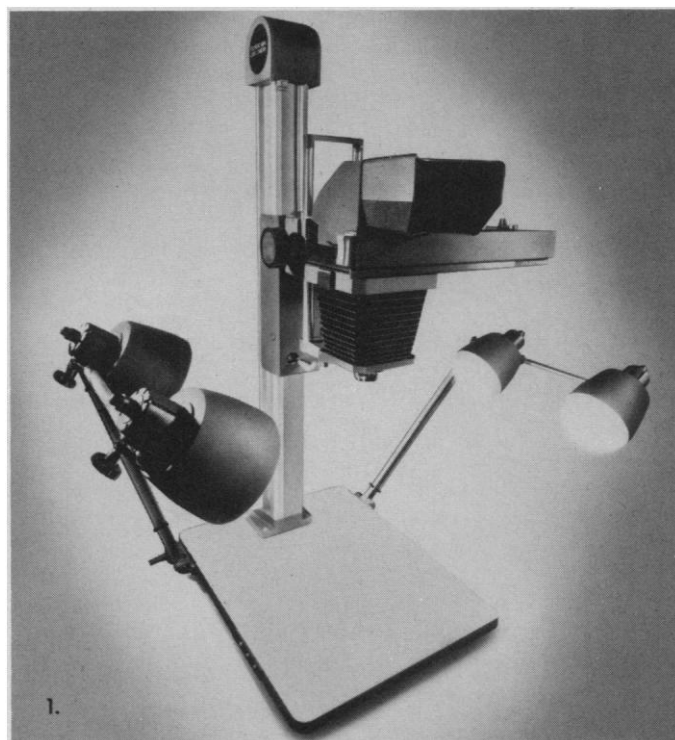
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19-20 June 1979

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"The budget analysis that the AAAS prepares for these meetings keeps getting better; the latest, third in a series, is a fine, item-by-item review of federal R&D spending and now qualifies as the best way of tracking the complexities of science and money in the US."

— Dan Greenberg, New Scientist,
29 June 1978

Now, for the fourth consecutive year, AAAS is preparing its budget analysis and will convene its 4th Annual AAAS Colloquium on R&D and Public Policy. Sponsored by the AAAS Committee on Science, Engineering, and Public Policy, the Colloquium will be held 19-20 June 1979 in Washington, D.C.

You are invited to participate in this Colloquium and in discussions with leaders in government, industry, and the scientific and technical community. Speakers and panelists (including Frank Press, the President's Science Adviser and Thomas R. Pickering, Assistant Secretary of State for the Bureau of Oceans and International Environmental and Scientific Affairs, U.S. Department of State) will examine the relationship between productivity, international competitiveness and the U.S. economy — on the one hand — and innovation, R&D, and the impact of current and proposed federal policies on the other.

Colloquium Topics

How *do* federal policies affect academic science? What *are* the major R&D policies? What are the real links between U.S. outlays for R&D and the factors that govern our economic growth? Speakers from government, industry, and the academic community will provide answers and highlight problems related to these and other questions as they address the following topics:

- *Federal R&D* • R&D issues in the FY 1980 budget • Federal policies on R&D • Outlook for FY 1981 and the future • Problems in the budget process
- *Industry R&D and the Economy* • Problems of R&D in industry • Emerging federal policies on innovation • Impacts on economic outlook of federal and industry policies on R&D and innovation
- *International Aspects of R&D* • R&D and international competitiveness • R&D and international cooperation and assistance • R&D and U.S. foreign policy
- *Science and Basic Research* • Impact of federal policies and practices on the conduct of research • Universities and academic science • Federal scientific institutions and capabilities • Basic and long-term research in industry • Public accountability versus excessive paperwork

Research and Development: AAAS Report IV covering R&D in the federal budget for FY 1980, data on R&D in industry, international aspects of R&D, and other topics related to R&D and public policy is being prepared by Willis H. Shapley and Don I. Phillips and will be available in advance to Colloquium registrants. Registrants will also receive the published proceedings of the Colloquium.

Interested individuals are urged to register early by using the Colloquium registration form on the facing page.



4th R&D Colloquium

Washington 19-20 June 1979

The fourth AAAS R&D Policy Colloquium will be held on Tuesday and Wednesday, 19 and 20 June 1979 at the MAYFLOWER HOTEL, 1127 Connecticut Ave., NW, Washington, DC 20036. [Although commercial parking is available in the vicinity of the Mayflower, the Hotel is a short walk from the Farragut North (Red Line) and Farragut West (Blue Line—connecting to National Airport) Metro stops.]

AAAS Colloquium (19-20 June) Advance Registration—enclosed is:

- ☐ **\$85** Full Registration (includes lunch on both days, dinner on Tuesday, the R&D: FY 80 Report, and the Colloquium Proceedings)
- ☐ **\$48** Partial Registration (includes Report and Proceedings only)
- ☐ **\$25** Student Registration (includes Report and Proceedings only; available to full-time graduate or undergraduate students only)

Separate Meal Tickets (lunches at **\$12** and dinner at **\$17**):

- ☐ Lunch on Tues., 19th; ☐ Dinner on Tues., 19th; ☐ Lunch on Wed., 20th

Previous Reports and Proceedings (at **\$5** each):

- ☐ R&D FY 79; ☐ R&D: FY 78; ☐ R&D: FY 77
- ☐ Proc. 78 Col.; ☐ Proc. 77 Col.; ☐ Proc. 76 Col.

Program, badge, meal tickets, and R&D: FY 80 Report will be sent about 8 June. Registrations received after 8 June will be held at the AAAS Registration Desk at the Mayflower Hotel. Previous reports ordered will be sent as soon as possible. Proceedings of 79 Colloquium will be sent as soon as available.

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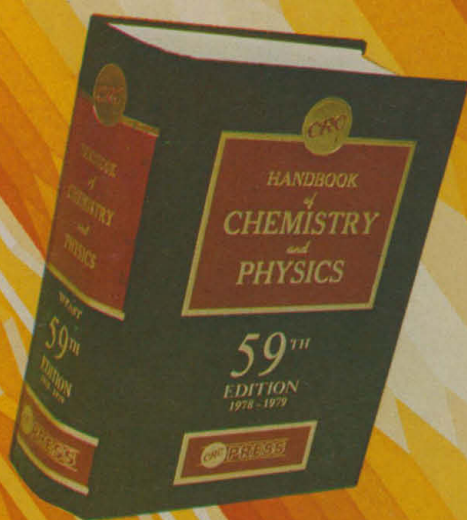
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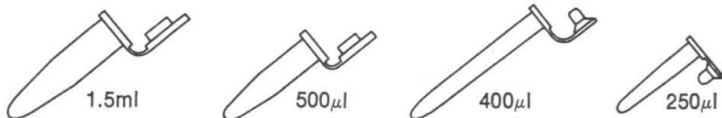
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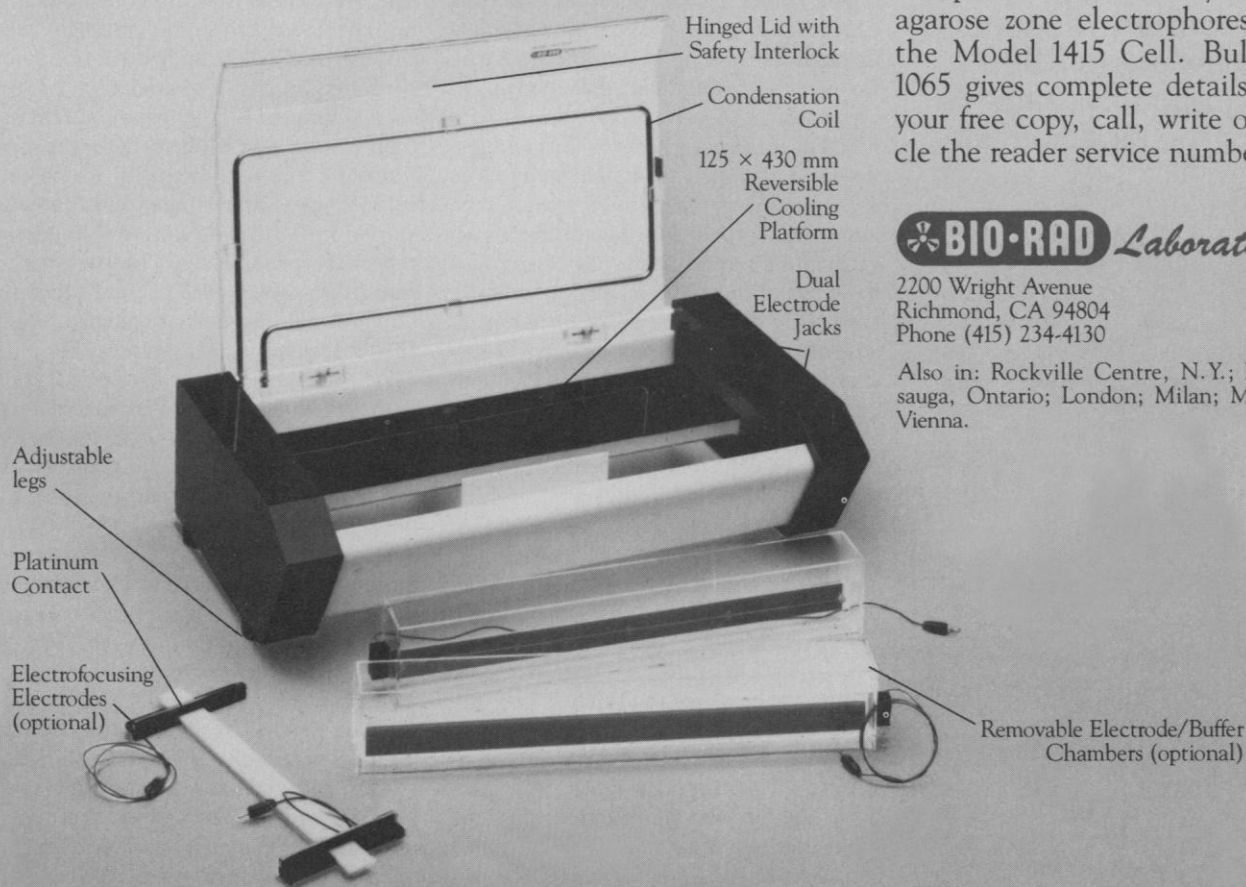
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LETTERS

Diabetes Drugs: Clinical Trial

The News and Comment article by Gina Bari Kolata (9 Mar., p. 986) about the controversy surrounding the University Group Diabetes Program (UGDP) contains a number of erroneous and misleading statements. Like so much that has been written about the study, it focuses on the toxicity issue. It is simply incorrect to suggest, as is implied in the article, that the UGDP drew any conclusion with regard to toxicity. The use of oral hypoglycemic drugs was terminated in the study because of lack of efficacy, not proved toxicity. As a matter of fact, ethical constraints make it impossible to reach a conclusion regarding toxicity from a trial such as the UGDP. It is necessary to stop use of a drug in a clinical trial before a definitive conclusion can be reached regarding toxicity.

The suggestion by Kolata that the Food and Drug Administration (FDA) acted in the absence of data is incorrect. The reporting requirements of a drug trial covered by an investigational new drug application (IND) from the FDA meant that the project supplied the FDA, at regular intervals, with updated reports containing summary analyses of accumulated data on the study treatments.

The nature of the reporting regarding Christian Klimt's participation depicts an incorrect role for him in the trial. The University of Maryland, through the Division of Clinical Investigation with Klimt as its director, serves as the repository for the data from the study. The data belong to the study and not to Klimt, as implied. Further, decisions regarding the format and types of analyses to be performed were made by the entire leadership of the study, not by Klimt or any other individual acting alone. Any suggestion that he was able to manipulate the data is irresponsible. It not only assumes conspiratorial behavior by him, but also by a host of independent people in the Coordinating Center who, in fact, carried out the coding and data analyses. In addition, it assumes complicity, naïveté, or stupidity on the part of the other investigators in the study, since they participated in the data review.

The article raises questions concerning access to raw data. The approach followed by the study represents a balance of rights: the rights of the patient to anonymity, the rights of the public to all relevant information, and the rights of the investigators to perform and complete analyses of data before they are analyzed elsewhere by others.

The *Science* article leaves the impression that the study has not revealed important information from its data files. In fact, quite the reverse is true. Much of the fuel for the controversy has come from data supplied by the study and is a direct result of the high standards set by it in making data available to the scientific community. Few if any trials have done as well in this regard. The study has generated seven key papers, all of which have appeared in peer-reviewed scientific journals (1, 2). The 1970 paper on tolbutamide contained an appendix listing the cause of death and baseline characteristics of deceased patients. The 1975 paper on phenformin contained 20 pages of individual patient data as well as updated information on the tolbutamide study. Baseline and follow-up data on all 1027 patients enrolled in the trial were made available in early 1978 through an announcement in the December 1977 issue of *Diabetes*.

There is no basis for Kolata's value judgments regarding the quality of patient care and data processing. It is suggested that the care provided for patients was substandard. The facts indicate quite the contrary. Mortality experience in the study for the placebo and two insulin treatment groups was less than that expected for a comparable group drawn from the general U.S. population (2). The use of hyperbole and anecdote is to be expected of critics attempting to make a point, but there is no justification for its perpetuation by a publication of *Science's* stature. It is unfortunate that neither critics nor Kolata note the time frame for the treatments to which they refer. Patient recruitment and follow-up started in 1961. Data for the tolbutamide report were assembled over the time period from 1961 to 1969, before the initiation of nationwide campaigns in the 1970's to identify and treat systolic hypertension. The much-discussed patient with sickle cell anemia was treated in the time period from 1964 to 1969, before there was a specific warning against the use of phenformin under these conditions.

The data file for the UGDP contains more than 30 million characters of information. Since they have been collected and processed by humans, the files do contain some errors, but if anything, the data entry and coding process is a source of pride instead of disappointment. The use of a magnifying glass on a particular study, with no denominator for comparison, can lead to lasting misconceptions. All evidence points to superior, rather than substandard performance in this regard. Neither of the two indepen-

dent audits found any significant errors in the coding, data processing, or analyses of the study. Further, an FDA audit of a 15 percent sample of patients in the UGDP found no evidence of significant errors in converting raw data to published tables.

The general questions raised in the article regarding the amount of time and money to be devoted to clinical trials are important. Ultimately, the public, through their elected representatives, must decide what the answers are. There is no doubt that clinical trials are expensive, but so is the misuse and overprescription of drugs of questionable value. The cost of the trial (\$8.5 million) is small compared to expenditures by consumers for oral hypoglycemic agents. The drop in consumption noted by Warner, Wolfe, and Rich (3) since publication of the UGDP results corresponds to a savings of more than \$100,000,000 for consumers.

The main difficulty with the UGDP is not its design, execution, or analysis, but rather that it reached an unpopular conclusion. The unfortunate aspect of the controversy is that it has served as a distraction from the real implications of the study concerning the absence of efficacy of the treatments tested. No amount of criticism, no matter how vitriolic, can alter the findings of the UGDP or obscure the fact that no other study has refuted its conclusions. Opponents and proponents alike would do well to expend their energies on generating new information rather than rehashing the old.

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2. ———, *Diabetes* 19 (Suppl. 2, part 2) (1970).
3. R. Warner, S. N. Wolfe, R. Rich, *Off Diabetes Pills: A Diabetic's Guide to Longer Life* (Public Citizens Health Research Group, Washington, D.C., 1978).

* Member, University Group Diabetes Program Steering Committee.

... The UGDP controversy illustrates indeed how shameful it is if challenging scientific evidence is met with disbelief instead of evidence disproving or contradicting the challenge and if insinuations of scientific dishonesty are continued even after the data in question have

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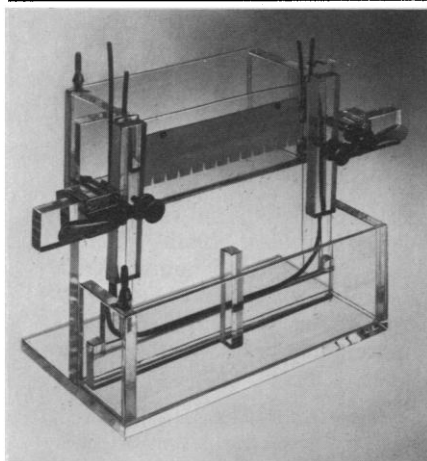
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been vindicated and upheld by two independent juries of peers, that is, two independent audit committees.

The UGDP data, of course, are open to challenge, as are most all scientific data, but probably somewhat more so. The UGDP investigators have been well aware of this fact. Therein lies a story which goes to the core of the controversy. It is the story of the ethical conflict which is confronted in almost all research involving humans—the question of whether a significant trend toward a threat to health or life is a signal strong enough for termination of a clinical investigation, or whether it is permissible ethically to continue such an investigation until the evidence is indisputable. How great an individual sacrifice is ethically defensible in the search for advancement of the common welfare and the scientific truth? We came face to face with this question when we were confronted with evidence suggestive of a proportionally higher incidence of death due to cardiovascular complications in two of the five treatment groups—those treated with the oral agents. We decided on the first answer, but not before we had asked for advice from independent special consultants who reviewed the evidence, analyzed it with new and different methods, and assured us that the observed trend was significant and in all likelihood irreversible. Some investigators regretted that the necessity of termination would weaken the final evidence; they would have preferred to see the period of data collection extended. Nobody, however, doubted the significance of the risk. That, by the way, was the extent of the disagreement described by Angela Bowen; most certainly it had not the connotation which she ascribed to it and to which Kolata refers. In retrospect one may wonder how much of a greater risk the investigators should have accepted in order to satisfy not only the two peer committees which concurred with the findings but also the profession at large and the public, which remained unconvinced. . . .

One may ask, also, why Kolata concentrates so much on the recital of proved and unproved plots and subplots surrounding the UGDP, and why, at the same time, most of the important aspects of the UGDP story are overlooked or misrepresented. The accusations against Klimt are not new; his consultantship with the U.S. Vitamin Pharmaceutical Corporation was known and so was his FDA assignment during his sabbatical. Both actions caused great concern to the investigators and were considered imprudent and regrettable, but no grounds

were found to assume that either jeopardized the integrity of the study. . . .

Kolata omits any reference to the fact that all UGDP publications have appeared in the refereed medical literature, while the critics of the UGDP, and particularly the members of the "Committee for the Care of the Diabetic" (CCD), used the pages of the privately owned and privately supported, non-refereed *Medical Tribune* for their pronouncements. It should be widely known by now and should not have escaped the attention of your reporter that the *Medical Tribune* is not so ready to print corrections or refutations as it is to accept accusations and rumors. . . .

Kolata quotes many critics of the UGDP who misstate the purpose of the UGDP and ascribe to it conclusions and generalizations which are not correct. The purpose of the UGDP was decidedly *not* to investigate whether the oral anti-diabetic agents were "safe and effective" means "of lowering blood sugar," nor were the conclusions "that the drugs are not efficacious and that they were probably toxic." The title of the program and the headings of all seven UGDP publications state that the study concerns "The effect of hypoglycemic agents on vascular complications in patients with maturity-onset diabetes." Clearly, not only the oral agents were involved, but also the other hypoglycemic modalities, insulin and diet; clearly also, the hypoglycemic potency of these agents was not under study, but their effect upon the vascular complications; and clearly, this effect was to be investigated in one special type of diabetes only, albeit the most common one. The conclusions of the UGDP were that, in the type of diabetes under study and with regard to the vascular complications of the disease, neither insulin nor the two hypoglycemic agents employed were more effective than diet alone (plus placebo); and that insofar as mortality from cardiovascular causes is concerned, the two oral agents were less effective than insulin or diet (plus placebo). There is no reference to toxicity. The investigators abstained intentionally from describing the nature of the cause or causes that were responsible for the increased proportional death rates. The design of the study did not permit any such investigations. It was hoped that this would be done by other, more qualified investigators. The UGDP investigators emphasized, however, in all their publications that their findings and conclusions applied only to the type of disease under study and to the agents employed in the study. Moreover, it was stated repeatedly that the findings re-

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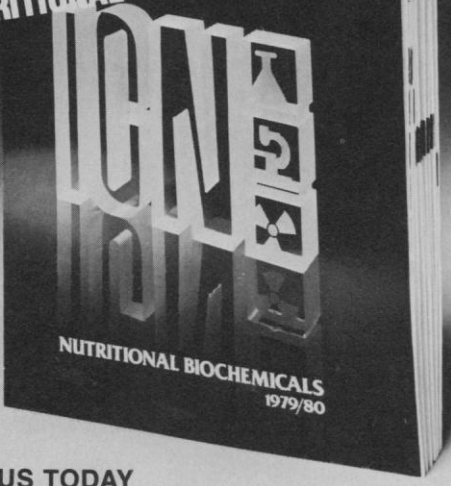
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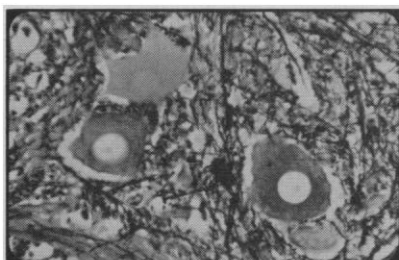
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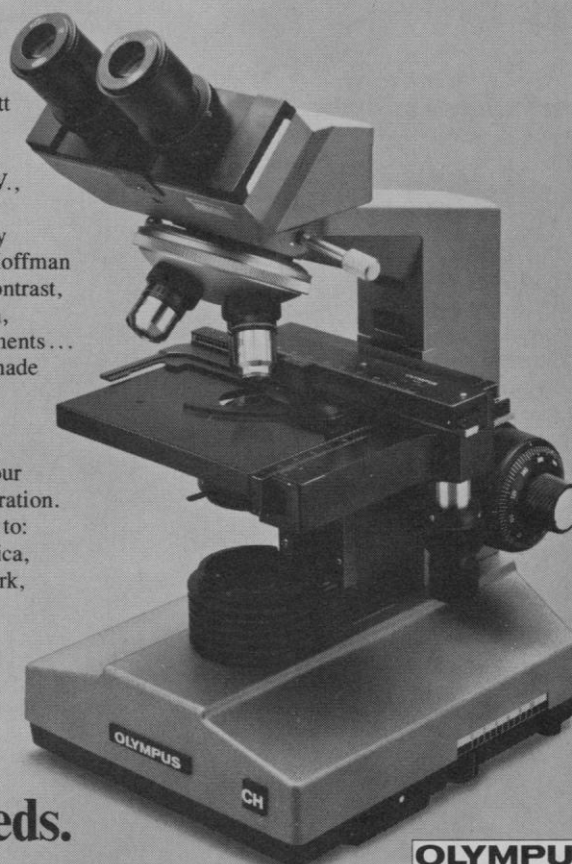
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sulted from a study design which attempted to duplicate as closely as possible the management of the ambulatory diabetic patient prevailing when the program started. At that time, no means were available to achieve ideal, that is continuous, physiological blood sugar homeostasis in the ambulatory patient. Thus the UGDP results apply only to the less-than-optimal control attainable under the design of the program. In recent years much progress has been made to develop means by which a more nearly ideal control may become possible and can be placed into the hands of the practitioner. If it is found in the future that such ideal control has better effects than those observed in the UGDP, the investigators will gladly acclaim this progress and will be satisfied that the UGDP controversy has accelerated this step forward in the care of the diabetic. After all it is not only the CCD who cares!

MARTIN G. GOLDNER
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Although I have admired Kolata's reporting in the past, her article on the UGDP is marred by incomplete and one-sided presentation of several key points. Among the many issues which call for comment, let me mention three.

Kolata formulates the controversy as a battle between those who "sharply attack" the findings of the UGDP on the one side, and those who "evangelically promoted" it on the other. She fails to point to the far larger group who share the view that the findings of the UGDP are not in themselves decisive, but that they raise a legitimate concern about the oral drugs tested. That concern cannot be resolved by further debate about the UGDP alone, but only by assessment of it along with other evidence, or by further clinical study. On these matters the review is silent.

Kolata describes the UGDP as "one of the first large-scale trials ever conducted" and says that "it served as a model for the large crop of clinical studies that followed it." These remarkable statements ignore the long history of clinical trials, both here and abroad. If a beginning date for "large-scale" clinical trials must be found, it would be at least 10 years before the start of the UGDP, when the Veterans Administration initiated its ongoing program of clinical trials, among which the trial demonstrating the effectiveness of streptomycin in treating certain types of pulmonary tuberculosis is perhaps preeminent. Nor should the contemporaneous British studies and the celebrated field trial of the Salk polio-

myelitis vaccine in 1954 be overlooked. The UGDP is a model for later trials only in the sense that those who plan new trials strive to improve on those of the past. However, it is no more of a model than are those mentioned above and the host of additional trials conducted over the last 20 years.

Kolata quotes me as pointing to the unusually complete reporting of detail as a source of some of the criticism of the UGDP, and she goes on to infer from my remark that all or most clinical trials collect data of inferior quality. I am, no doubt, at fault for failing to emphasize to her that my remarks apply to *all* scientific experiments, and not just to clinical trials. When a great many variables are measured simultaneously in a comparative experiment, it is nearly certain that, as a matter of chance, some variables will appear to favor one group over another. Were it the general custom to publish experimental data in so much detail, the scope of criticism—both valid and misguided—would be virtually unlimited. If my comment is seen as a basis for such criticism, the target will have to be the whole of experimental science, not just clinical trials.

In sum, the issues surrounding almost any public policy decision are difficult and often controversial. There is room for strong differences of opinion in the present instance, and that should cause neither surprise nor alarm.

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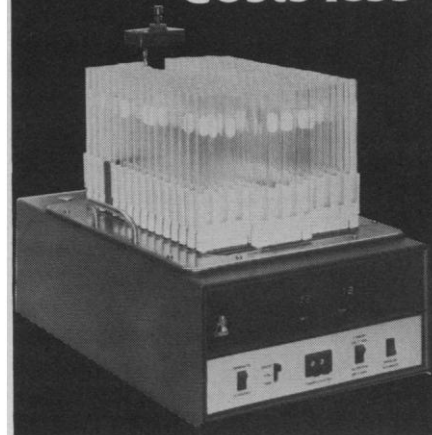
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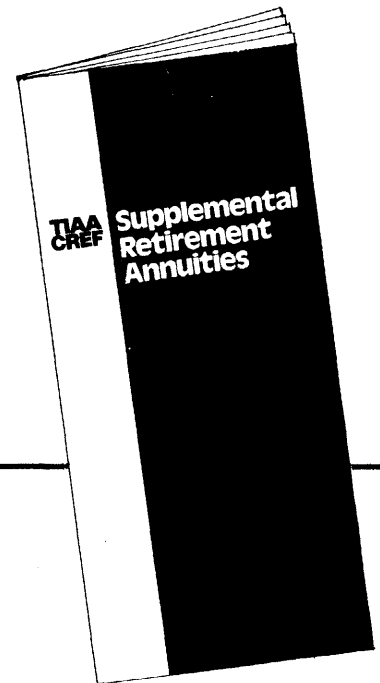
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President Carter's Energy Speech

In the light of public attitudes, President Carter's recent speech on energy was courageous. To announce a plan for decontrol of oil at a time when the public is concerned about inflation and suspicious that it is being ripped off required a deep personal commitment.

The public does not understand the extent of our vulnerability. A recent national poll conducted by NBC News and the Associated Press posed the following question: "Do you believe there is really an oil shortage, or do you believe that it is a hoax to get consumers to pay higher prices for oil?" Of the group polled, 22 percent responded that there is a shortage, 68 percent said it is a hoax, while 10 percent were not sure. Consumers have experienced few difficulties in obtaining gasoline or heating oil; talk of shortages seems to them a fiction created by Dr. Schlesinger. The reality is that we are in a precarious position with respect to oil and its products.

One factor that is not generally understood is the delicate balance between supply and demand in our oil industry. There are no large inventories that can be quickly drawn on. The so-called pools of oil in the ground are not pools at all but many droplets of oil in semiporous rocks. Typical times required for the oil in a well to be produced are 10 to 40 years. Above ground, the inventories are relatively small and about half the total is unavailable—for example, gasoline in transit in pipelines. As of the end of March 1979, the ratio of usable inventories to demand was near its lowest level in many years. Available supplies of heating oil were equivalent to only about 2-weeks' consumption or less. In order to build up stocks for next winter, production of gasoline must be held down. If the oil producing and exporting countries (OPEC) maintain their present levels of production, annoying shortages of gasoline will occur. A cutback of production by OPEC of 10 percent for 20 weeks would necessitate gasoline rationing. It would also lead to a frantic scramble for oil.

We are at the mercy of OPEC. How hard they squeeze us will depend on what kind of image of determination and resourcefulness we present. Until the President's speech, we looked flabby and helpless. Mr. Carter's actions are no magical cure, but they are a step. Because of artificially low energy costs, the economy and our living patterns have remained geared to waste. Such patterns will not be easily changed and especially not by more admonitions. Higher prices here and the prospects of yet higher ones will foster conservation, though not as much as some have hoped. Nor are higher prices likely to produce much more oil quickly. They will lead to more drilling, but experience during the 1970's indicates that really major discoveries in the lower 48 states are unlikely.

Decontrol will be particularly helpful in encouraging companies to expand production through tertiary recovery. Using conventional techniques, only about one-third of the oil in place has been produced, leaving behind some 300 billion barrels—a 45-year supply. Only part of that will be obtained, and it will be costly. But producing it in quantity would be the quickest way of lessening dependence on imports.

In his speech, Mr. Carter touched on the possibility of expanding efforts to obtain synthetic fuels, but he did not go far enough. The OPEC now, in effect, levy on us a tax or tribute of nearly \$50 billion a year. Soon the tax may reach \$100 billion. More jobs and money would be exported. Would it not be better for us to levy a tax, for example, 10 cents a gallon, on gasoline to be devoted to building a synthetic fuels industry? Such a tax would yield \$10 billion a year and could be used to help provide the kinds of guarantees and incentives necessary to induce industry to invest much larger sums.

Mr. Carter has given a signal to the world that we are going to begin to address our energy problems. But further actions will be required if we are to avoid a long period of anxiety and subservience.—PHILIP H. ABELSON

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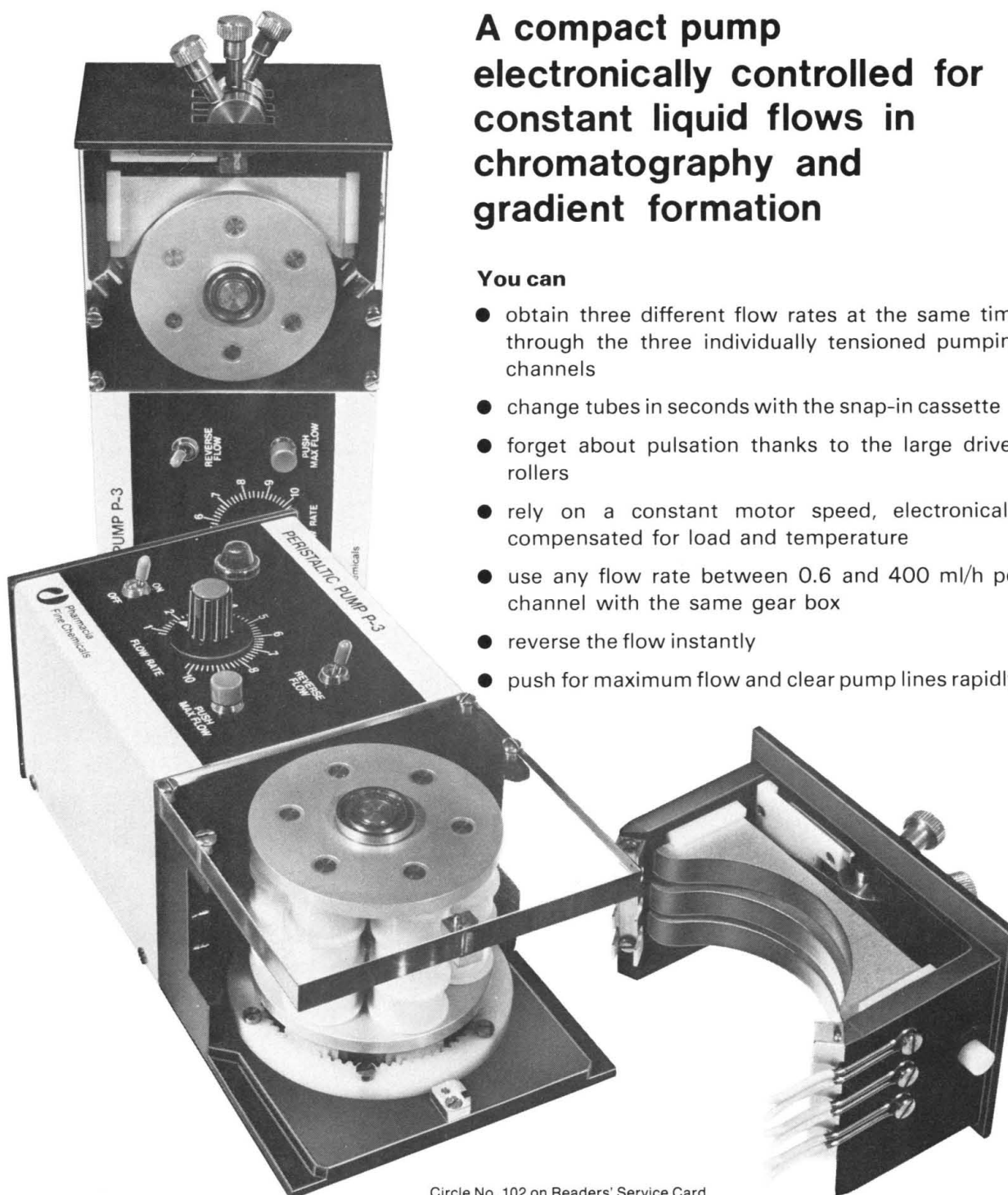
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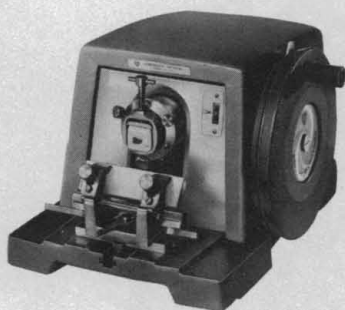
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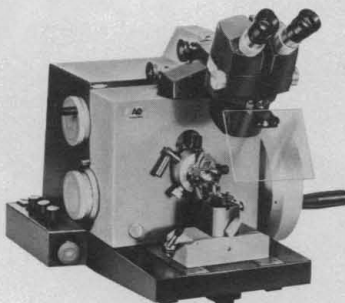
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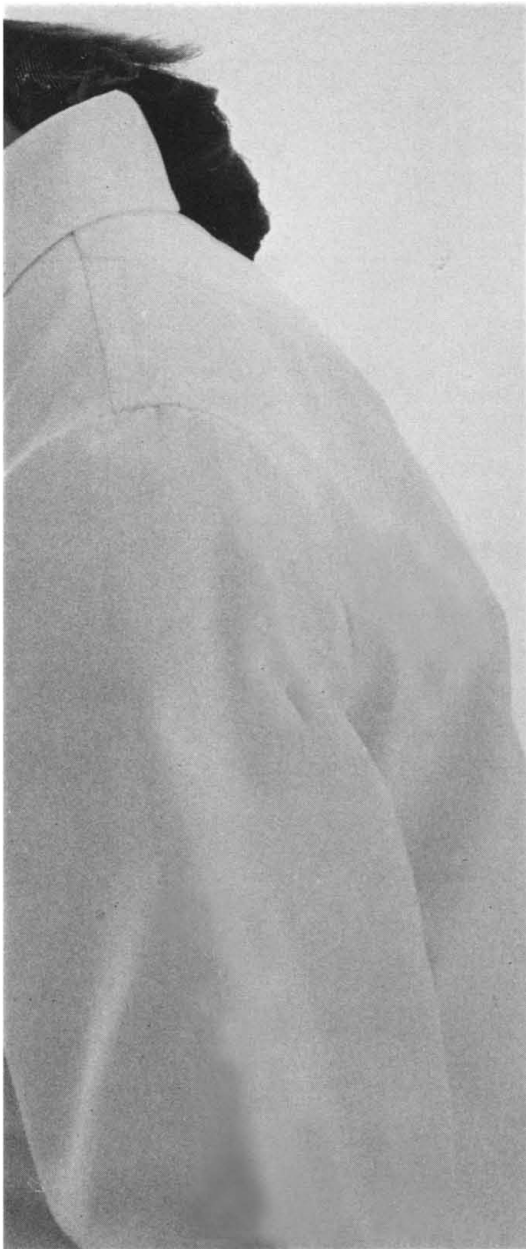
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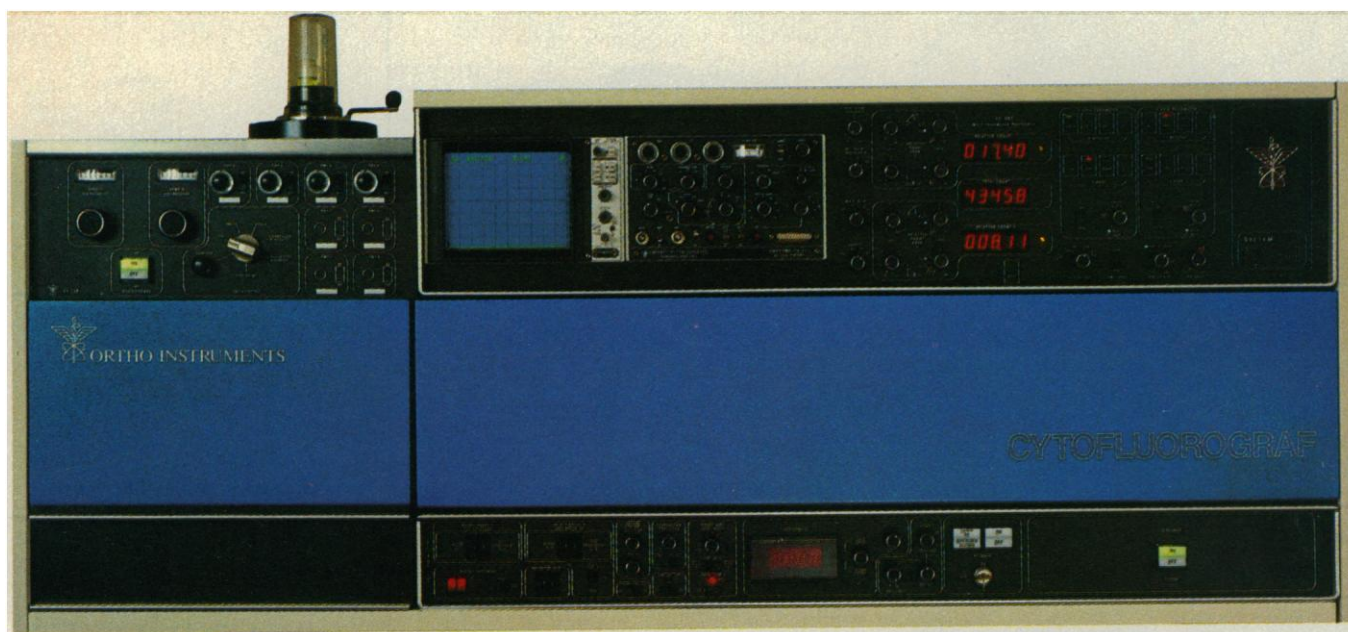
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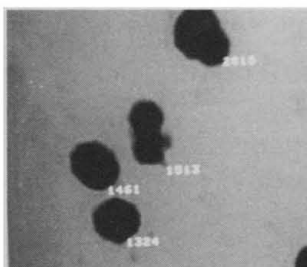
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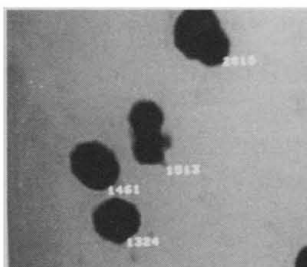
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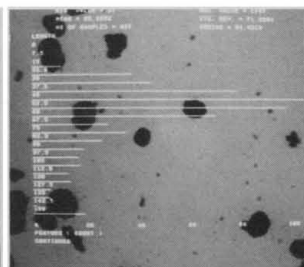
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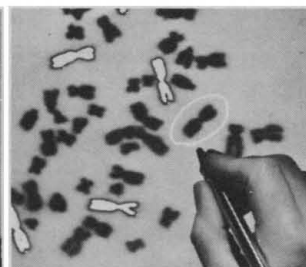
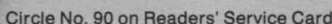


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¹ Juel, R., Serum Osmolality, *AJCP* July 1977 (165-169).

² Rocco, R.M., Letter, *Clin Chem* 22: No. 3, 1976, p. 399.

³ Champion, H.R. et al., Alcohol Intoxication and Serum Osmolality, *The Lancet* June 28, 1975 (1402-1404).

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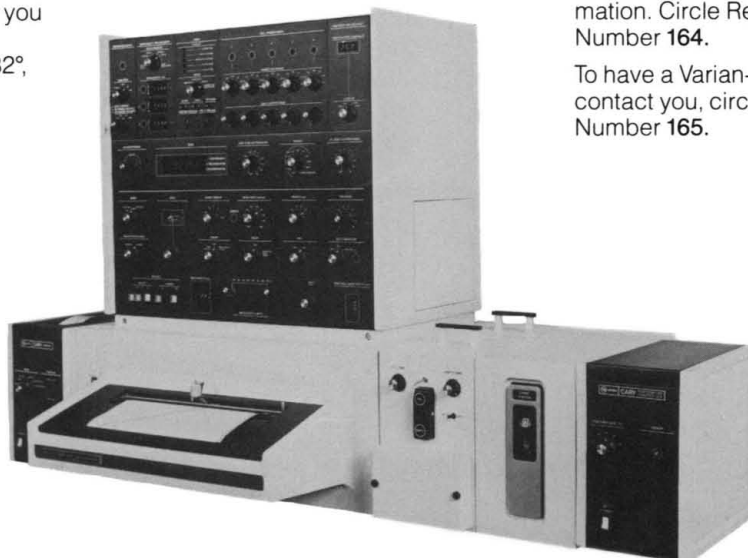
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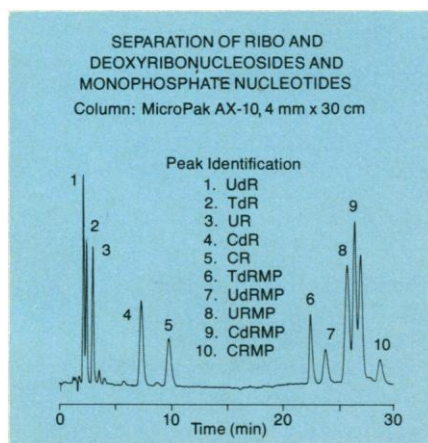
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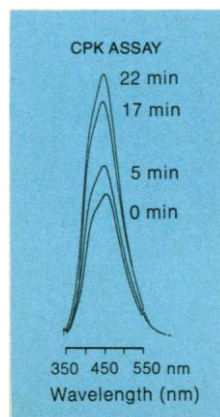
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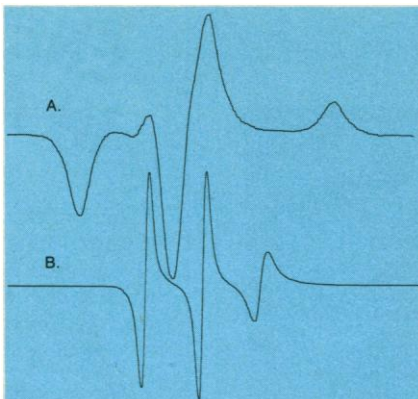
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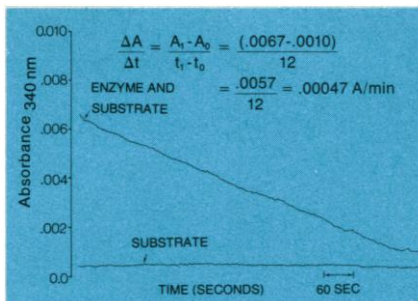
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Before (A) and after (B) administration of anesthetic.

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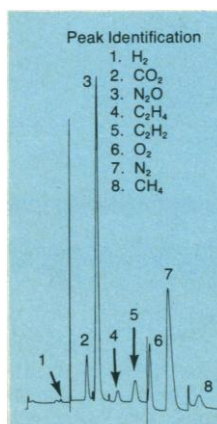
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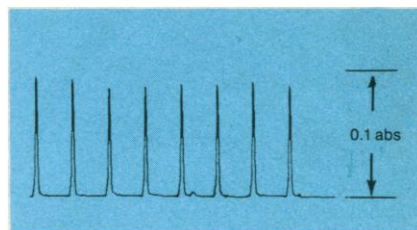
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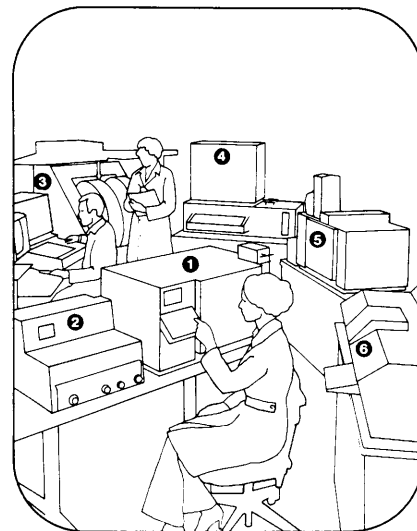
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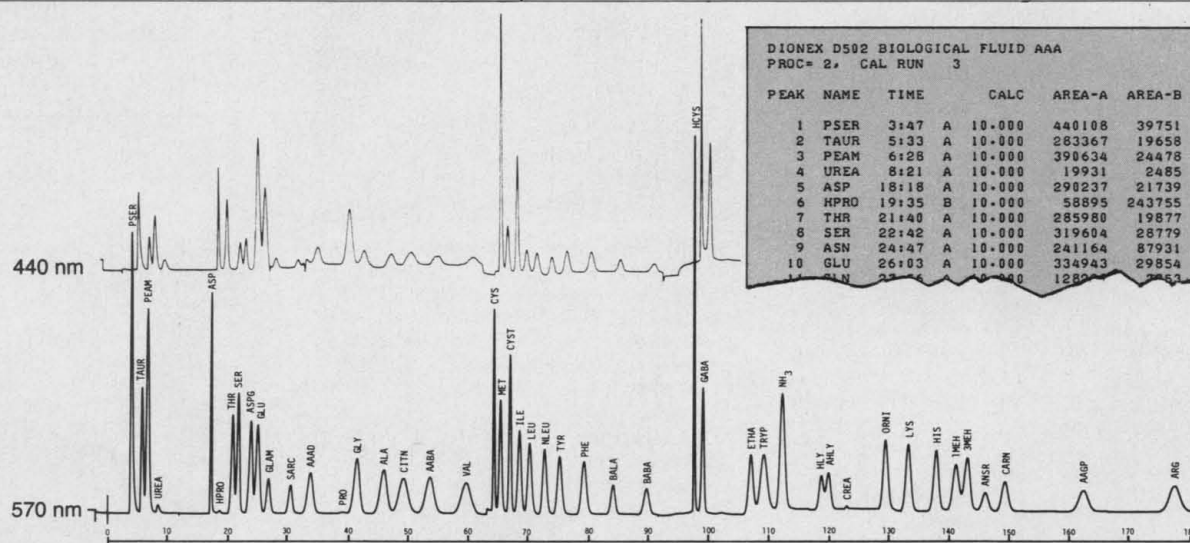
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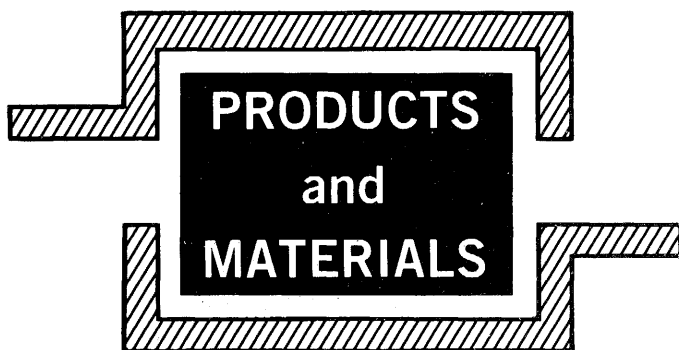
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Portable Pulse-Height Analyzer

Model 540 is a battery-operated analyzer that may be connected to an x-ray or gamma-ray probe to form a complete spectrometer. It can acquire a complete spectrum in a 1024-channel memory and display it on a terminal or it can integrate the counts in many peaks, correct for spectral interference, apply calibration factors, and display the results directly on the probe. The device is useful for nondestructive analysis, sorting, testing, and exploration for metals. Inax Instruments. Circle 767.

Virus and Cell Substrate Wall Chart

This chart alphabetically lists 120 viruses that affect humans and 479 in vitro cell populations in which they replicate. The cell populations are segmented into four groups: primary, diploid, heteroploid, and cells of unknown or unspecified type. A handbook accompanies the chart to aid the user and more than 1000 references are cited. There is also a glossary of names of the cell populations. Microbiological Associates. Circle 769.

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 Reader Service Card (on pages 366A and 430A) and placing it in the mailbox. Postage is free.

—RICHARD G. SOMMER

Biological Oxygen Monitor

Model 53 is documented with over 200 references to studies of oxygen uptake and evolution. The studies are grouped under subject headings such as Bacteria, Yeasts and Molds, Cell Fractions, and Intact Organisms. The device plots uptake or evolution directly on a chart recorder with greater rapidity than that obtained with conventional manometric techniques. A Clark-type electrode operates in a well-defined, controlled environment for sensing. Most tests are completed within minutes and useful information about rate of uptake or evolution is generated within seconds. Yellow Springs Instrument. Circle 766.

Flask Heaters

Heatwell Model One will accommodate round-bottom flasks from 25 through 125 milliliters. Model Two is designed for larger flasks from 200 to 500 milliliters. Both models have refractory cavities with embedded heating elements to allow temperatures up to 600°C. Temperatures may be maintained to within 2 percent by an available controller. Protrek. Circle 765.

Microprocessor-Based Liquid Scintillation Counter

Tri-Carb 460C can capture the entire radionuclide spectrum from coincidence threshold to infinity. The controller enables the operator to communicate with the system before, during, and after any procedure. The counter can handle up to 460 samples at a time in cassette-style racks. While a large operation is in progress, the operator may interrupt analysis to insert and quickly read any other sample and then continue the previous analysis. All instructions, modifications, communications, and results of analysis are available in hard copy for ready reference at the end of a procedure. Another feature of the Tri-Carb 460C is the Spectra-

lyzer which is set for two or three selected energy values such as those of tritium, carbon-14, iodine-125, or phosphorus-32 in single label or for tritium/carbon-14 or tritium/phosphorus-32 in dual label. It may also be set manually for counting at any other energy values. Packard Instrument. Circle 770.

Radioimmunoassay Data Reduction

A system is available for on-line operation with gamma counters. It features retention of eight assay protocols in memory and it processes up to eight different assays in one unattended operation. Printed standard curves may be modified prior to an analysis, and a variety of replicate structures may be used with up to eight response selections and eight transforms. One- or two-level screening is possible on response or dose. Iso-Data. Circle 768.

Literature

Life Sciences is a photographic product directory that focuses on 35 major applications from autoradiography and clinical photography through photomicrography and veterinary photography to radiography and x-ray microscopy. Eastman Kodak. Circle 761.

Environmental Enclosures describes shielding from radio frequency, x-rays, and gamma radiation. Ray Proff Division, Keene. Circle 763.

Analytical Microbiological Testing describes procedures for quantitating vitamins, amino acids, and antibiotics. U.S. Testing. Circle 771.

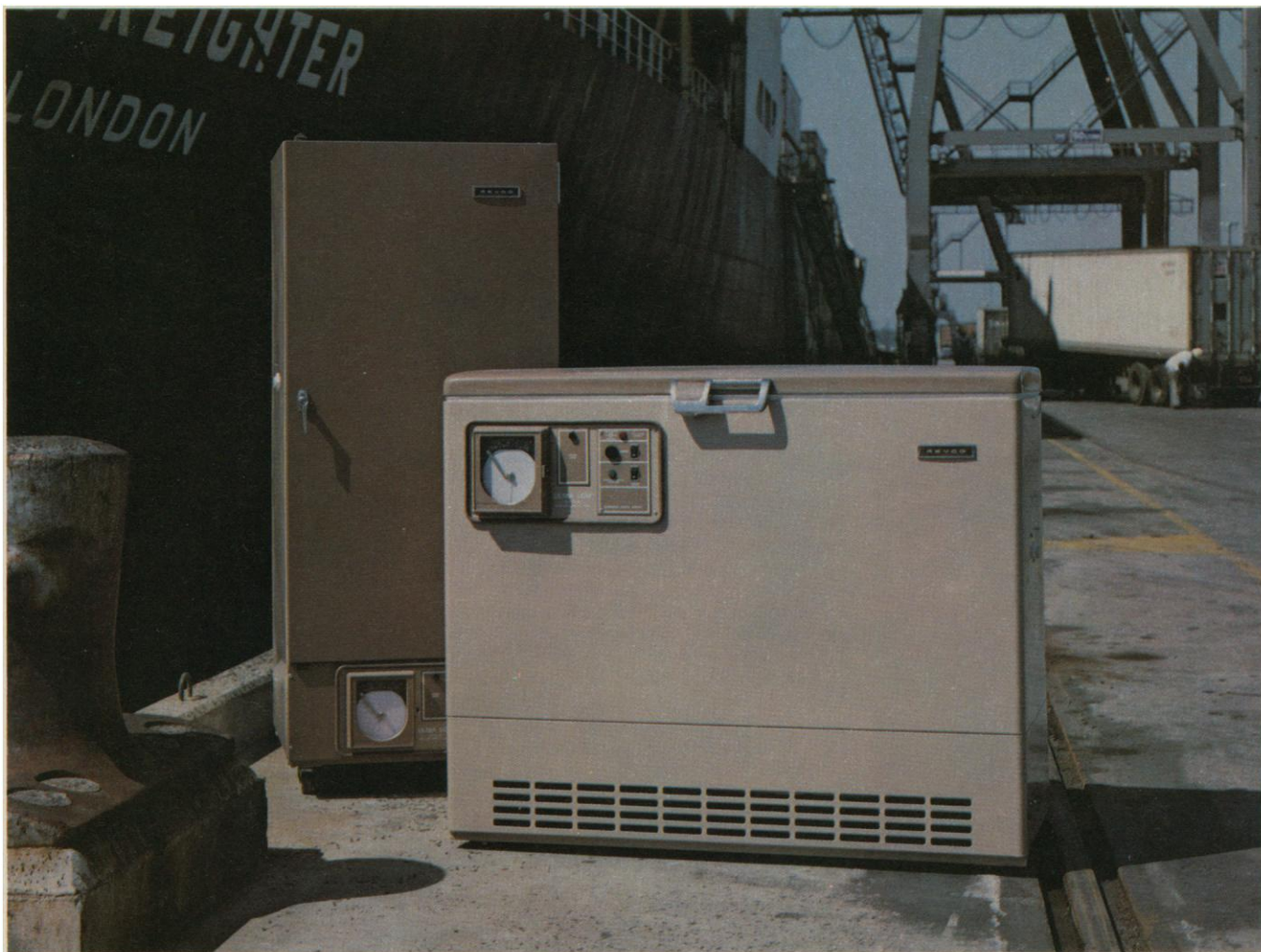
Care and Handling of Laboratory Glassware offers safety and maintenance suggestions to reduce laboratory expenditures and make equipment last longer. Corning Glass Works. Circle 772.

Electronic Instrument Rental is a catalog of more than 1000 instruments that are tested, calibrated, and guaranteed to meet manufacturers' specifications. Continental Resources. Circle 773.

Disposable Labware features glass and plastic items such as culture tubes, shell vials, patent lip vials, and others. Research Products International. Circle 775.

Spectroscopy Accessories lists supplies for fluorescent, ultraviolet, and visible light spectroscopy. Wilmad Glass. Circle 776.

Liquid Chromatography is an introduction to the subject for those already familiar with gas chromatography. Gow-Mac Instrument. Circle 777.



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