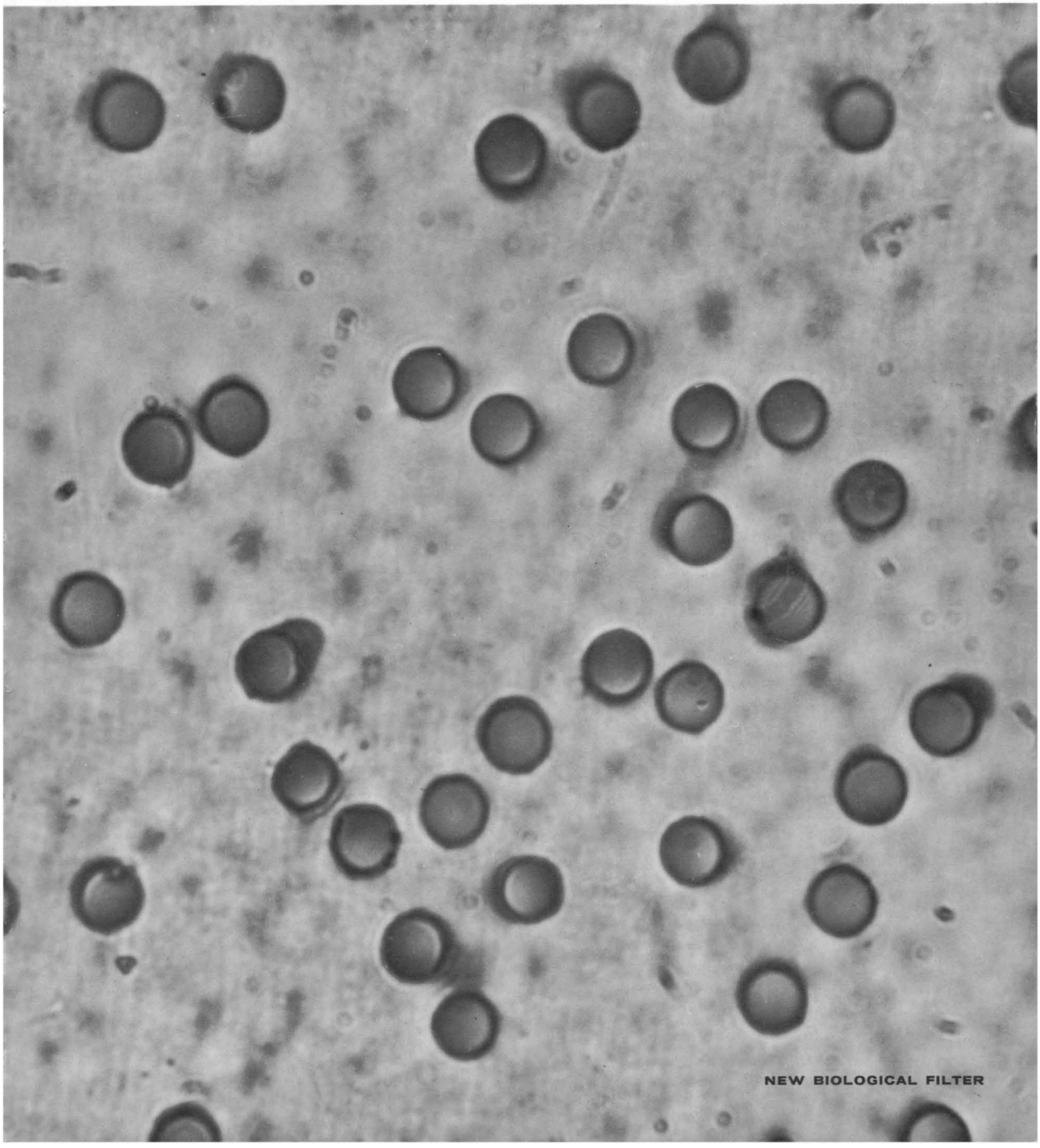
SCIENCE

17 January 1964

Vol. 143, No. 3603

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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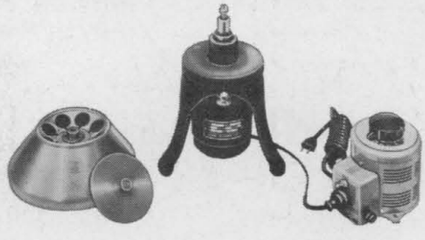

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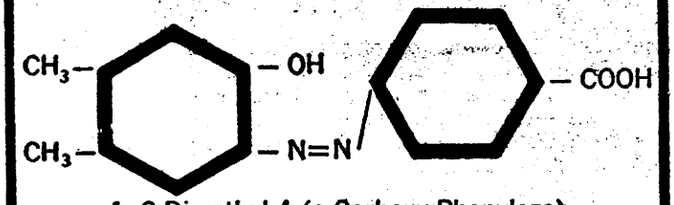
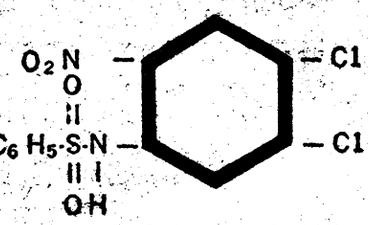
ANTI-CANCER AGENTS

CPA



1, 2 Dimethyl 4 (p Carboxy Phenylazo) 5 Hydroxy Benzene

DCBN



1,2 Dichloro 4 Benzene Sulfonamido 5 Nitro Benzene

A mixture of 1, 2 Dimethyl 4 (p carboxy phenylazo) 5 Hydroxy Benzene (CPA) and 1, 2 Dichloro 4 Benzene Sulfonamido 5 Nitro Benzene (DCBN) when fed to mice of the SPFS strain bearing spontaneous mammary cancers, cured permanently about one third of the animals.

The investigators adjudged the permanency of the cure of the cancers when the neoplasm decreased in size, disappeared and remained undetectable for at least 5 months.(1).

The maximal number of cures was obtained with 6 grams of CPA and 0.5 grams of DCBN per kilo of ration. This represents the first case of the cure of such cancers by any chemical agent.

These biochemicals were conceived on the basis of a demonstration that spontaneous cancer differed from normal host tissues in that they synthesized vitamin B_{12}.

Previously it was demonstrated that certain spontaneous mammary cancers of mice differed from normal mouse tissues in that cancer cells synthesized Vitamin B_{12} (2) (3). This metabolic difference allowed the prediction and the realization of antimetabolites poisonous to the cancers that are harmless to the host mice (4) (5).

These new anti-cancer agents, (CPA) and (DCBN) are members of a series of antimetabolites which have been shown to inhibit biosynthesis of Vitamin B_{12} in microorganisms. It was reported that these biochemicals demonstrated no detectable harmful effects on the host mice as the dosage used to bring about the desired results.

CPA and DCBN are available on 24-hour delivery basis anywhere in continental USA. Call 216-662-0212 or write Nutritional Biochemicals Corporation, 21010 Miles Avenue, Cleveland 28, Ohio.

All chemicals described are for chemical and investigational use only. They are not offered for clinical or drug use. The literature reference should not be interpreted as either an endorsement or disapproval of the biochemical by the cited investigator.

(1) D. W. Woolley and J. M. Stewart, Biochem. Pharm. 11, 1163, (1962). (2) D. W. Woolley, Proc. Nat. Acad. Sci. Wash. 39, 6, (1953). (3) D. W. Woolley, Ibid, 41, 111, (1955). (4) D. W. Woolley, Cancer Res. 13, 327, (1953). (5) D. W. Woolley and G. Schaffner, Ibid, 14, 802, (1954).

CPA	DCBN
100 gram bottle, gram $ .95	100 gram bottle, gram $1.25
50 gram bottle, gram $1.03	50 gram bottle, gram $1.35
10 gram bottle, gram $1.10	10 gram bottle, gram $1.45
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After polycarbonate resin film has been bombarded with fission fragments and etched in a hot solution of sodium hydroxide, uniform holes about 5 microns in diameter are produced. Plastic filters developed by this method can be used to separate cancer cells from blood cells (about × 1420). See page 249.

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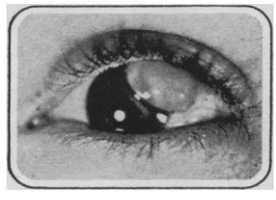
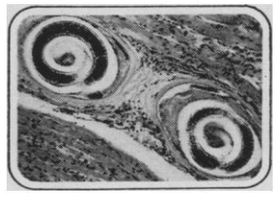
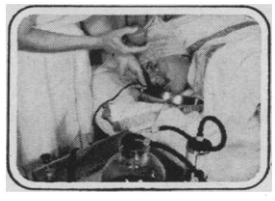
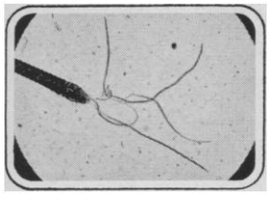

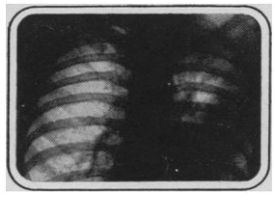
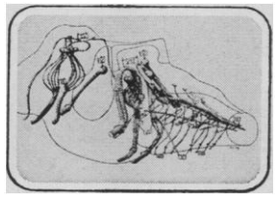

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dissolved in 50 ml. of 5% sodium hydroxide. The solution is acidified with 10 ml. of 1:1 sulfuric acid then diluted to exactly 1 liter with distilled water. The vanadium concentration is determined by the sulfur dioxide and standard permanganate procedure (*2*).

Mixed Acid. Concentrated sulfuric, nitric, and hydrochloric acids, and distilled water are mixed in the volume ratio of 1:2:2:3, respectively.

All spectrophotometric measurements were made at 25° C. with either a Beckman DU or Beckman DB spectrophotometer using 1-cm. matched silica cells.

Recommended Procedure. Weigh an appropriate size sample of aluminum powder (2 to 5 grams, but not to exceed 0.4 mg. of V) into 600-ml. beakers. Dissolve by careful repeated addition of 0.5- to 1.0-ml. portions of mixed acid. (Violent reaction and frothing occur with larger repeated acid additions.) After the reaction subsides (85% dissolved), add more of the acid mixture to make a total volume of ca. 175 ml. Evaporate this mixture to strong fumes of sulfuric acid (ca. 50 ml.). Cool, add 15 ml. of 85% phosphoric acid, and dilute to 200 ml. with distilled water. Heat to boiling and add 1.5 ml. of 0.5*M* sodium tungstate solution. Add 4% sodium permanganate solution to the boiling mixture until it remains pink after boiling for 5 minutes. Then carefully discharge pink color with 1 to 2 drops of 1:4 HCl. Destroy excess HCl (if any) with 1 to 2 drops of the 4% sodium permanganate to just the first pink color. Cool the mixture, transfer it to a separatory funnel, and dilute it to 350 ml. with distilled water. Add 18 ml. of *n*-hexanol to the solution in the separatory funnel. Shake for 30 to 40 seconds, let stand 3 to 5 minutes, and remove the aqueous phase. Add 30 ml. of 2.5*M* H_2SO_4 to the *n*-hexanol extract, shake for 30 to 40 seconds, and let the phases separate. Remove

$\log[BiX_2^{3-}]/[BiX][X^{3-}]=9.54$ である。

ちいて恒温槽中で 25°±0.1°C に保持した。

特性は 0.1N 塩化カリウム溶液中において n

$t=4.70$ sec(開回路) である。電解液の調製

A溶液を適量とって緩衝溶液を加えてイオン強

し，窒素ガス通気したのち，ポーラログラフに

大抑制剤は使用しなかった。pH の測定には柳

ーターを使用した。

紫外吸収スペクトルの測定には島津自記光電

27型と Beckmann DU 分光光度計を使用し，セ

の石英製を使用した。

被検液の調製はビスマス溶液，NTA溶液を適

酸と水酸化ナトリウムで pH を調節し，イオン強

定した。なお，緩衝溶液はもちいなかった。温度

測定した。

3 実験結果および考察

3.1 ビスマス-NTA錯塩のポーラログラフ波

ビスマス 4.8×10^{-4} mol/l，NTA 10^{-2} mol/l を

酢酸ナトリウム緩衝溶液を加えてイオン強度を 0.25

化ナトリウムと過塩素酸で pH を調節した被検液に

ログラムを記録した。図1に示すように2段波を示す

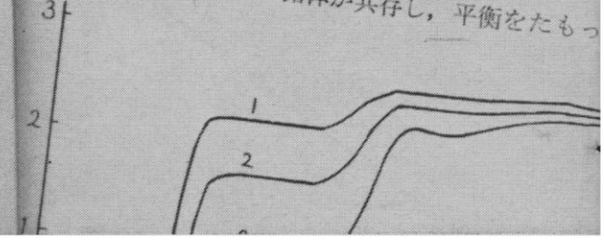
明確な第3波がみられるがこれについてはのちに述べ

高くなるにつれて半波電位は負側へ移行し，第1波は

2波が増大する。半波電位の位置からみて第1波は錯

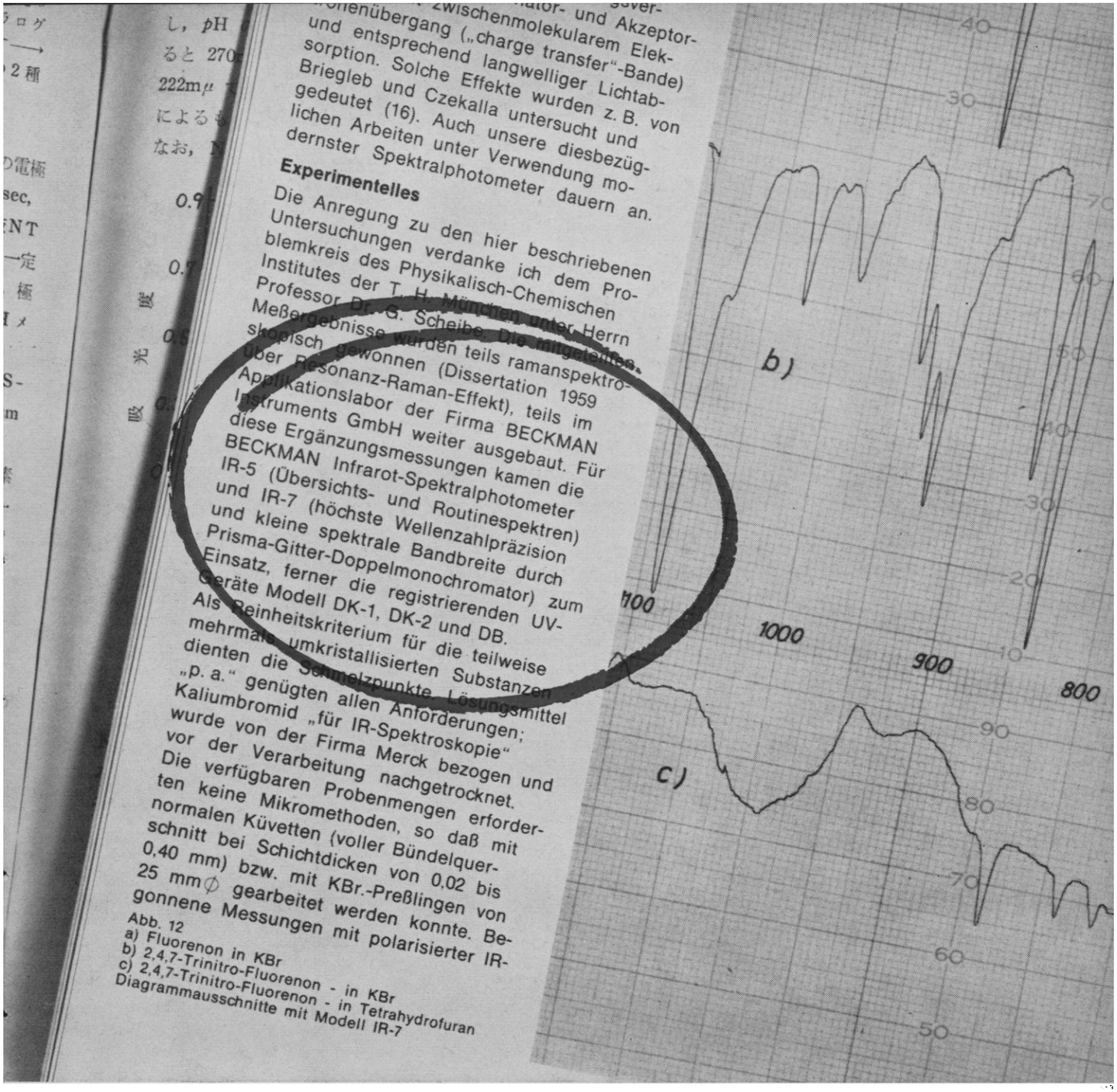
したビスマス単イオンの還元波ではなく，両波ともに錯

還元によるもので，2種の錯体が共存し，平衡をたもっ



This happened 963 times last year in English alone!

(Which makes us very happy indeed!)



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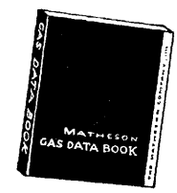

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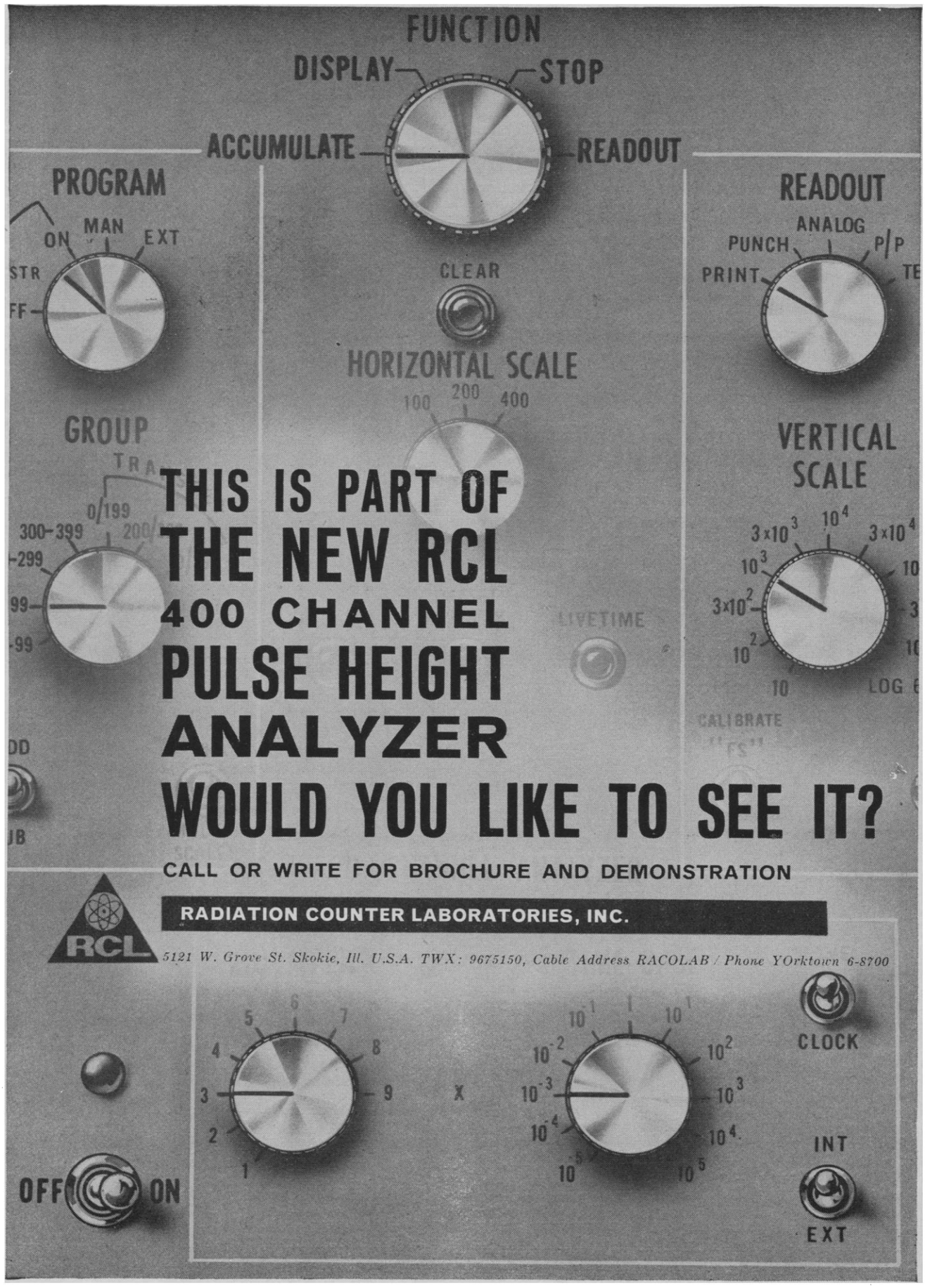
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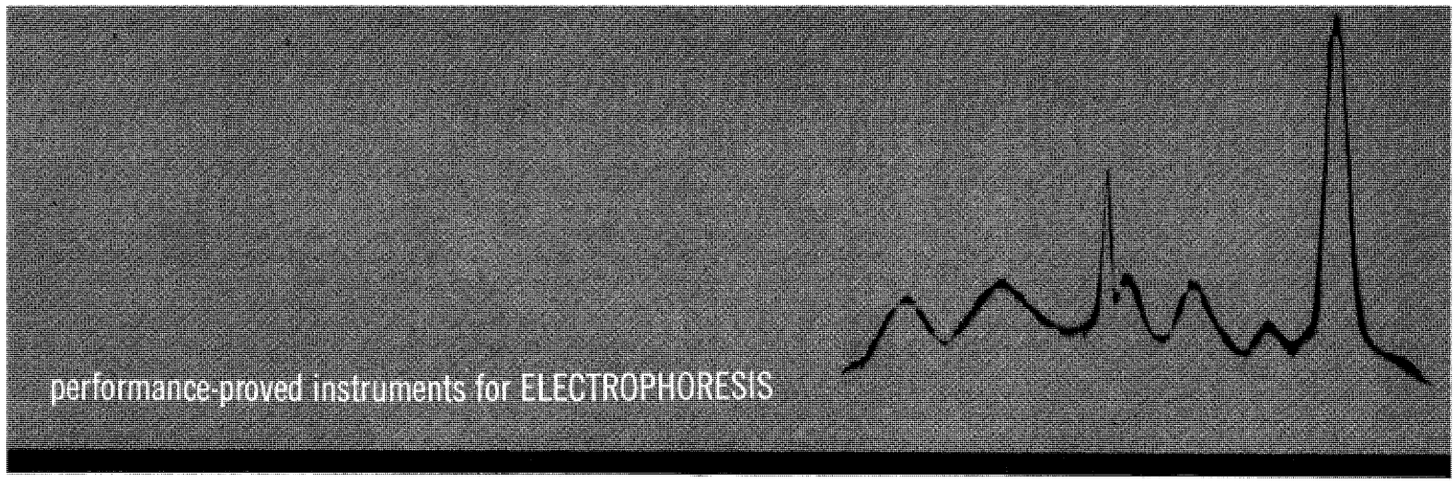

Electrophoresis diagram (above) from a descending limb obtained by using the half-wave phaseplate as the schlieren diaphragm. Electrophoresis diagram (lower left) of same serum as that represented above, but made by combining interference and phaseplate schlieren optics. Another electrophoresis diagram (lower right) of the same serum, made by using an 0.35 mm diagonal slit as the schlieren diaphragm.

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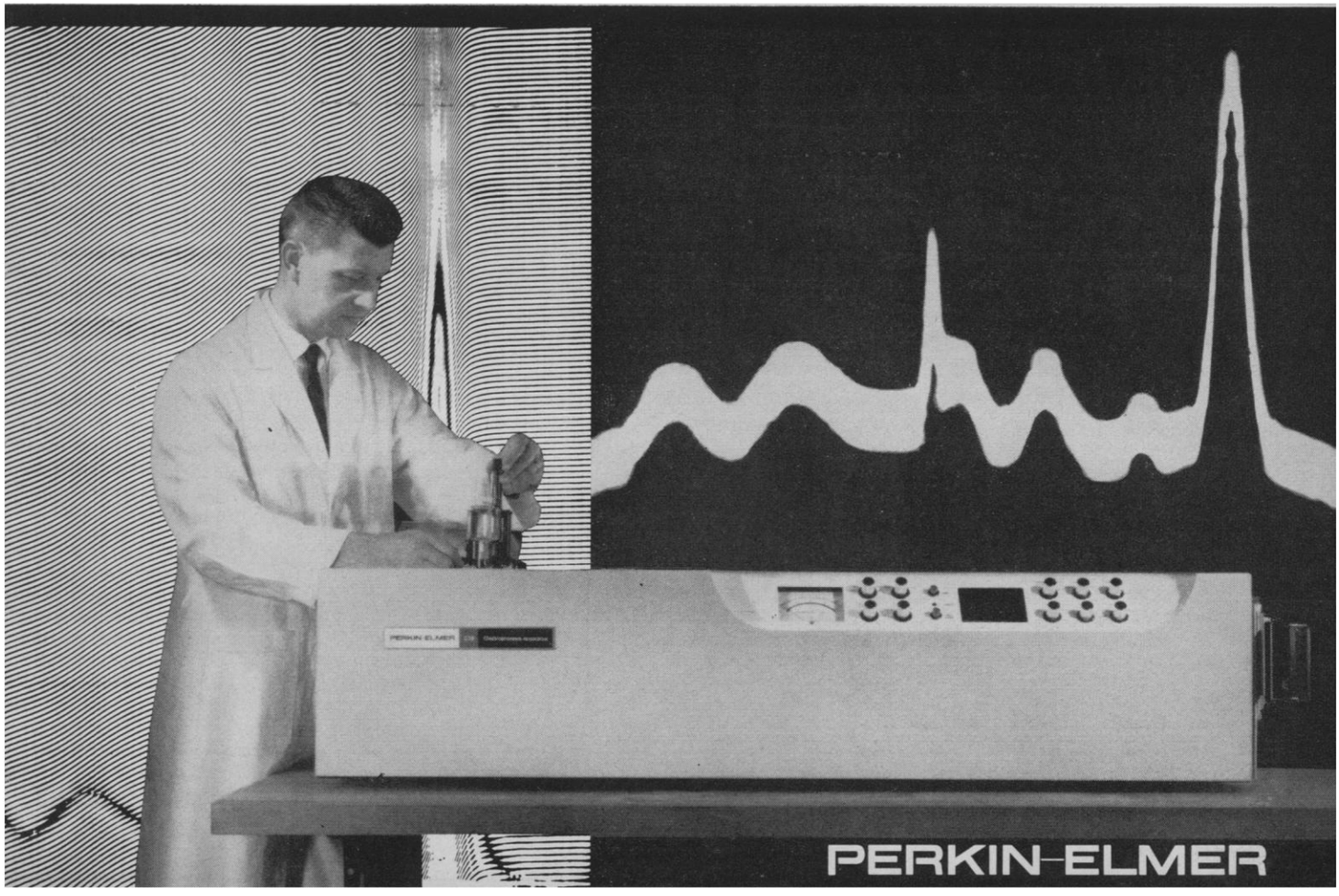

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weak vitamin E... how much we have smartened up in 15 years... optics for ATR

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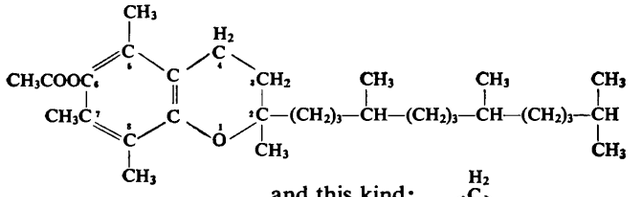
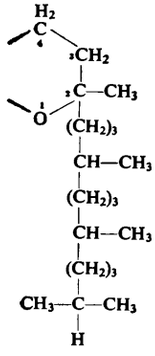
We offer two kinds of α-tocopheryl acetate. This kind:



and this kind:



Both of these configurations exhibit the tangle of biological effects conveniently named "vitamin E." One exhibits much more vitamin E effect than the other. Do we charge more for that one? No, sir or madam. The biologically more effective one, on the commodities market, costs about 1/2000 as much as the less effective one.

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Further studies of other vitamin E-deficiency symptoms and with other species will be well worth doing. Data on the low effectiveness of the *l*-epimer may shed light on the mechanisms by which the natural form, *d*-α-tocopherol, does its work in animals and men.

We aren't trying to do it all. Others are welcome to this lively subject. For ½ gram of l-α-Tocopheryl Acetate *as* EASTMAN *Organic Chemical No. 9170 send $65 to Distillation Products Industries, Rochester, N. Y. 14603 (Division of Eastman Kodak Company), which has research laboratories staffed with people who like to correspond about vitamin E.*

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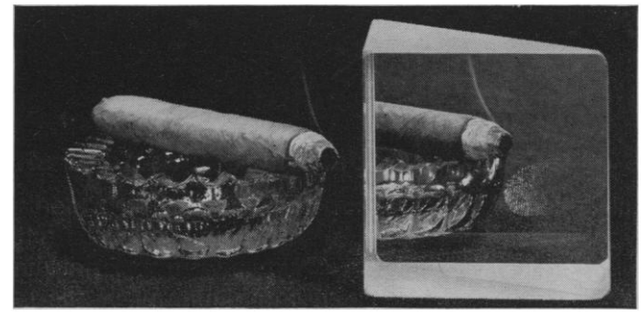
For putting both the picture and the sound on this magnetically striped movie film we recommend a KODAK Reflex Special Camera. We would appreciate an opportunity to show you that this is the finest 16mm *professional* camera that money can currently buy on the open market. If you already know that because you have one but didn't know we could adapt it for sound, you now know that, too. If you are thinking more of analog or digital data corresponding to the event that is pictured on the film for the eye, you have just suffered a brilliant flash of insight and we have to talk to you about what kind of movie stock you want striped.

Get in touch with Eastman Kodak Company, Motion Picture Products Department, Rochester, N. Y. (Phone 716-562-6000, Ext. 6230), which is also in a position to sell you the processor and camera but may not even mention them unless you ask.

Thoughts while viewing a greasy thumbprint



In the case of total reflection, such as is going on here, one is taught that 100% of the energy and not just 99.999+ % comes back. That may possibly be a good enough assertion for the average high school physics course, where one can also learn that scientists must never be sloppy.

It is instructive, however, to inquire what the grease of the thumbprint does: it ruins the perfection of reflection.

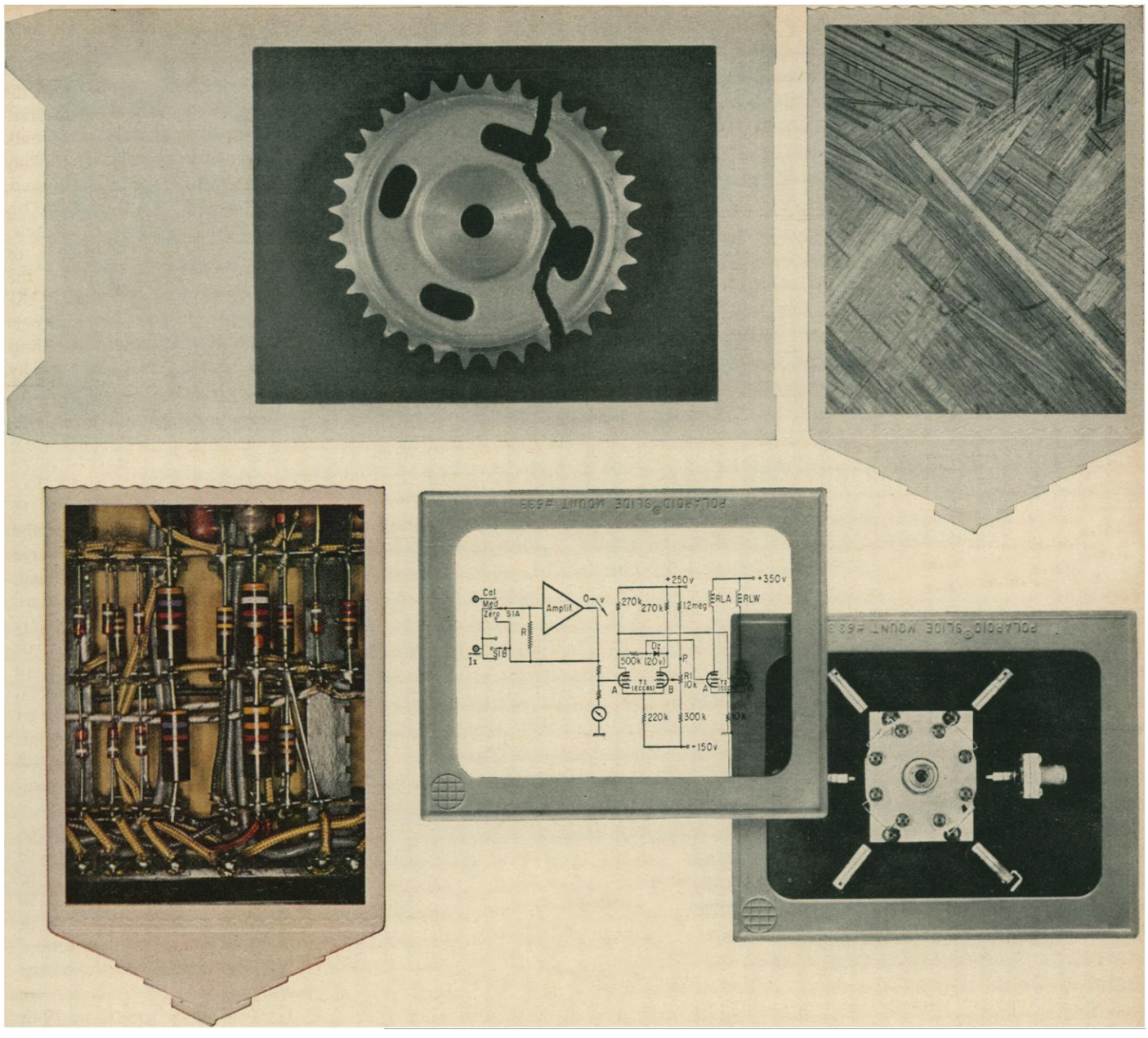
This is no news but comes out of James Clerk-Maxwell. The light penetrates a short distance into the lower-index medium. Only if not trapped there does the energy turn around and all come back. By sheer power of intellect without lifting a pinky labwise, one can prove that the spectral composition of the reflected light must be affected by the absorbance encountered during the brief skid outside. Penetration might be as much as 10 wavelengths very near the critical angle but quickly diminishes to a small fraction of a wavelength for incidence angles only a few degrees greater. As long as the absorbing substance is laid on thicker than that, the thickness doesn't matter. Get spectrophotometric curves. Who cares about cell thickness? Who needs cells? Why bother with tedious sample preparation? Just smear it on.

It would be well to do all this in the infrared, where absorption bands are numerous, strong, and enlightening. But you had better be sure you have a higher refractive index in the infrared than that of any sample you are likely to be examining.

Optical materials of high index and clean, extended infrared transmittance tend to be soft, soluble, both, or worse, or good for just one-time use. One, IRTRAN *4, offers high promise. We make it (from ZnSe). Excitement over the method—called ATR, for attenuated total reflection—had by September reached a pitch where ACS was able to put on a whole afternoon of papers about it. If you wish, you can use us as a sort of clearing house on the subject among the analytical instrument manufacturers and more specialized groups. Call 716-562-6000, Ext. 5166. If patient, write Eastman Kodak Company, Special Products Division, Rochester, N. Y. 14650.*

*In nature C_6 carries a hydroxyl instead of an acetyl radical. For pharmaceutical and animal-husbandry applications, the acetyl completely protects the molecule from oxidation, without further protective measures. The acetyl is hydrolyzed off by the esterases in the digestive tract. Without the acetyls, these two kinds of tocopherol can act chemically as antioxidants; they have equal antioxidant activity.

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science



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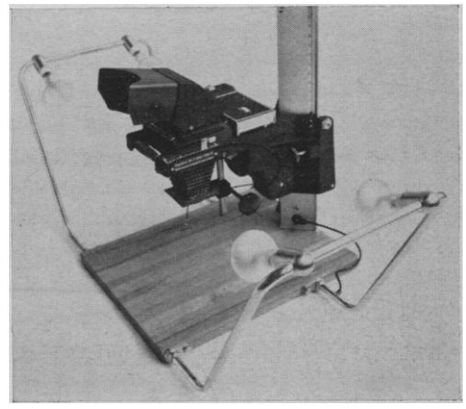
Clockwise from upper left: The 4x5 print of the broken gear was ready in 10 seconds. The photomicrograph is a 3¼ x 4¼ print made in 10 seconds. The continuous tone slide (subassembly) and the line slide (a circuit diagram) were made in 2 minutes and 10 seconds respectively. And the macrophotograph of the solid-state circuit board was made in full color in 50 seconds. There are 13 different Polaroid Land films for use when the order's marked "rush." And you can use conventional 4x5 or roll film when it isn't.

Eye-level reflex viewing, fixed lights, simple controls make the MP-3 easy to use. And the results meet professional standards. Write for a free six-page brochure. Polaroid Corporation, Technical Sales Dept., Cambridge, Mass. 02139.



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17 January 1964, Volume 143, Number 3603 **SCIENCE**

Letters to the Editor

Nearly everyone has at some time considered writing a letter to the editor, but few actually do so. The effort involved in assembling and then conveying thoughts on paper is a barrier which few surmount, and it introduces an important screening determinant on the nature of letters which an editor ultimately receives. Most contributors do not overcome their inertia unless they are strongly motivated. A common and effective goad is anger, which produces activity but not high-quality thought. Most letters written under the stimulus of adrenalin are rich in invective, nit-picking, and flat disagreement, but often they have limited substantive content. A dash of controversy spices a journal, but an overdose only leaves the impression that a man was angry. In some instances the principal consequence is to render disservice to the author.

With many, sending a letter to the editor seems to involve much more than writing and posting a communication. Two instances have impressed us. In early 1963 we published a controversial article by M. K. Hubbert (8 March, p. 884). Hubbert received more than a hundred notes commending him on his stand and only a few disagreeing with him. The editor received 11 letters—8 pro and 3 con. An editorial in *Science* (13 Sept., p. 999) entitled "Responsible scientific choice," which mentioned a paper appearing elsewhere, elicited a thousand requests for reprints. The editor received only three letters, two concurring and one dissenting.

Another measure of the behavior of writers of letters to the editor is the time delay of response. Most communications can be correlated with a specific item. Thus, we can note the time lapse between receipt of the journal and the date of the letter. Rarely is there a rapid reaction. The median response time is about 2½ weeks. Only part of this delay is accounted for in the time required to read the journal. The remainder of the period is often devoted to cogitation and consultation with colleagues. There are, however, frequent instances of greatly delayed comments. We have had letters referring to items which appeared many months and even more than a year previously. Apparently the readers had been browsing through old issues.

We receive at least three types of letters, and the different types are handled in different ways. First, there is the comment on scientific papers. This discussion usually is technical and critical of the authors. If it appears to have merit, it may be edited to remove excessive invective and is then referred to the original author for rebuttal.

A second type of letter is in response to material appearing as an editorial or as "News and Comment." Often the letters make the same points. To print them in their entirety would make boring reading. Accordingly, we accumulate the comments on a particular item and publish excerpts, trying to give the main points. In general we print the adverse rather than the favorable material, since the latter usually only reiterates what has already been said.

A third type of letter is the spontaneous, creative contribution not obviously related to an item which has appeared in the journal. This is likely to be printed with least delay. In the current issue are two letters of this type—one a contribution by Ralph Lapp calling for action by scientists in advance of the political conventions, the other a lampoon of the word-coining propensities of some molecular biologists. These are but two examples of the fine communications we hope to publish in 1964.—P.H.A.

Pulse Summation IN NEW TRI-CARB® SPECTROMETERS

Pulse summation is an exclusive Packard Tri-Carb development for utilizing essentially all of the light energy produced in liquid scintillation solutions, rather than only half of the light as in all older coincidence-type liquid scintillation spectrometers. The benefits to the user are:

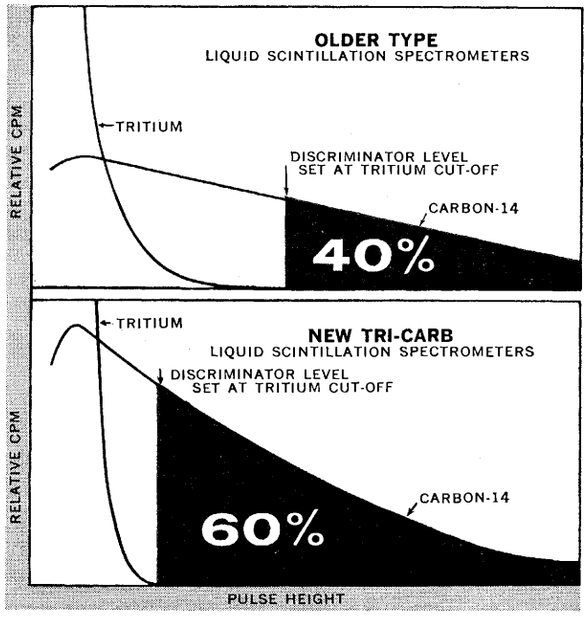
(a) *Higher counting efficiencies, especially for low energy emitters such as tritium*

(b) *Greatly improved isotope separation in double-label counting*

HIGHER COUNTING EFFICIENCIES

Previously, coincidence-type liquid scintillation spectrometers were able to utilize the pulse output from only one of the two photomultiplier tubes—the Analyzer—for pulse height analysis. Pulses from the second photomultiplier tube—the Monitor—served only to provide coincidence signals.

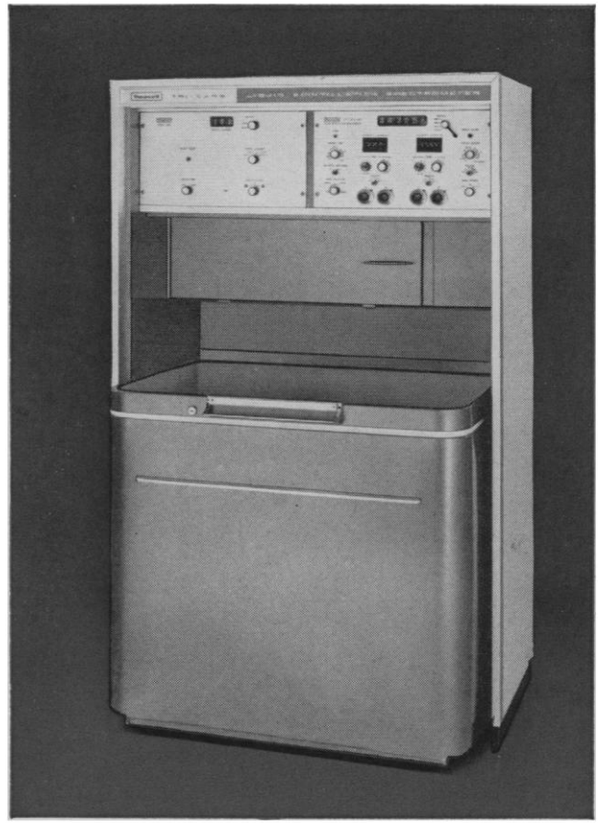
New Tri-Carb Spectrometers incorporate a pair of carefully matched 13-dynode photomultiplier tubes. Pulses from *both* tubes are used to establish coincidence, and simultaneously they are summed prior to pulse height analysis. This results in an improvement in the signal-to-noise ratio by a factor of two, since random noise pulses do not sum and coincident pulses do. Further, the use of 13-dynode photomultiplier tubes obviates the need for preamplifier circuits which inherently tend to slow down the pulse rise time and which contribute to the noise level. This permits much faster coincidence resolving time and relatively lower discriminator settings. The overall benefit is to **provide higher counting efficiencies for low energy isotopes.**



Comparison demonstrating greatly improved isotope separation obtainable with new TRI-CARB Spectrometers by showing percentage of total carbon-14 which appears beyond tritium cut-off. Data is directly comparable in both cases: discriminator levels were set so that only 0.01% tritium remained in the carbon-14.

GREATLY IMPROVED ISOTOPE SEPARATION

A further advantage of pulse summation is the more faithful reproduction of the true spectral shapes of low energy isotopes. The total number of photons emitted for each low energy beta particle is very small. Even with the best light collection and photocathode conversion efficiencies, only one or two photoelectrons are produced in each photomultiplier tube from an average 6 KeV tritium particle. Obviously, with such small numbers, a substantial advantage can be achieved in the statistics of photon collection and photoelectron utilization by doubling the numbers through the full use of *both* photomultiplier tubes for pulse summation and subsequent pulse height analysis. The more precise spectral curves achieved in new Tri-Carb Spectrometers, as a result of better statistics, provide **very greatly improved separation of low energy isotopes such as tritium and carbon-14.**



Pulse summation is just one of many significant new features now available in Packard Tri-Carb Spectrometers. Ask your Packard Sales Engineer for complete details, or write for Bulletin.

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tional Institutes of Health, Bethesda) considered the problems involved in predicting three-dimensional structure of proteins from the amino acid sequence. There is strong experimental evidence from his work on ribonuclease and other proteins, that, given the sequence, the peptide chain will fold spontaneously into the correct steric structure, but the problems of predicting this structure are formidable.

That evening, in Tel Aviv, E. B. Chain (Rome) gave a dramatic and very interesting lecture on the newly developed penicillins, which have so significantly enlarged the therapeutic uses of penicillin.

The symposium then turned to problems of development and differentiation. E. Kellenberger (Geneva) reported on the use of facultative lethal mutants for the investigations on the assembly (morphogenesis) of phage particles. These mutants are distributed all over the genetic map, so that they affect numerous genes: eight genes affect the formation of the phage head. Mutants in some genes produce abnormal assembly of subunits, as for example into long tubes, the "polyheads." The subunits are not self-assembling, but need supplementary information (morphogenetic principles) to be shaped correctly. The micrographs of "polysheath," however, suggest that the subunits of the tailsheath are of the self-assembling type. Leo Sachs (Weizmann Institute) considered problems of cell differentiation and the immune mechanism. Lymphoid cell precursors, in tissue culture, can form essentially pure cultures of either mast cells or antibody-producing cells, provided a suitable layer of other cell types is present in the medium. Lymphoid precursors from lymph nodes of a rat, exposed to mouse cells, differentiate to give cells releasing antibodies, which destroy the mouse cells; that is, this is a heterograft reaction in vitro. Both Sachs and, independently, Dulbecco have studied the transformation of normal into tumor cells by the polyoma virus, and the virus acts directly on the cells to induce the change. Michael Feldman (Weizmann Institute) considered the role of the thymus in promoting antibody formation in the adult organism, making use of the histocompatibility antigens which are determined by the Y-chromosome of male animals. Transfer of such antigens from a male to a female of the same species, in a tissue graft, leads to rejection of the graft by the female, due to an anti-Y immune response. Some tumors induced in males cannot grow when transplanted into females because they evoke a similar response. However, animals previously irradiated with x-rays fail to develop the immune response until after several weeks, and the tumor in the female continues to grow. If the animal has been thymectomized, the immune mechanism does not recover at all after x-radiation; grafting a thymus back into such animals, however, does lead to recovery of the immune response. This recovery is an inductive effect of the thymus; it is not due to production of immunologically competent cells by the thymus itself.

H. H. Weber (Heidelberg) discussed the role of adenosine triphosphate (ATP) in the active transport of ions, with special reference to the work of W. Hasselbach in his institute on the vesicles of the sarcoplasmic reticulum, which accumulate calcium ions. There is a very close correlation between the Ca^{++} ions transported and the ATP hydrolyzed (2 Ca^{++} per ATP). He concludes that the ATP denotes an energy-rich bond to phosphorylate a carrier in the membrane, and that the phosphorylated carrier has an affinity for Ca^{++} ion several hundred times as great as the unphosphorylated carrier. David Nachmansohn (Columbia University) considered chemical control of movements of ions across conducting membranes, with special reference to nerve and electric organs. Hugo Theorell (Stockholm) set forth, with beautiful clarity, his recent work on complexes of liver alcohol dehydrogenase with coenzymes and inhibitors or substrates.

The last session was devoted to immunochemistry. Michael Heidelberger (Rutgers University) described his recent work on the immunological properties of the capsular material of pneumococci of various types. The structure of the carbohydrates in these capsules is now becoming known in far more detail than ever before—in type SV, for example, recent work of Barker in Birmingham, on material supplied by Heidelberger, has identified N-acetyl-L-fucosamine and N-acetyl-6-deoxytalosamine, among other constituents. These two sugars were never before known in natural products. The chemical identification of antigens by immunochemical techniques is now being greatly refined, and in many cases furnishes a short cut to determination of the structure of the antigen. Michael Sela (Weizmann Institute) described his researches on the development of

polyamino acids and their derivatives as synthetic antigens. One good antigen can be made from polylysine by first growing alanyl chains on the amino groups of the lysyl side chains and then attaching tyrosyl chains to the alanyl chains. If the attachments are made in reverse order—first tyrosine, then alanine—the resulting product is not antigenic. The tyrosyl groups must be on the outside to make a good antigen. The optical specificity of the amino acids is important—compounds made from combinations of D-amino acids are generally nonantigenic, even when the corresponding L-compounds are strongly antigenic. Sela's recent work has shown that electric charge is not necessary for antigenicity. He and a colleague have recently synthesized a water-soluble, uncharged polymer that is strongly antigenic. [M. Sela and S. Fuchs, *Biochim. Biophys. Acta* **74**, 797 (1963)]. When galactose is attached to a synthetic polymer, the galactose grouping becomes a powerful antigenic determinant. Immunological tolerance may be established to synthetic antigens, as shown by experiments on new-born rabbits. The aim of all these researches is to throw light on the nature of the immune mechanisms found in living organisms; the synthetic chemicals are merely a means to this end.

J. C. Kendrew concluded the final session with brief, graceful, and humorous comments on some of the major points of the symposium.

One nonscientific interlude deserves mention. Midway in the week, we left Rehovoth for a 2-day trip along the coast to Caesarea, Haifa, and Acre, then to the Galilee mountains and the Lake of Galilee. We stopped overnight at a kibbutz which, in addition to the usual farming and other community activities, ran a small and very pleasant hotel for visitors. That evening all of us had the opportunity to talk with members of the kibbutz and learn directly about their way of life, its values and its problems. We returned with renewed zest to the scientific conference after this fascinating interlude. In addition to this thoughtfully arranged pause in the symposium, all of us will remember the warm and generous hospitality of our Israeli hosts, during and after the conference, which combined with the high level of the scientific discourse at the meetings to make this a most memorable occasion.

JOHN T. EDSALL

Biological Laboratories, Harvard University, Cambridge, Massachusetts

Forthcoming Events

January

29–31. American **Meteorological** Soc., 44th annual, Los Angeles, Calif. (A. Court, 17168 Septo St., Northridge, Calif.)

29–1. Southwestern Federation of **Geological Societies**, 6th annual, Midland, Tex. (W. E. Wadsworth, AAPG, 1444 S. Boulder, P.O. Box 979, Tulsa 1, Okla.)

29–1. Western Soc. for **Clinical Research**, 17th annual, Carmel-by-the-Sea, Calif. (H. R. Warner, Latter-Day Saints Hospital, 325 Eighth Ave., Salt Lake City, Utah)

30–31. Spontaneous and Experimental Comparative **Atherosclerosis**, conf., Beverly Hills, Calif. (E. McCandless, Los Angeles County Heart Assoc., Los Angeles 57, Calif.)

February

2–5. American Inst. of **Chemical Engineers**, annual. Boston, Mass. (J. Henry, AICE, 345 E. 47 St., New York, N.Y.)

2–7. Institute of **Electrical and Electronics Engineers**, winter meeting. New York, N.Y. (A. P. Fughill, Detroit Edison Co., 2000 Second Ave., Detroit, Mich. 48226)

2–8. **Teratology**, workshop, Commission on Drug Safety, Gainesville, Fla. (D. C. Trexler, Commission on Drug Safety, 221 N. LaSalle St., Chicago, Ill. 60601)

2–11. Scientific-Technical **Documentation and Information**, intern. congr., Rome, Italy. (I. M. Lombardo, La Produttivita, Viale Regina Margherita, 84d, Rome)

3–4. Society of **Rheology**, Claremont, Calif. (T. L. Smith, Stanford Research Inst., Menlo Park, Calif.)

3–4. Perspectives in **Virology** IV, Gustav Stern symp., New York, N.Y. (M. Pollard, Lobund Laboratory, Univ. of Notre Dame, Notre Dame, Ind.)

3–7. **Materials**, intern. conf., Philadelphia, Pa. (A. G. H. Dietz, Dept. of Building Engineering, Massachusetts Inst. of Technology, Cambridge)

4–6. Society of the **Plastics** Industry, conf. of the reinforced plastics div., Chicago, Ill. (W. C. Bird, SPI, 250 Park Ave., New York, N.Y. 10017)

4–6. Cellular Biology of **Myxovirus Infections**, CIBA Foundation symp., London, England. (CIBA Foundation, 41 Portland Pl., London, W.1)

5–7. **Military Electronics**, 1964 winter conv., Los Angeles, Calif. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York, N.Y. 10021)

5–8. American College of **Radiology**, natl. meeting, Tucson, Ariz. (American College of Radiology, 20 N. Wacker Dr., Chicago, Ill. 60606)

7–8. **Differentiation and Development**, symp., New York, N.Y. (New York Heart Assoc., 10 Columbus Circle, New York, N.Y. 10019)

9–11. **Entomological** Soc. of America, Southwestern Branch, Monterrey, Mex. (D. F. Martin, P.O. Box 1033, Brownsville, Tex. 78521)

10–14. New Zealand Institution of **Engineers**, conf., Wellington. (F. N. Stace, P.O. Box 3047, Wellington, N.Z.)