trophysique, Université de Liége, Liége.)

8–10. Endocrine Aspect of Breast Cancer, Internatl. conf., Glasgow, Scotland. (A. P. M. Forrest, Dept. of Surgery, Western Infirmary, Glasgow, W.1.)

8–12. Inter-American Cong. of Philosophy, 5th, Washington, D.C. (R. M. Chisholm, Brown Univ., Providence, R.I.)

8–12. Poliomyelitis Conf., 4th internatl., Geneva, Switzerland. (Secretariat, 4th International Poliomyelitis Conference, Hotel du Rhone, Geneva.)

8–20. Legal Medicine and Law-Science Problems, 1st American cong., Chicago, Ill. (Law-Science Inst., c/o School of Law, Univ. of Texas, Austin 12.)

9–11. Biological Symp., 8th annual, Univ. of Michigan, Ann Arbor. (B. L. Baker, Dept. of Anatomy, Univ. of Michigan, Ann Arbor.)

9–13. European Molecular Spectroscopy Conf., Freiburg, Breisgau, Germany. (R. Mecke, Dept. of Physical Chemistry, Univ. of Freiburg, Freiburg.)

9–13. International Cong. for the Study of Social Insects, Paris, France. (G. Richard, International Union for the Study of Social Insects, Faculty of Sciences, University of Rennes, Rennes, France.)

10–12. Thermodynamic and Transport Properties of Fluids, conf., IUPAC, London, England. (Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, London, S.W. 1.)

10–17. International Union of Crystallography, 4th genl. assembly, Montreal, Canada. (G. A. Jeffrey, Chemistry Dept., Univ. of Pittsburgh, Pittsburgh 13, Pa.)

11–13. Applied Cytology, European Symp., Brussels, Belgium. (Secretary, Comm. on International Cong., American Cancer Soc., 521 W. 57 St., New York 19, N.Y.)

14–19. International Assoc. of Gerontology, Merano, Italy. (A. I. Lansing, Dept. of Anatomy, Univ. of Pittsburgh, Pittsburgh 13, Pa.)

14–20. Clinical Pathology, 4th internatl. cong., Brussels, Belgium. (M. Welsch, Service de Bacteriologie et de Parasitologie, Université de Liége, Blvd. de la Constitution, Liége, Belgium.)

15–18. Biochemistry of Lipids, International Colloquium, Oxford, England. (Dr. Sinclair, Laboratory of Human Nutrition, Oxford.)

15–19. Institute on College Administration, annual, Ann Arbor, Mich. (A. D. Henderson, 2442 U.E.S., Univ. of Michigan, Ann Arbor.)

16–19. American Malacological Union, annual, New Haven, Conn. (Miss M. C. Teskey, P.O. Box 238, Marinette, Wis.)

16–24. International Cong. for Pure and Applied Chemistry, 16th, Paris, France (R. Morf, Secy. Genl., IUPAC, Sandoz, S.A., Basel, Switzerland.)

20–21. Medical-Sociological Aspects of Senile Nervous Diseases, internatl. symp., Venice, Italy. (S. N. Feingold, Jewish Vocational Service of Greater Boston, 70 Franklin St., Boston 10, Mass.)

21–28. Neurological Sciences, 1st internatl. cong., Brussels, Belgium. (P. Bailey, National Institutes of Health, Bethesda 14, Md.)

23–24. Modern Electrochemical Methods of Analysis, Internatl. symp., Paris, France. (G. Charles, Ecole Superieure de Physique et de Chimie, 10, rue Vauquelin, Paris 5e.)

25–26. Structure Properties Relationships of Polymers (IUPAC), Paris, France. (International Union of Pure and Applied Chemistry, 4, Avenue de l'Observatoire, Paris 6e.)

25–29. Protein Chemistry Symp., IUPAC, Paris, France. (J. Roche, College de France, Place Marcellin Berthelot, Paris 5e.)

26–27. Experimental Psychology and Animal Behavior Section of International Union of Biology, Brussels, Belgium. (H. S. Langfeld, Dept. of Psychology, Princeton Univ., Princeton, N.J.)

26–27. Linguistic Soc. of America, Ann Arbor, Mich. (A. A. Hill, Box 7790, University Station, Austin 12, Tex.)

26–27. Military Psychology, internatl. symp., Brussels, Belgium. (National Academy of Sciences, 2101 Constitution Ave., NW, Washington 25.)

26–31. International Humanist and Ethical Union, 2nd cong., London, England. (American Humanist Assoc., Gate House, Yellow Springs, Ohio.)

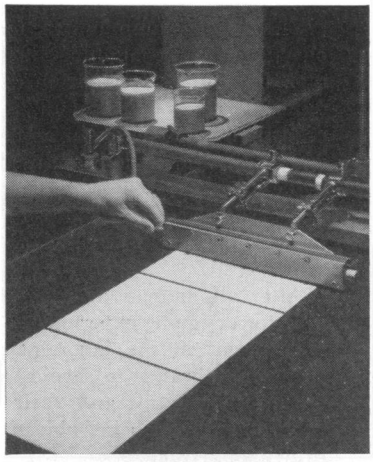
26–1. International Congress on Nutrition, 4th, Paris, France. (Quatrième Congrès International de Nutrition, CNERNA, 71, boulevard Péreire, Paris 17e.)

(*See issue of 17 May for comprehensive list*)

Kodak reports to laboratories on:

four new sensitizings for an expanding universe . . . two new thermosetting optical cements . . . some dry and scarcely credible dark violet prisms

Finesse and sensitivity



Here we are, seemingly hoist in the dark with our own photographic petard, while in the act of coating photographic emulsion on glass to keep the astronomers in business. Since the world's professional astronomers could all be comfortably accommodated in the stands of even a smallish town's ball park, the coating equipment we maintain for their benefit need not be very streamlined. It must, however, be very good, lest precious hours be wasted for magnificent instruments and men who have so much probing of the universe to cram into too brief lifetimes.

Photographic emulsion, the heart of the matter, comes here in beakers —a little beaker to coat a couple of dozen 2 by 10's, a bigger beaker for a dozen dozens of 8 by 10's to go to a man who wants to make sure his whole autumn's observing program will be on the same coating. This is custom manufacturing, of course. Up to now we have listed 104 combinations of emulsion types and spectral sensitizing classes in which we can make *Kodak "Spectroscopic" Plates*, as these esoterica are trademarked. Occasion for the present remarks is the addition of four sensitizing classes for *Emulsion Type IIa*.

The lower case "a" means that the sensitivity emphasis has been so applied as to require the fewest hours of exposure to make visible the incredibly faint rather than to freeze a split microsecond with the least burst of brilliance. For building up something in the way of image out of virtually nothing in the way of energy flow, there is an *Emulsion Type 103a* that is even more sensitive. *IIa*, however, beats it for fine image structure and signal-to-noise ratio in the microphotometer tracings of stellar and galactic spectra.

The new *IIa* sensitizings are *Class F*, a very uniform one for the whole visible spectrum, especially for the red to 680 mμ; *Class E*, with low green sensitivity but the highest total red sensitivity, peaking at about 645 mμ and cutting off sharply beyond about 660 mμ; *Class D*, the most generally useful one for the green region to about 630 mμ; and *Class G*, which provides the highest green sensitivity obtainable without appreciable red sensitivity.

Astronomers and others who employ photographic sensitivity with this order of finesse conduct their negotiations for materials with Special Sensitized Products Sales Division, Eastman Kodak Company, Rochester 4, N. Y., which arranges for delivery through Kodak dealers—the very same, in many cases, who supply portrait photographers with Kodak Opal Paper *on which to picture the local brides. This also requires finesse and sensitivity.*

What's wrong with Canada balsam?

We seem to have achieved a lonely leadership in the manufacture of optical cements. The eminence is not altogether enviable. It's hard to make money at selling optical cement to other optical manufacturers, nor is there in it the kind of satisfaction to be found, for example, in making ever better photographic plates for astronomers to use in exploring the universe. (There isn't any money in that either, but it's fun and it sharpens the skills.) Lens cement, however, is only lens cement. What if it does hold lenses or prisms together over a much wider range of temperatures than the old Canada balsam used to? After all, our resin chemists and our optical production engineers get the same signature on their pay checks.

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A scoop for radicals

"I have in my hand a little bottle which contains some dry, dark violet prisms of a free radical," you will casually remark to acquaintances and students suspected of being unfamiliar with *J.A.C.S., 72*, 1051; *J. Org. Chem., 17*, 1437; or *J. Chem. Soc., 1954*, 3574 and *1956*, 1127. It will be diphenylpicrylhydrazyl. You will have made it by treating *1,1-Diphenyl-2-picrylhydrazine* (Eastman 7365) with lead peroxide in chloroform. It will keep on the shelf for a while but not long enough for us to have relieved you of the preparation chore. Being reasonably inert to molecular oxygen, it will make a very fine scavenger with which to scoop other, less long-lived free radicals out of a reaction. As your insight will at once tell you, it will inhibit polymerization, abstract hydrogen from certain molecules, and be paramagnetic because of its unpaired electron.

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Kodak
TRADEMARK

LETTERS

The editors take no responsibility for the content of the letters published in this section. Anonymous letters will not be considered. Letters intended for publication should be typewritten double-spaced and submitted in duplicate. A letter writer should indicate clearly whether or not his letter is submitted for publication. For additional information, see Science **124,** *249 (1956) and* **125,** *16 (4 Jan. 1957).*

Passive Voice and Personal Pronouns

R. V. Ormes' judicious criticism of the passive voice [*Science* **125,** 529 (1957)] reminded me, by contrast, of my own too sweeping indictment of it a year ago. A young chemistry major took my remarks seriously and wrote a formal account of experimental procedure entirely in the active voice, using the first personal pronoun. The result was revealing. At least it convinced me that the passive voice is sometimes preferable to the active, and that criticism of it should be confined, like Ormes', to its abuse.

To illustrate, here is a passage on procedure, chosen at random from the *Journal of the American Chemical Society.* The original reads: "The thick oil was dissolved in ether, the solution was extracted twice with dilute alkali, and the combined basic extracts were washed with ether. The ether solutions were combined, dried and evaporated to give 2.8 g. of starting alcohol. The basic solution was acidified with dilute sulfuric acid and extracted with ether. The ether layer was washed with water. . . ."

Recast in the active voice, with the first personal pronoun, it reads: "We dissolved the thick oil in ether, extracted the solution twice with dilute alkali, and washed the combined basic extracts with ether. We combined the ether solutions, dried them, and evaporated them to give 2.8 g. of starting alcohol. We acidified the basic solution with dilute sulfuric acid and extracted it with ether. We washed the ether layer. . . ."

Except for the opening sentence, the original version is superior, primarily because it places the emphasis where emphasis logically belongs: on the process rather than on the agent. Coherence is better too: in the original, the substance named at the end of one sentence tends naturally to become the subject or subject modifier at the beginning of the next (". . . ether. The ether solution . . ."); in the revision, the reader is constantly brought back to "we" before he learns the next step in the on-going process.

But having stated the obverse or counterpart of Ormes' position with regard to the passive voice, I should like only to reinforce his position that the first personal pronoun is not an invariable sign of immodesty or subjectivity; sometimes considerations of objectivity and responsibility, no less than of style, demand its use. Certainly avoidance of it is no guarantee of virtue; I recall one immodest self-reference that went something like this: "Analysis of this problem is difficult, but after long deliberation, it was decided by this analyst to. . . ." Even worse is the pretense that beliefs are held and assumptions are made without danger of contamination from human fallibility. "It is assumed" may be quite all right for reminding a reader of assumptions customarily understood when certain equations are used, but the reader should know when the assumptions are original, and the simplest way to tell him is by saying "I have assumed. . . ."

After all, human agents are responsible for designing experiments, and they are present in the laboratory; writing awkward phrases to avoid admitting their responsibility and their presence is an odd way of being objective. P. W. Bridgman (*Reflections of a Physicist,* 1950, pp. 57–58) puts it even more strongly: "In suppressing these personal expressions I am doing an unnatural thing that sometimes demands obvious circumlocutions and always involves an element of convention and construction. If I want to express what obviously occurs, I have got to use the first person. Has it ever been adequately proved, or has ever the assumption been adequately examined that in forcing myself to speak non-personally I have not thrown away something vital?"

JANE J. ROBINSON
University of California, Los Angeles

University Responsibilities and Government Money

I agree very definitely with Paul Klopsteg [*Science* **124,** 919 (1956)] that the danger of government sponsorship of research is that of violation of the integrity of the universities in their research programs. However, the proposals and the suggestions made by Klopsteg are, in my opinion, diametrically opposite to those which would solve the problem.

In principle, Klopsteg proposes that whenever funds are granted to an institution for a particular project by a government agency, these funds should cover only part of the costs, and the remainder of the costs should be supported from the university's research funds, thus fulfilling the obligation of the university to support research. That this method of operation would lead toward the domination of the over-all research activity of an institution by granting agencies can be made clear by the following example.

Let us assume that a given institution has a total of $100,000 (including overhead) to distribute among its various research activities. In the absence of a granting agency, the institution can

choose, using its best judgment for the benefit of mankind, which individuals and research programs it will support with this fund. We must further assume, which is generally true, that the institution would like to enlarge its research activities. This desire is certainly in line with the aims of Congress as specified in the formation of the National Science Foundation. To simplify our thinking, let us assume that the granting agency agrees to spend $5000 for 20 specific projects which it approves, provided that a corresponding and equal amount of money toward each of these projects is granted by the institution. Thus, the institution can double its research activity and spend $200,000 on research, provided that it undertakes projects approvable by the agency. On accepting the aid of the granting agency under this procedure, the institution becomes the servant of the granting organization, which effectively controls the whole research program at the university. Under the alternative system, the granting agency would support the total costs of ten specific projects at $10,000 each which are approved by the granting agency. At the same time, the institution will retain its integrity with respect to the expenditure of the $100,000 which it originally had, and it may now devote this money to any ten research projects which it feels, or its scholars feel, are best, regardless of the views of the granting agency. Thus the institution is no longer the complete slave of the granting agency.

Another insidious method of using the institution's funds in the support of research approvable by a granting agency is that of requiring that the principal investigator, who devotes a material part of his effort to the work supported by the grant, shall do so without charging his time to the grant, thus forcing the institution to carry his salary and its share of the overhead. In many cases, especially in the case of small grants, this cost is as large as, or larger than, the grant itself.

A further loss of control by the institution of the direction in which its own funds may be used through the procedure suggested by Klopsteg is brought about in a more subtle manner. Whenever a sponsoring agency fails to provide the full indirect costs of a project by limiting the allowance for them to 15 percent of direct costs or to some other arbitrary figure that is less than the true cost, the institution is forced to use a portion of its free funds to make up the difference. This must of necessity be true, since overhead rates are determined by distributing actual indirect costs over all programs, whether or not the overhead costs are provided by the granting agency. Since this indirect contribution to an added project through the failure to ob-

tain full overhead may be obscure, institutions are prone to accept the grant without qualm. However, when the number of projects reaches a significant size over several years, the total value of general funds used in this manner becomes an important drain on general funds that might otherwise be used for university-sponsored research, faculty salaries, or other activities traditionally associated with the institution. Klopsteg's implication that overhead funds are "uncommitted money" would appear to indicate his failure to understand the concept of indirect costs. Expenses for which overhead allowances are made must be paid by the institution. If the overhead allowances themselves are identified as "uncommitted money," then other available "uncommitted money" must be used to pay for the overhead expenses. There can be no net gain in "uncommitted money" from overhead allowances in the long run, for administrative costs must be paid, research buildings and equipment must be maintained and replaced, and the library facilities must be available for research workers. It is these costs that an overhead allowance is designed to cover. It does not increase the volume of free funds in an institution.

CARL C. CHAMBERS
University of Pennsylvania, Philadelphia

My purpose in publishing the article to which Carl Chambers refers, and the one in the next following issue of *Science,* has been accomplished when thoughtful, judicious persons like Chambers are moved to comment on the problems discussed. Whether our views coincide or differ matters little. What is important is recognition of the problems, and action to solve them.

It is quite impossible within the scope of a letter and a response to reconcile all the divergent views, nor does it seem possible at all, for we are dealing with opinions based on appraisal and judgment of facts and assumptions. What I shall attempt to do is to clarify where it appears that Chambers misunderstood what I tried to convey.

One such instance appears in his second paragraph in which he makes a condensed and, I regret, an erroneous paraphrase of what I "propose in principle." I do not propose that "whenever funds are granted to an institution . . . by a government agency, these funds should cover only part of the costs." On the contrary, in those research areas in which by far the greatest volume of government money flows to the institutions, I have stated that all costs, direct and indirect, should be *adequately* covered. These areas are comparatively new in the research pattern at universities, having come into being under OSRD during World War II. Most of the work is applied, not basic.

The much smaller segment of research, aided by government, in which I strongly feel that institutions must maintain complete independence and integrity, is that which by tradition is the admitted responsibility of the university. To preserve the essential freedom, it is necessary that institutions receive financial aid from many sources, so that they may support competent scholars on their faculties in their intellectual pursuits, with complete absence of extraneous intervention, domination, or control. Money from private individuals and foundations assures such freedom. Money from government does not, since this is public money over which surveillance must be exercised in the public interest. If an institution, viewing a source of government funds as a virtually inexhaustible reservoir, insists that a grant or gift from such a source to help it in supporting scholarly research must cover fully every kind of outlay, direct and indirect, such insistence increases the danger of government control. This follows, because such discussions about overhead bring into the argument fiscal questions by participants who lack understanding of the ideals and functions of the university.

In dealing with private sources of gifts. the point is seldom made by universities that such sources must accompany their grants by an additional 25 to 50 percent of the principal amount tendered to cover indirect costs. Generally, private gifts are happily accepted as tendered. and great good will continues between the institution and the donor. If private sources could be stimulated to provide sufficient funds to enable universities and colleges to carry on their important functions, as is discussed in my second article. the question of overhead on gifts would fade away. To my knowledge, it never arose before government money came into the picture.

For a number of years, I have been in position to observe "from the inside" the increasing support of research through government funds. There is nothing insidious or sinister in the management of these funds by any agency. Those responsible for allocation and disbursement are honest, devoted public servants. Their duty to the taxpayer requires that they exercise judicious "control"; that is, they are responsible for seeing that funds under their supervision are handled properly under applicable statutes and the rules and regulations that have been derived from them. Because I feel so keenly the need for preserving freedom of action for the institutions, both intellectually and administratively, I feel growing apprehension over the fact that, as financial support from a given source increases, so also does the amount of control from that source increase.

If what I have written here and in my articles on these questions conveyed the impression that I fail to understand the concept of indirect costs, it is only because I failed to express myself clearly. During my many years as a business executive, I have had long, practical experience with that subject. Indeed, the problem of overhead is a perennial subject of discussion, if not controversy, among cost accountants. In its practical applications, it must in some of its aspects be handled arbitrarily. Probably it can never be settled to the satisfaction of everyone concerned with it. The use of the term *true cost* by Chambers implies a concept that is practically attainable. A method of determining the true cost of the contemplated basic research of a faculty scholar would be a major contribution to the art of accounting.

I respect Chambers and his views highly. I hope that it is not impertinent for me to say that the views are not unfamiliar to me, for I have heard them expressed in many discussions with university administrators. If he and I could discuss them in person, which I hope we may do, I am sure that we could substantially reduce our differences concerning the important questions under scrutiny here.

PAUL E. KLOPSTEG

Glenview, Illinois

EQUIPMENT NEWS

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Science *does not assume responsibility for the accuracy of the information. All inquiries concerning items listed should be addressed to* Science, *Room 740, 11 W. 42 St., New York 36, N.Y. Include the name(s) of the manufacturer(s) and the department number(s).*

■ PULSE GENERATOR provides repetition rates up to 100,000 pulses/sec as well as a manual trigger for single pulses. Maximum rise and fall times are 0.018 sec. Pulse width is continuously adjustable between 0.05 and 100 sec. Maximum pulse amplitude of either polarity is 50 v into 50 ohm. Attenuation of 59.5 db in 0.5 db steps produces no pulse degradation. Hard-tube circuitry is used throughout. (Allen B. DuMont Laboratories, Inc., Dept. S313)

■ SURVEY METER is available either as a beta counter with a 3 to 4 mg/cm² end window or as an alpha-beta-soft x-ray counter with a 1.4 to 2 mg/cm² window. Maximum counting rate is 50,000 count/min or 20 mr/hr. A radioactive sample is built in for calibration. (Nuclear Measurements Corp., Dept. S329)

■ OIL-BATH THERMOSTAT for the temperature range from ambient to 260°C is stirred by the magnetically actuated up-and-down motion of a base plate. This mode of operation is said to provide the advantages of greater work space and uniform distribution. Control sensitivity is 0.25°C. Three standard sizes are available, wired for either 115 or 230 v. (Blue M Electric Co., Dept. S342)

■ TUBE FURNACE is capable of heating to 5000°F in approximately 2 hr. The heat zone is 12 in. long and 3 in. in diameter. Carbon resistors are the heating elements; electrodes are water cooled. Electric interlocks shut down the furnace automatically on failure of the water supply. The furnace may be equipped with either Ignitron-Thyratron-type or saturable-reactor-type power control. (Wheeler-Knight and Gainey Inc., Dept. S346)

■ POWER SUPPLY furnishes all the power required to operate the Beckman model DU spectrophotometer, eliminating the need for storage battery and dry-cells. Power for ultraviolet accessories is also provided. According to the manufacturer, the new power supply improves the over-all operating stability of the spectrophotometer. Dimensions are 6½ by 11 by 22 in. Weight is 35 lb. Input power is 50 to 60 cy/sec, 115 v, 350 w. (Beckman Instruments Inc., Dept. S347)

■ LIQUID LEVEL CONTROL is of explosion-proof design. The detector is capacitance actuated, converting changes in level to directly or inversely proportional pneumatic output. Probes are rigid, rod-shaped structures having no moving parts. (Robertshaw-Fulton Controls Co., Dept. S343)

■ BLOOD-GROUPING REAGENT, called Anti-A_1 Lectin, is said to produce more rapid and clear-cut agglutination of A_1 and A_1B specimens of human blood. The reagent is extracted from the seed of an Indian legume, *Dolichos biflorus* and purified by fractionation; it is available in 2-cm³ dropper vials. (Hyland Laboratories, Dept. S349)

■ ELECTRONIC SWITCH controls up to 500 watts of power, either delivered at 115 v, 60 cy/sec, or switched by its internal contacts. Minimum input impedance is 2 Mohm. The switch may be actuated by a contact closure. A rear-mounted terminal strip provides access for selection of switching functions. Autron Engineering Inc., Dept. S336)

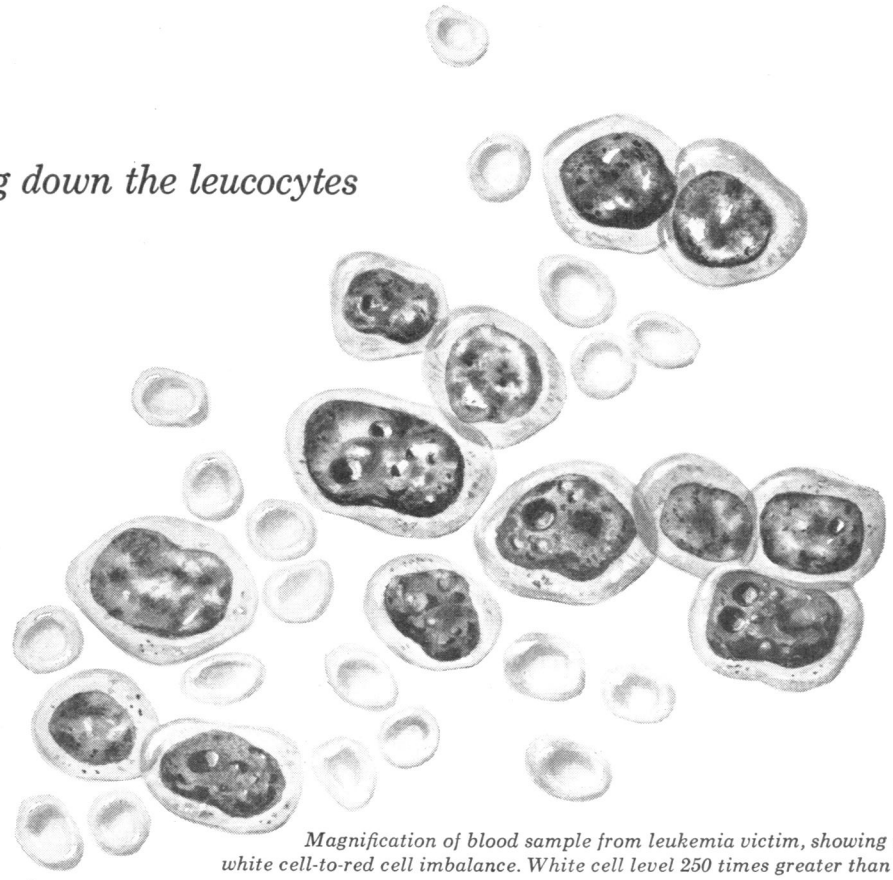
■ REMOTE POSITIONING DEVICE is based on 360-deg potentiometers with taps 90 deg apart. A receiver and transmitter potentiometer are used in a self-balancing bridge network. Imbalance of the system produces error signals that actuate a direct current motor, through a relay, to adjust the receiving potentiometer to balance. The maximum follow-up rate of the receiver is 60 deg/sec. Accuracy is said to be ± 0.5 deg. (Air Marine Motors, Inc., Dept. S341)

■ RATIO PLOTTER accepts two alternating voltages produced by transducers and plots their ratio continuously on a strip-chart recorder. The input voltages are fed into identical amplifiers and rectifiers in separate channels. A range of four full-scale settings permits plotting of ratios from 0 to 0.2, 0 to 1, 0 to 10, and 0 to 100. Frequency response is ± 2 percent from 5 to 2000 cy/sec and ± 2.5 percent from 2 to 4 kcy/sec. Chart speed is variable from 6 to 960 in./hr. (Barry Controls Inc., Dept. S337)

■ OXYGEN INDICATOR measures as little as 2 ppm of oxygen in hydrogen or inert gases in the presence of up to 3 percent CO. The gas being tested is passed over a catalyst which causes any oxygen present to combine with hydrogen and detects the heat evolved. Hydrogen is generated, if necessary, by an electrolytic cell built into the indicator. The electric signal provided by the thermopile used to detect the rise in temperature is indicated and recorded by a potentiometer. (Baker and Co., Dept. S344)

JOSHUA STERN
National Bureau of Standards

Slowing down the leucocytes



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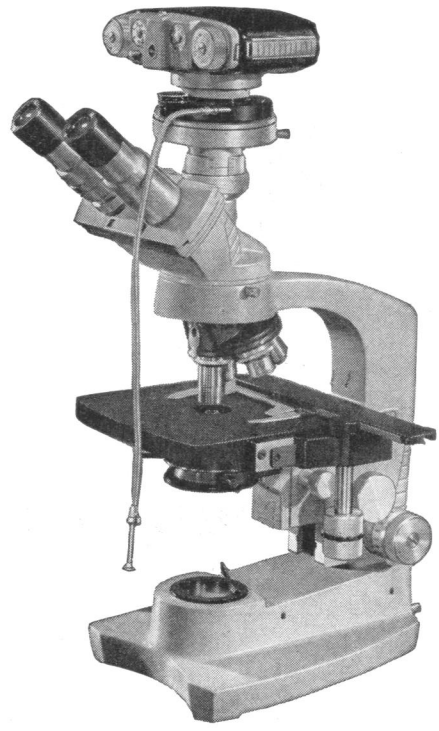

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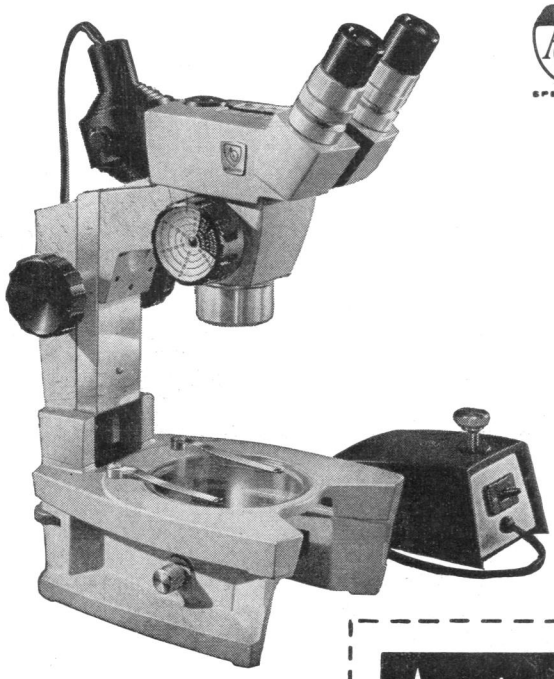

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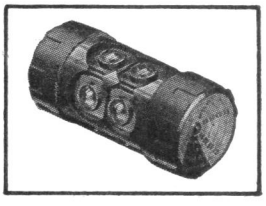

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