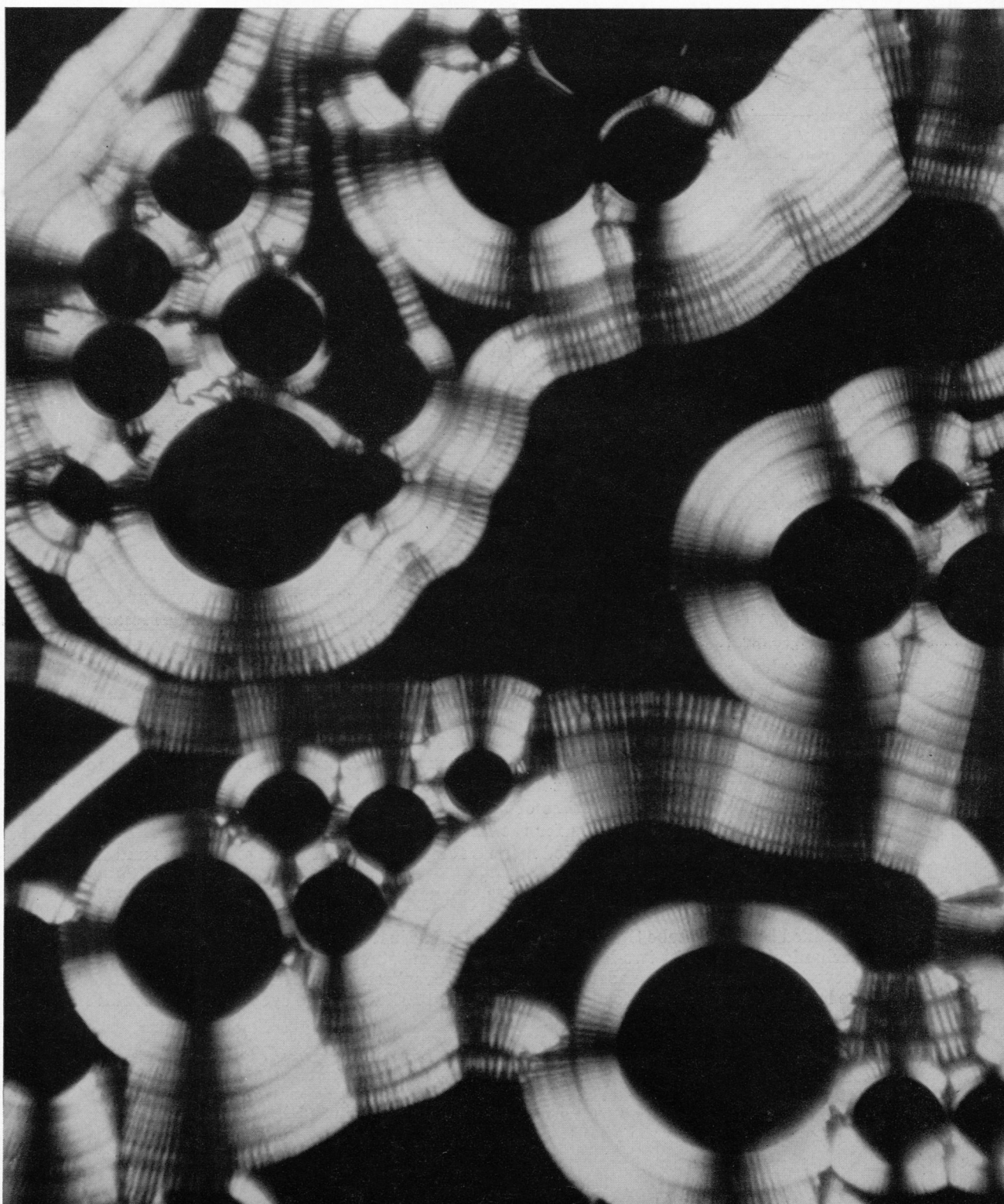


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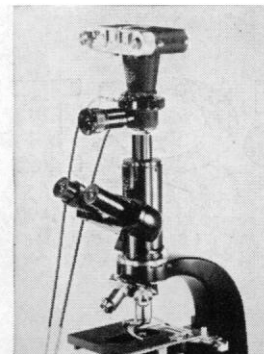
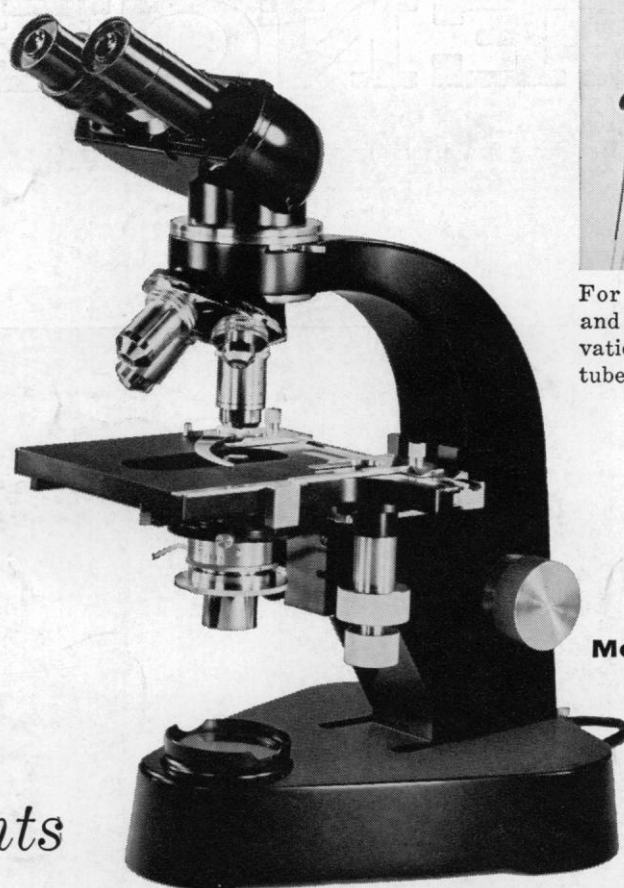
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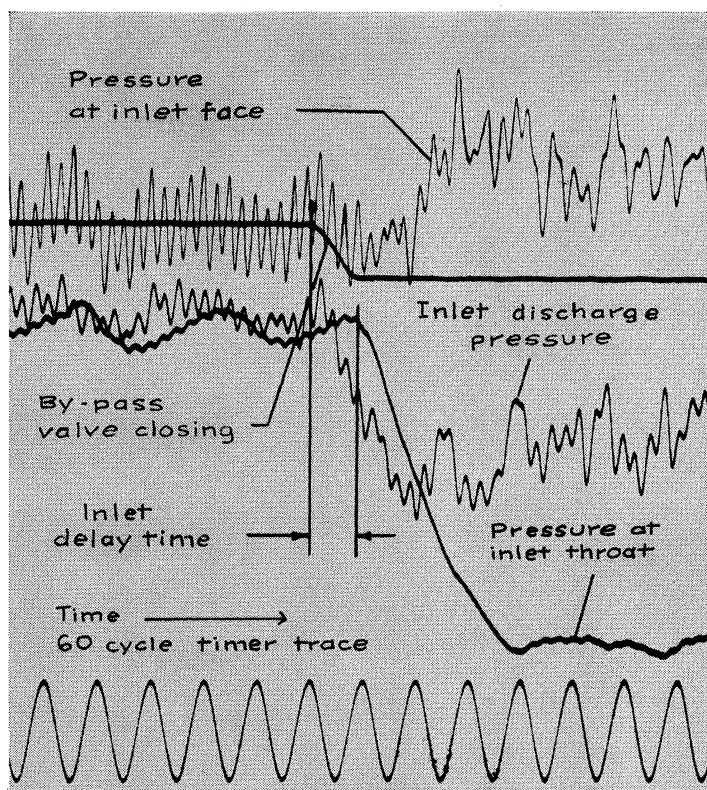
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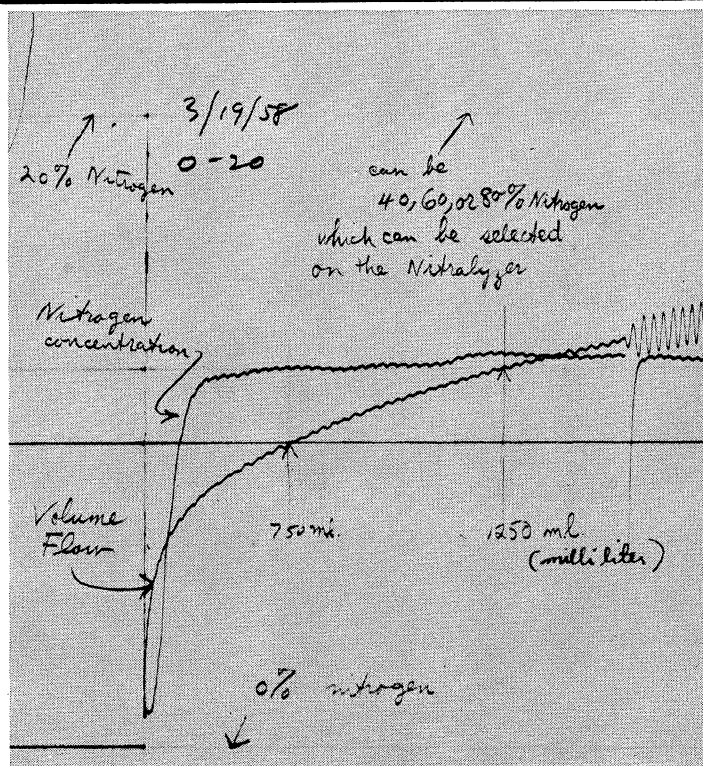
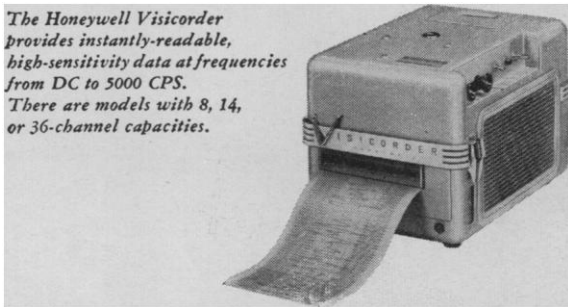
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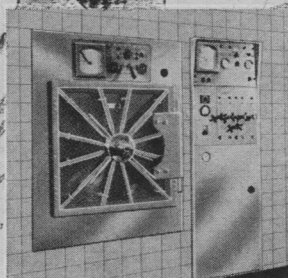
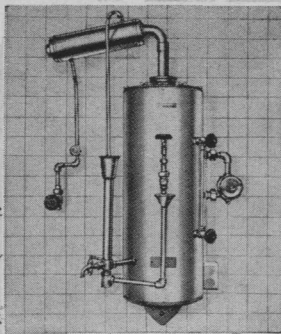


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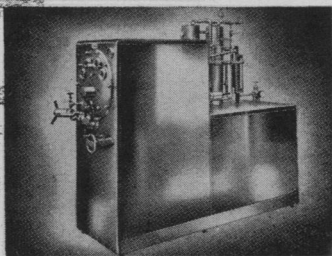
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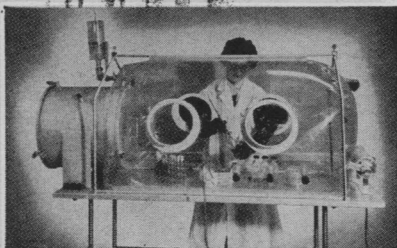
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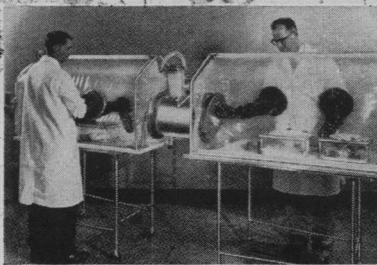


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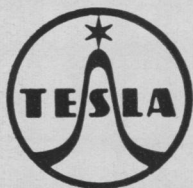
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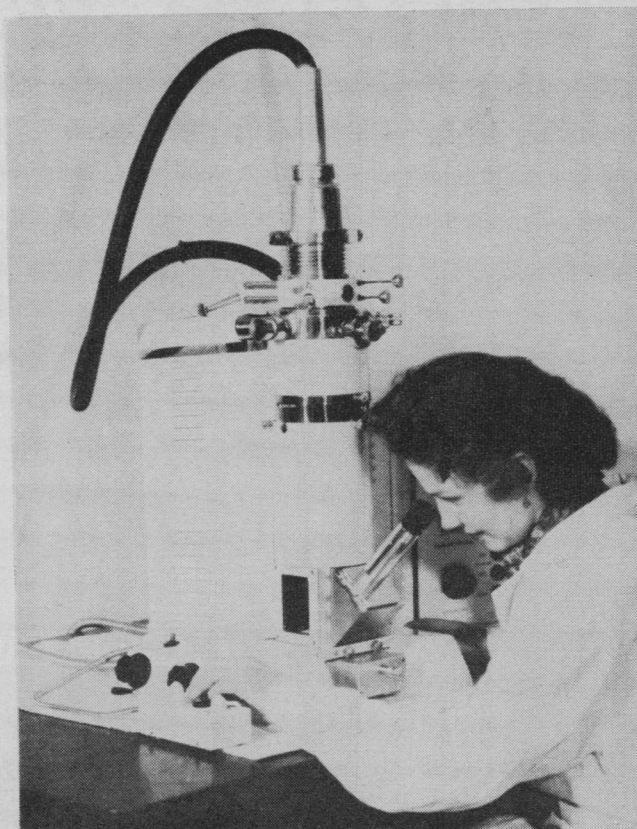
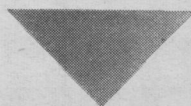
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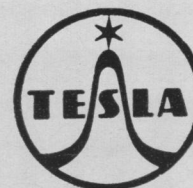


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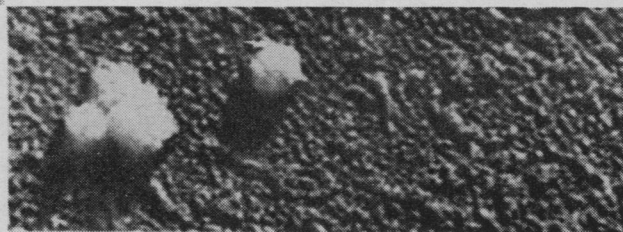


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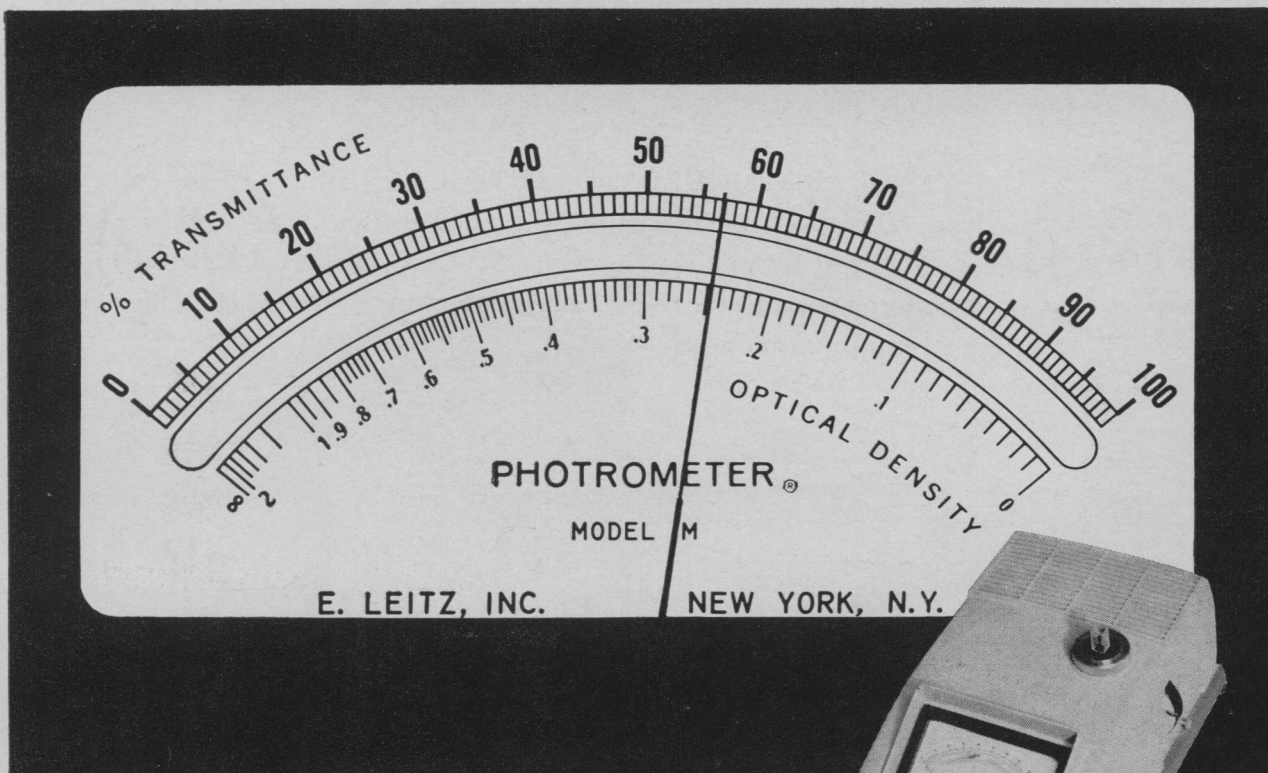
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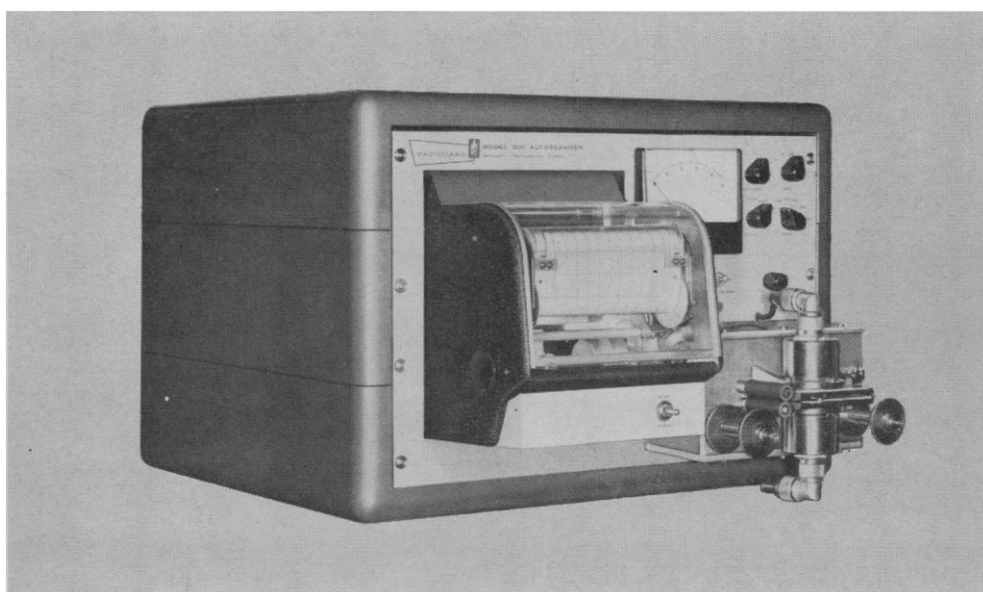
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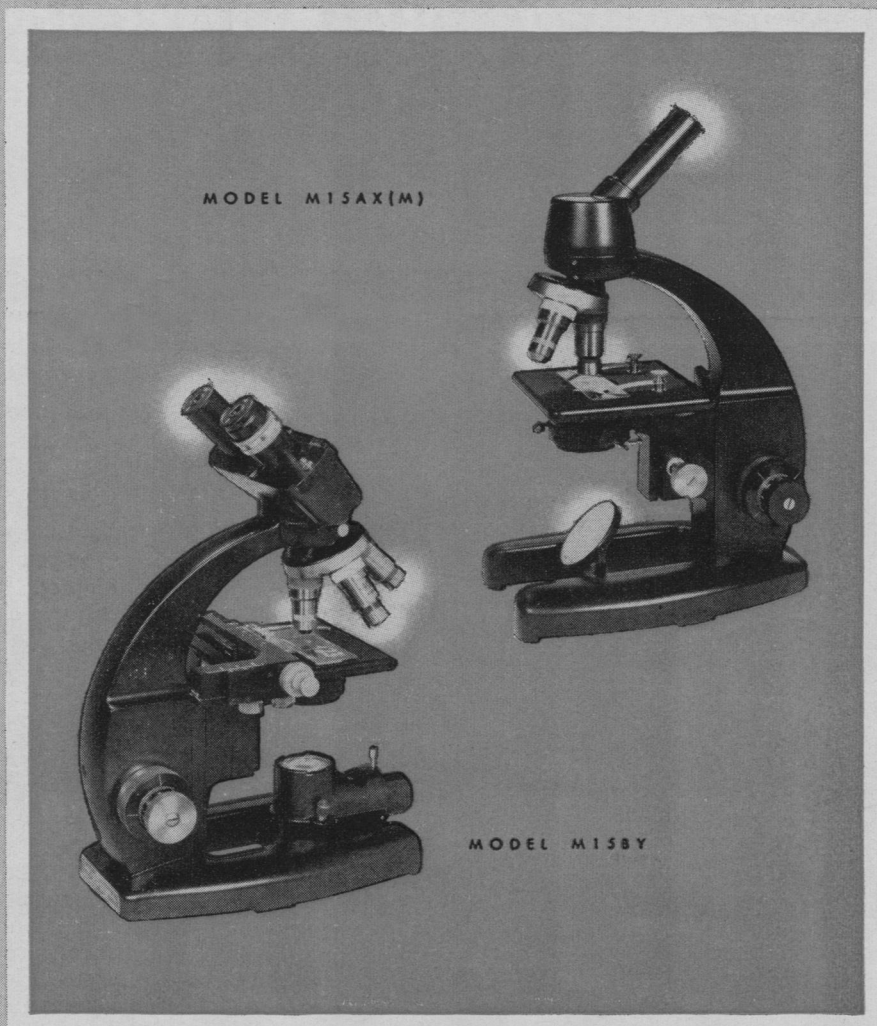
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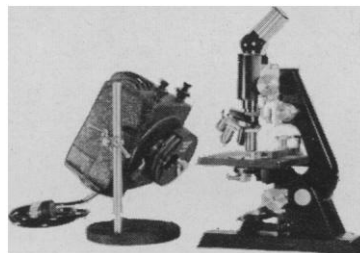
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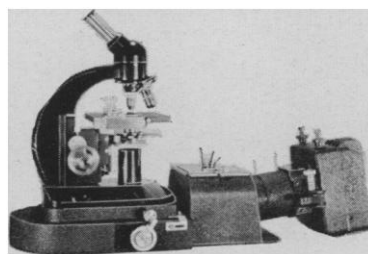
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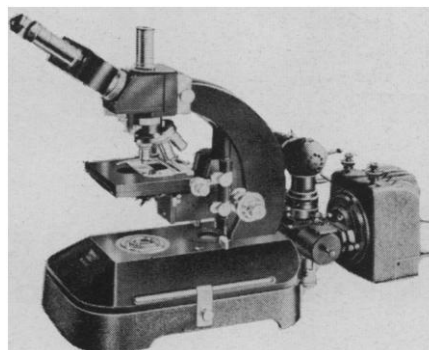
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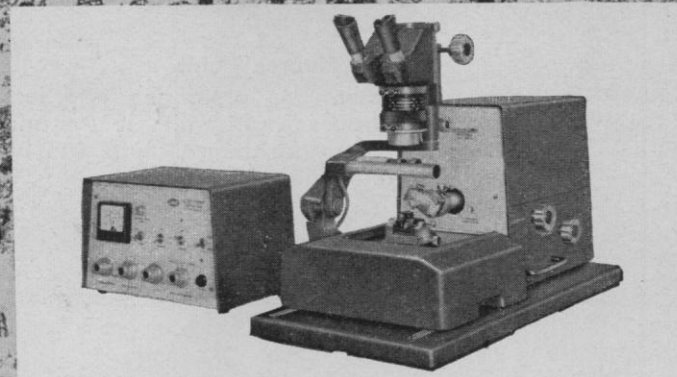
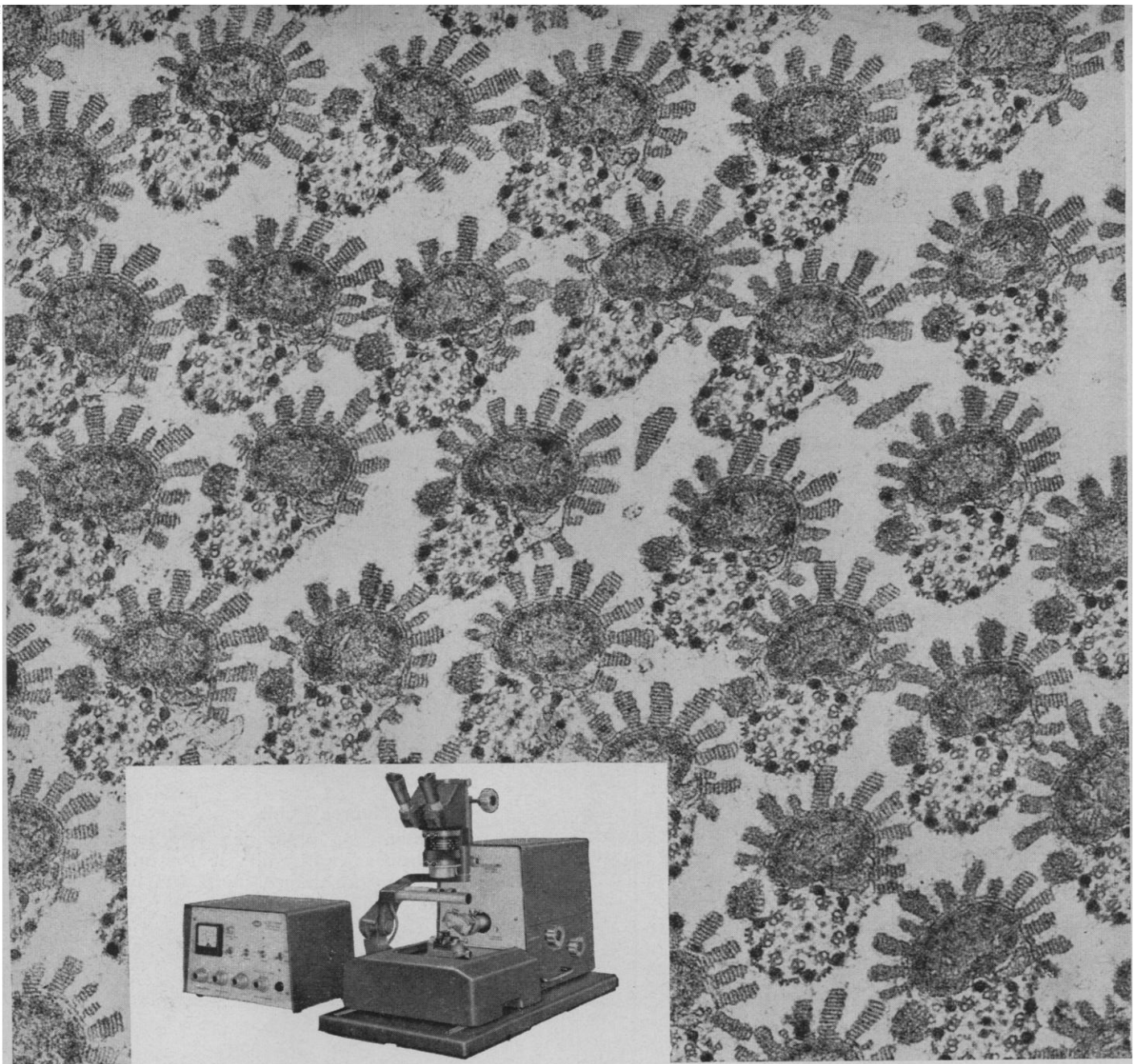
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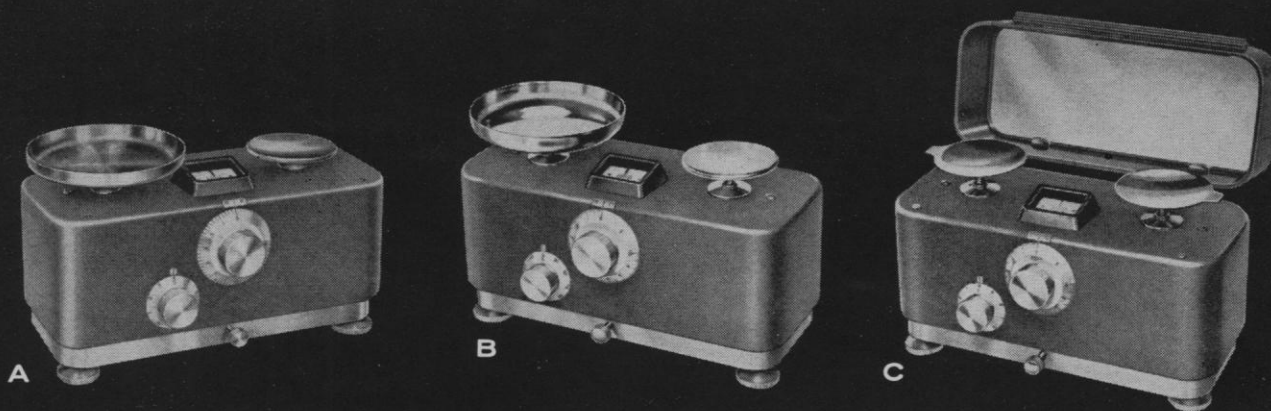
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The Torsion Balance Company

Main Office and Factory: Clifton, New Jersey
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Capacity: 200 grams

Weight-loading Dial: up to 9 grams by 1 gram increments

Fine Weighing Dial: 1 gram by .02 gram graduations
(Readability: .005 g)

B TORSION DWL-5

Capacity: 500 grams

Weight-loading Dial: up to 90 grams by 10 gram increments

Fine Weighing Dial: 10 grams by .1 gram graduations
(Readability: .02 g)

C TORSION DWL-2

Capacity: 120 grams

Weight-loading Dial: up to 9 grams by 1 gram increments

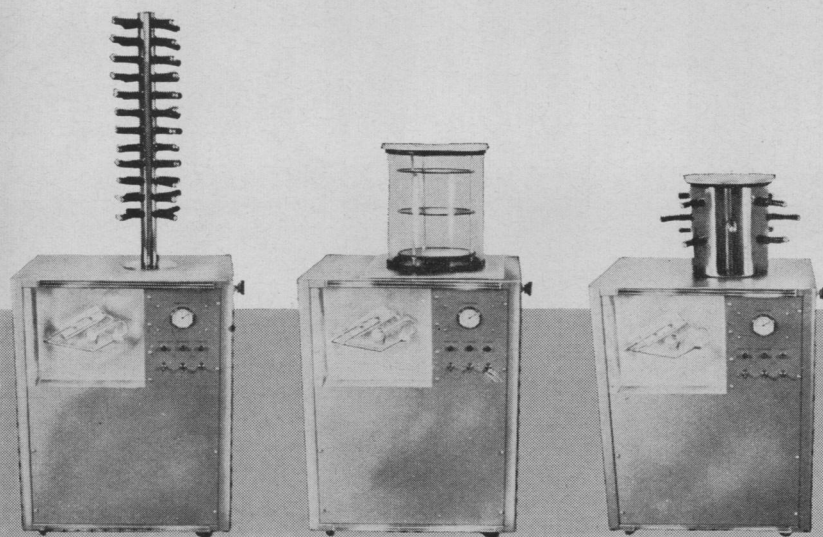
Fine Weighing Dial: 1 gram by .01 gram graduations
(Readability: .002 g)

TORSION DWL2-1

Specifications are same as the DWL-2 except that this model has scoop for seeds or other bulky material.

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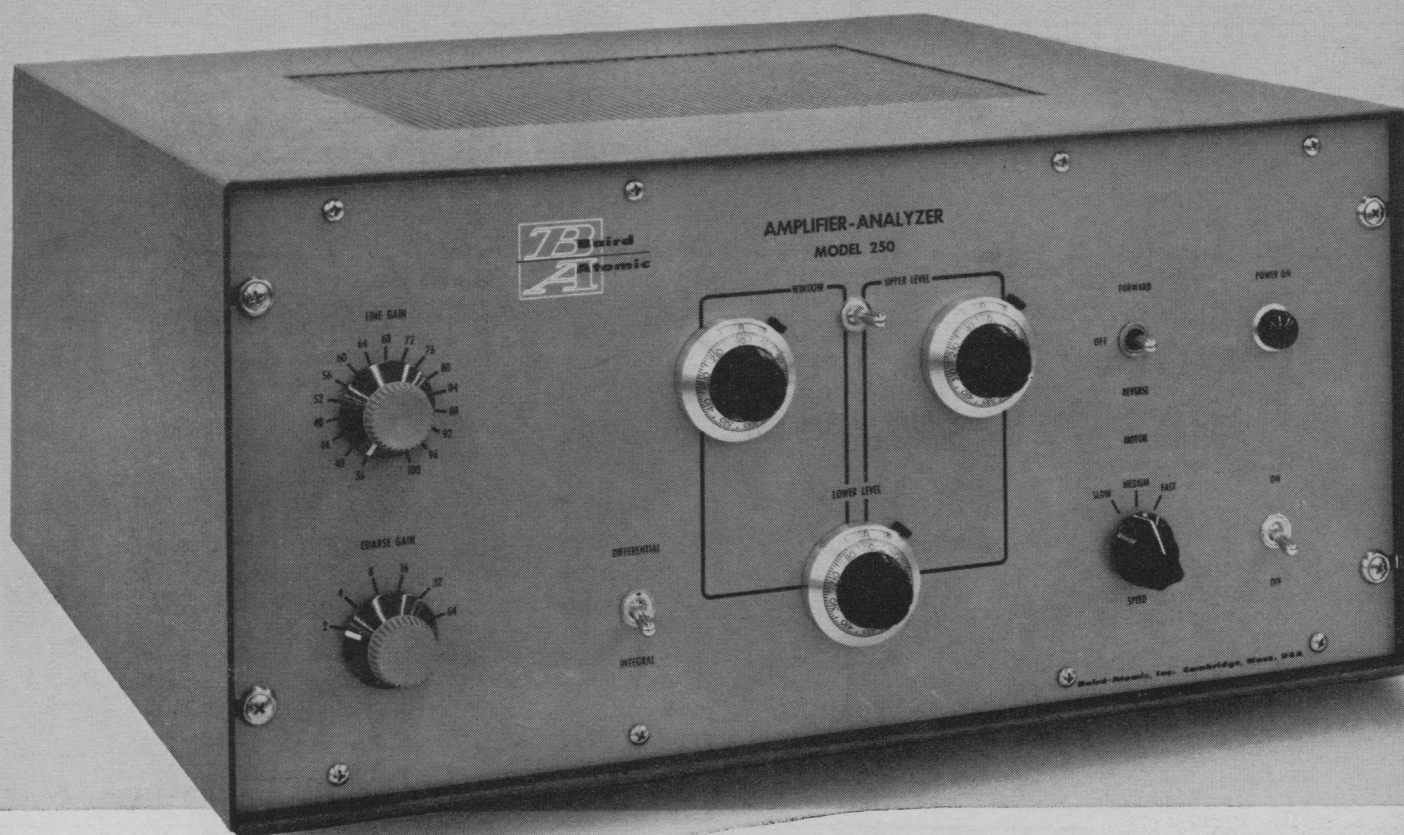
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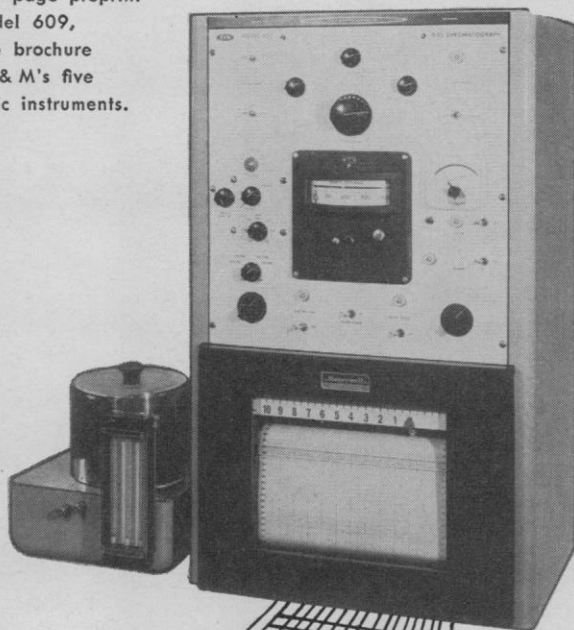
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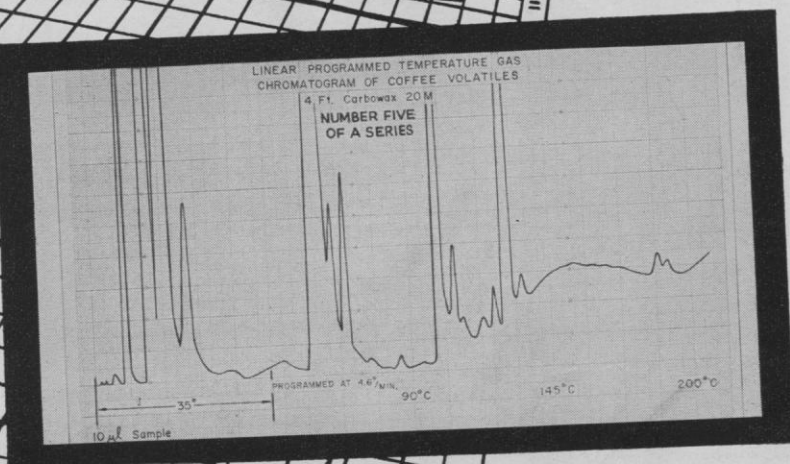
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- (3.) MacKay, D. A. M., and Connor, J., "The Use of Gas Chromatography in Food Additive Analysis," presented at Symposium for Analysis of Food Additives, Michigan State University, March 1960.
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- (6.) Rhoades, J. W., *J. Agr. Food Chem.*, 8, 136-141 (1960).
- (7.) Zlatkis, A., and Sivetz, M., *Food Res.*, 25, 395-398 (1960).

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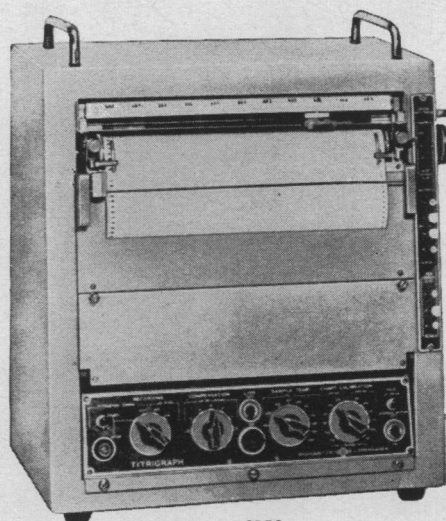
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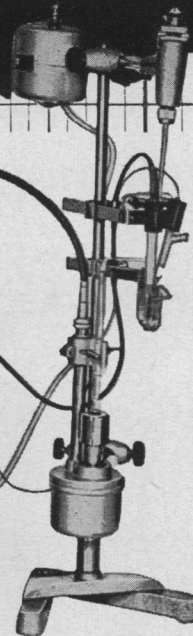
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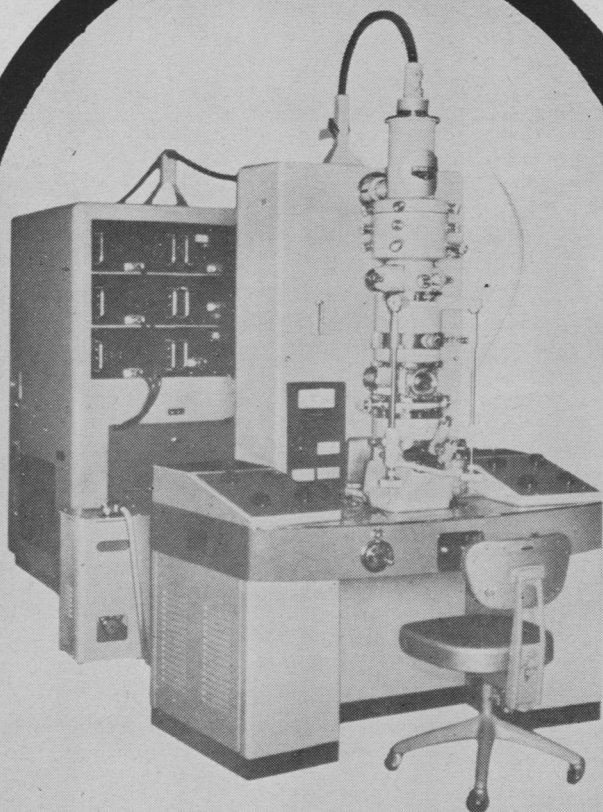
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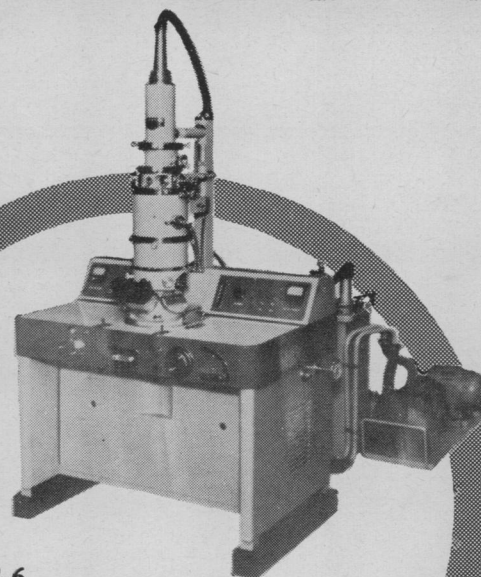
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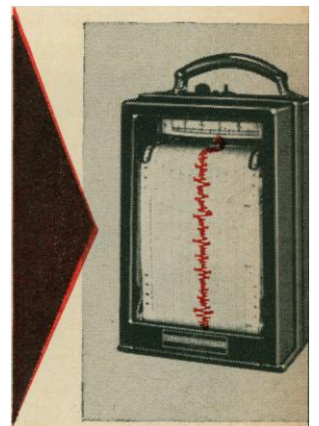
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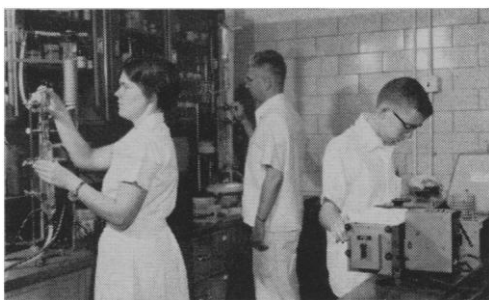
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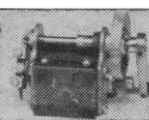


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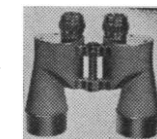
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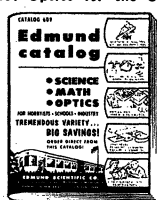
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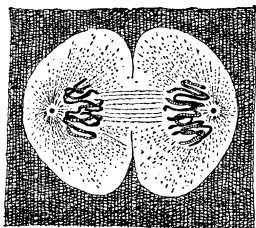


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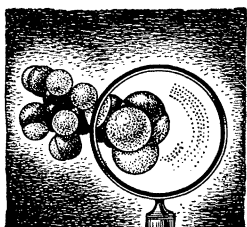
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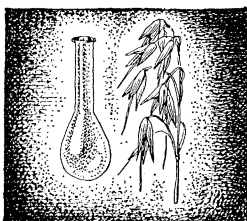
IN JANUARY—(1950)—a report¹ from the Karolinska Institutet in Stockholm discusses the effect of cold storage on mouse ascites tumor. There was a considerable loss of RNA but not DNA after 9 days at 4° C. Depletion of RNA is correlated with loss of virulence. Maintenance of a high nuclear DNA content indicates the cells survive the storage period and may possibly be interpreted as evidence of polyploidy.

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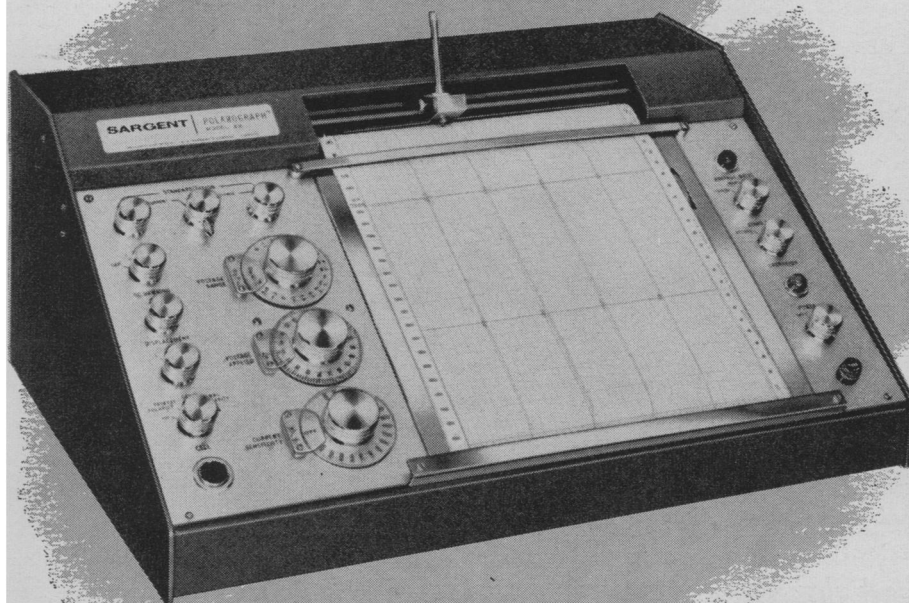
1. Klein, E.; Kurnick, N. B., and Klein, G.: The effect of storage on the nucleic acid content and virulence of mouse ascites tumor. *Exper. Cell Research* 1:127 (Jan.) 1950. 2. Fischer, E.: Synthesis of polypeptides, XV. *Chem. Abstracts* 1:51 (Jan.) 1907. 3. Virey, J. J.: General remarks on aliments produced by the different classes of the animal kingdom, and their influence on the human body. *Med. & Phys. J.* 3:65 (Jan.) 1800.



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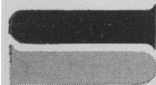
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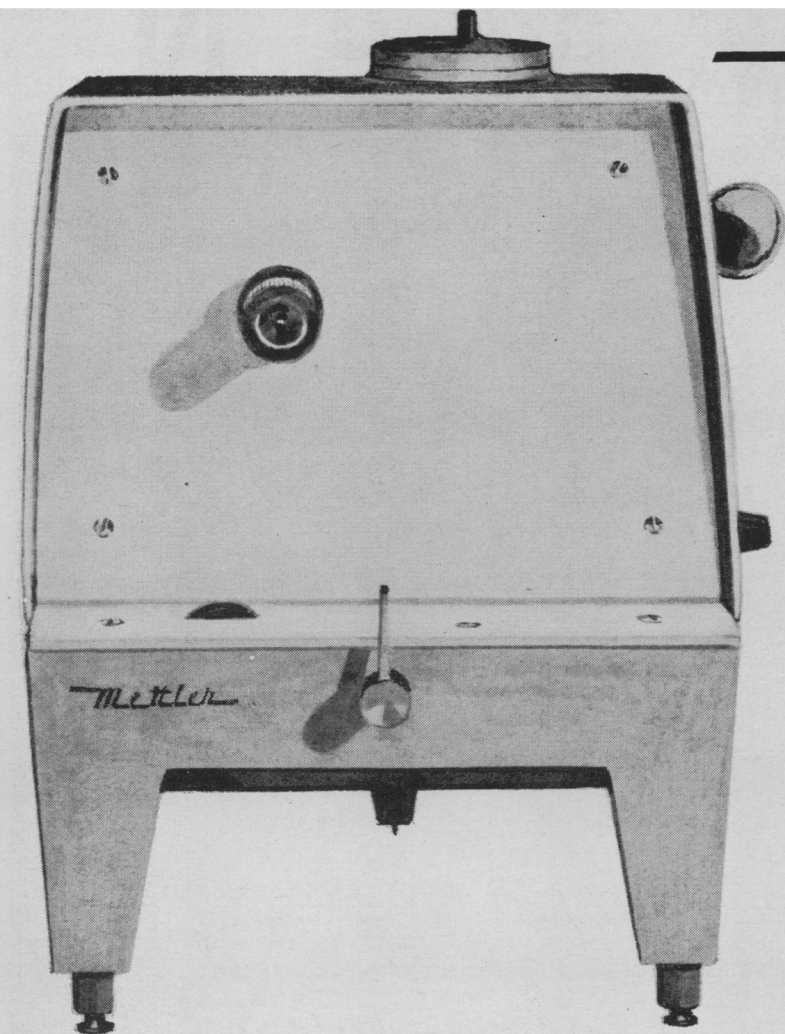
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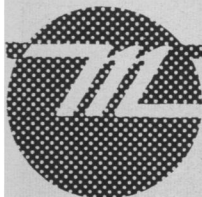
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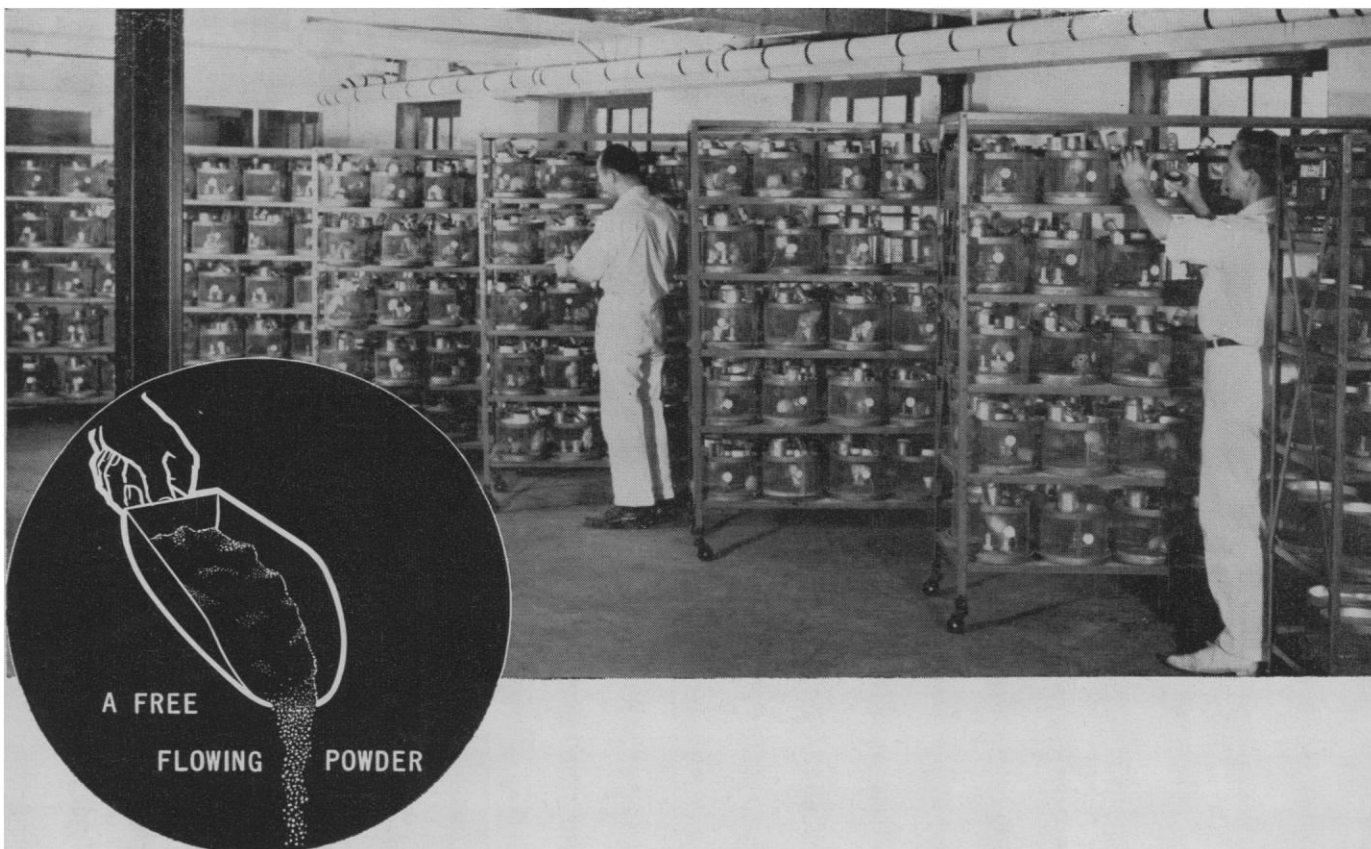
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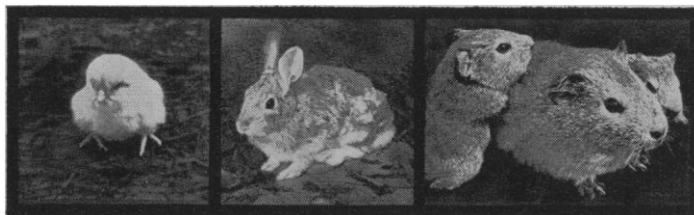


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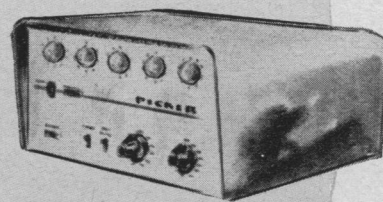
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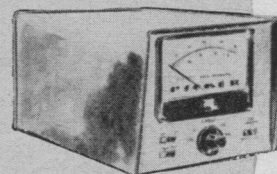


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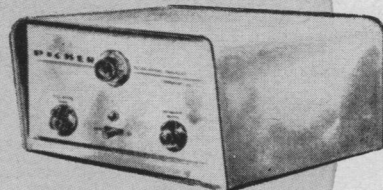
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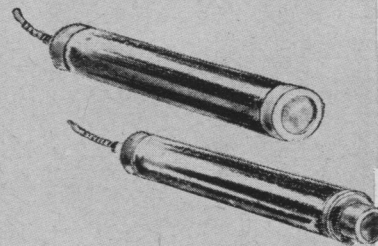
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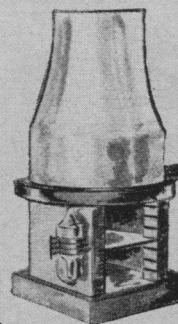
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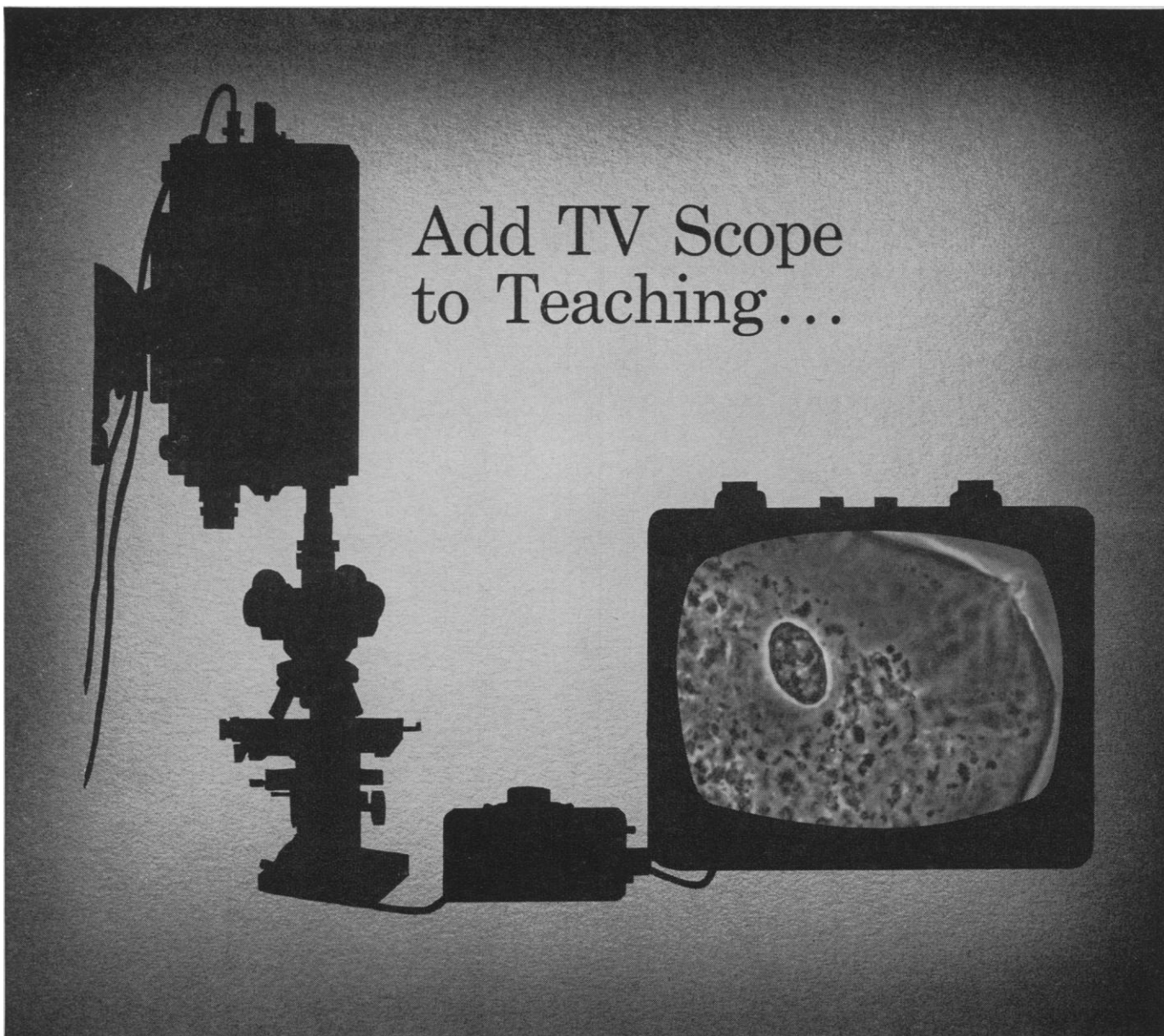


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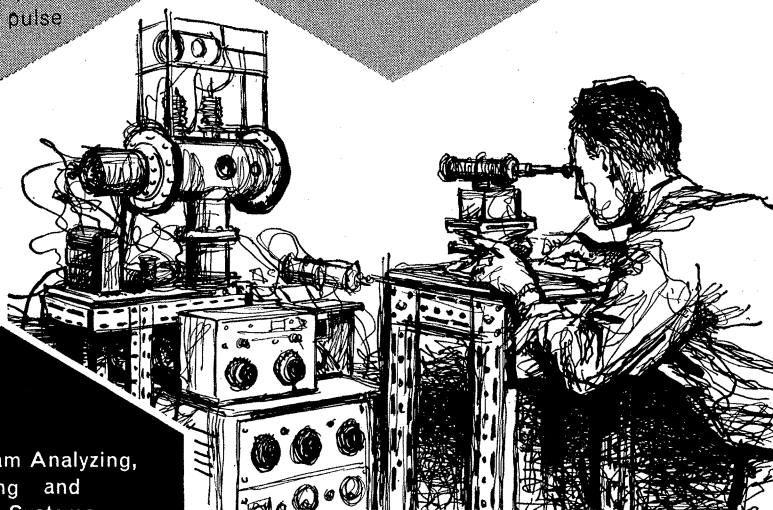
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The Human Study of Human Beings

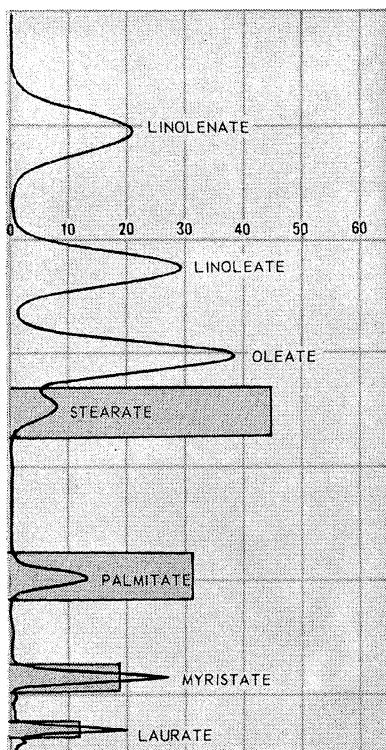
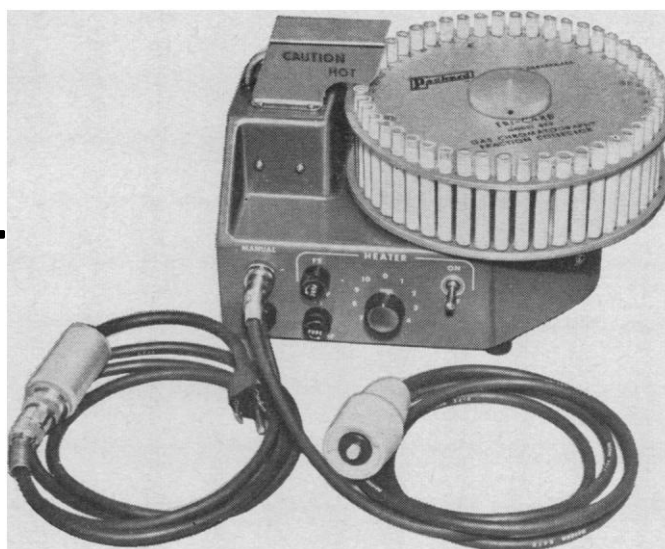
The growth of importance of the study of human behavior raises a host of new ethical problems, at the head of which I would place the need for consent to the research by both observer and subject. Studies of the behavior of animals other than man introduced a double set of problems: how to control the tendency of the human observer to anthropomorphize, and so distort his observations, and how to protect both the animal and the experimenter from the effects of cruelty. In debates on the issue of cruelty it is usually recognized that callousness toward a living thing may produce suffering in the experimental subject, but it is less often recognized that it may produce moral deterioration in the experimenter.

Further problems arise when living human beings are studied in their natural habitats, in laboratories, or in partially simulated situations. The observer or experimenter must control his individual and cultural bias at the same time that he uses his membership in the species and in a culture as tools of research. He must systematically allow for the effect of his research methods on the behavior he is observing. He must protect his subjects from damage during and subsequent to his investigations. He must protect his particular scientific discipline and science in general from any loss of confidence that might make future scientific work more difficult. And he must protect from ill effects other human beings who are not involved in his particular set of observations.

The first two of these ethical and scientific imperatives are reasonably well understood, although many natural scientists may not be fully conversant with the various disciplined ways in which individual and cultural bias are allowed for—through, for example, allowance for countertransference in psychiatry or the employment of different observational methods with comparison groups. One possibility for dealing with the third imperative was discussed in *Science* [132, 989 (1960)], but much more specific safeguards are needed to protect the subjects of research, sometimes in terms of their own identity, sometimes in terms of their capacity to trust themselves or to trust other individuals of higher status. In regard to loss of confidence, there is a general recognition that a social investigator should not infuriate the local citizenry or outrage the board of trustees of a university by his research methods or the way in which he presents his results.

But the last requirement is one on which scientists have not yet adequately come to terms. The question can be stated simply: Is it scientifically and ethically permissible to deceive the subjects of research by disguising oneself as a "participant observer," or by introducing stooges into an experiment, or by making use of long-distance television or hidden microphones or other devices for concealed observation? When a human being is introduced who is consciously distorting his position, the material of the research is inevitably jeopardized, and the results always are put in question as the "participant"—introduced as a "psychotic" into a mental ward or as a "fanatic" into a flying-saucer cult group—gives his subjects false clues of a nonverbal nature and produces distortions which cannot be traced in his results. Concealed instruments of observation may not distort the subjects' course of action, but the subsequent revelation of their presence—as in the jury room that was tapped for sociological purposes—damages the trust both of the original participants and of all others who come to know about it. The deception violates the conventions of privacy and human dignity and casts scientists in the role of spies, intelligence agents, Peeping Toms, and versions of Big Brother. Furthermore, it damages science by cutting short attempts to construct methods of research that would responsibly enhance, rather than destroy, human trust.—MARGARET MEAD, *American Museum of Natural History, New York*.

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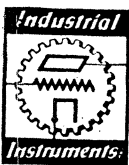
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Letters

Cost of Scholarly Books

Steven Ross's letter in *Science* [132, 835 (23 Sept. 1960)] rightly points out the high cost of scientific books. Yet many who cannot afford to buy would borrow, if they knew where. College students with access to good libraries are largely but not entirely free of this problem, but others find it pernicious.

The obvious answer is the public libraries, but even the best of these will have a skimpy representation in many fields. Probably this is inevitable in a local system, but why can't a large, national collection be built and maintained? This would not be an archive but a supplement to local libraries unable to meet specific requests. As Ross says, "to read is to learn"; such a project would certainly help spread scientific knowledge.

WOLFGANG WIEMER

B. S. Coler Hospital,
Welfare Island, New York, New York

Your recently published plea by S. E. Ross regarding the need for cheaper books prompts me to voice a related pet peeve. As a practicing clinician my mail is clogged with innumerable pieces of junk mail from drug concerns. Most of this is no doubt conceived, printed, and distributed at great cost. Yet a brief, admittedly statistically invalid, survey of my colleagues reveals that almost none of this material is ever opened, much less read. If it is opened it is only to identify it for what it is—an ad proposing that some company's new muscle relaxant, tranquilizer, or antibiotic is superior to its competitors' chemically identical product.

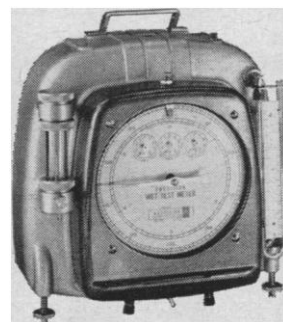
The distressing part of this is the fate of all that costly writing and printing—to wind up unseen in a trash can. Yet other printed matter, directed at the same scholar, is out of reach because of the cost of printing technical books. How much more practical, then, to direct the trash-can advertising money into subsidizing scholarly books. Perhaps only the dust cover could be bought for advertising at the start. Less costly printing and paper would help too.

There is, no doubt, a hard conservative core in the publishing industry which holds a book to be sacred and not to be contaminated by advertising. Somehow there is no objection to advertising in periodicals, and indeed *Science* itself would quite probably not be published if it were not for advertising. Small, highly specialized periodicals could certainly not be produced without advertising. Why, then, the difference between the periodical and the textbook?

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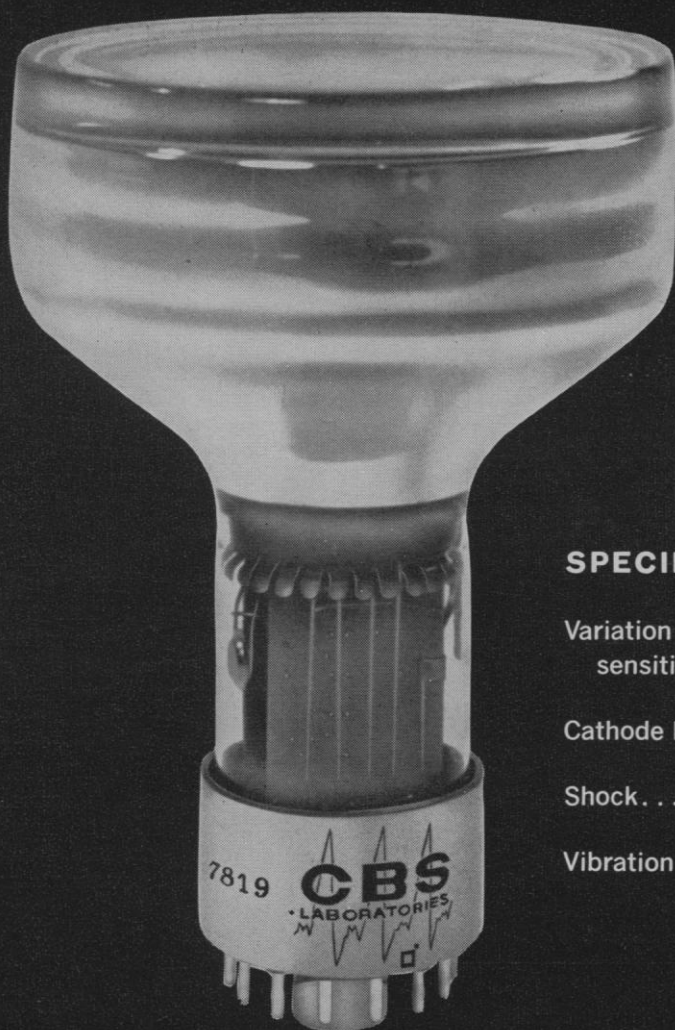
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W. H. OLDENDORF
Veterans Administration Center,
Los Angeles, California

Food and Flavor

Concerning the report on radiation flavor by M. P. Drake, B. J. Kroll, and F. J. Pilgrim [*Science* 132, 1394 (11 Nov. 1960)], may I suggest that the "representative tasting panel" whose responses might enable us to foretell something about "consumer acceptance" be augmented by such invaluable members as a cat and a rook (or any other member of the raven family). In my experience these animals, if copiously supplied with food and given an *embarras de choix*, turn into finical connoisseurs. And, whatever their prejudices may be, there can be no question of partiality against radiation.

Advanced efforts in food technology remind one that ours is a period of transition from mass-produced, mass-distributed, and prefabricated foods toward worse to come. Would it perhaps be desirable, for the benefit of later generations of scientists bound to take an interest in the nature of foods so often referred to in documents of all times up to the present, to stow away a representative selection from all over the world in some remote corner of the Antarctic?

H. GLOOR
Department of Genetics, University of
Leiden, Leiden, Netherlands

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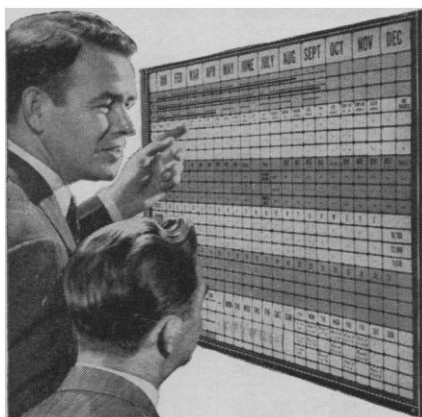
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The Future of "American Men of Science"

American Men of Science has been published as a biographical directory since 1906. As editor, I have carried on its publication for the last 35 years.

During this period the directory has never had financial help in the form of a grant, though it is a marginal publication insofar as profits are concerned. In 1948, after World War II, prices spiraled, making it necessary to ask those included to help make ends meet. The results were gratifying, and through such contributions publication of *American Men of Science* was continued.

I find it desirable to again approach those included for additional funds. The price of the four volumes that cover the physical and biological sciences is high for an individual; after test mailings of the A-E volume, the number of

orders did not come up to the expected percentage. As a result, the size of the complete edition will be smaller than had been planned, and the cost per volume will be correspondingly higher. Thus, the membership subscription established for this edition appears to have been too low.

A request for contributions to make up this deficit has been mailed to those included, or scheduled for inclusion, in the 10th edition (the editors hope that no supplementary contributions will be needed for future editions). It is well known that subscriptions and contributions have never been factors in the selection of scientists to be included in *American Men of Science*.

It has been proposed by a large proportion of those who have returned their proofs that specialized volumes be published. This may be the solution.

I would be glad to receive suggestions from readers of *Science* as to the best method to be followed in future publication of this important tool of the scientists of America.

JAQUES CATTELL*

"American Men of Science,"
Arizona State University, Tempe

* Deceased

Science Teaching

The recent letter on science teaching [*Science* 132, 836 (23 Sept. 1960)] by Harry Milgrom made reference to an earlier report by Howard E. Gruber [*ibid.* 132, 467 (19 Aug. 1960)]. Both were stimulating and informative. Each points up a real problem in the area of higher education in the United States (particularly in science education) and the need to re-examine not alone what we are teaching but the pre-service and graduate training we are giving those who have chosen teaching as a career.

We think it ridiculous to teach scientific facts as isolated units of knowledge, but a cursory study of most college examinations indicates that the measurement of factual knowledge is the primary objective. There is much talk in academic meetings about the development and use of the scientific method and the scientific attitude, but there seems to be little attempt to attain these objectives through our present traditional methods of teaching and evaluating.

Jerome Bruner, in a little book called *The Process of Education*, has spoken well of this dilemma in present-day teaching and refers to the teaching of "unconnected facts having a pitifully short half-life in memory."

The preparation of good secondary school and college teachers involves

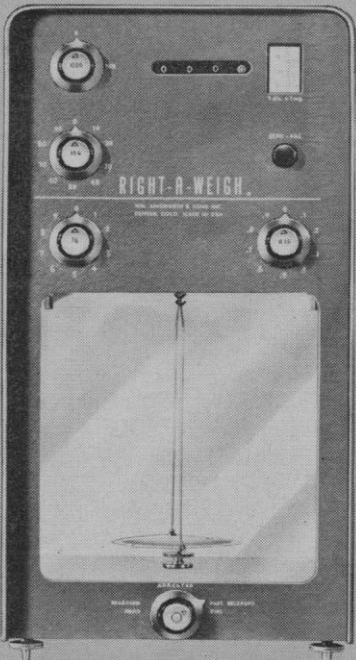
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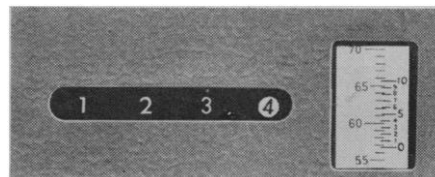


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My thinking has been similar to Gruber's in that I think the history leading up to a scientific discovery and the consequences of such a discovery

In 1957 I made a random sample of 135 colleges and universities to find to what extent the history and philosophy of science were being offered as a requirement or an elective for those going into teaching. A summary of the compiled data looks as follows: Of the 107 colleges and universities that answered the questionnaire, 58, repre-

My contention is not that a specific course will be just the answer to problems dealing with the broad background and development of ideas in the sciences, but few will argue that one's scientific education and potentials as a teacher would not be enriched if this and similar disciplines were a part of his required preparation.

In the light of my findings (7) I think there is need for more inquiry into what teachers are being trained to teach. This is of real concern to both colleges and secondary schools. We will then be moving in the direction of improving the quality of science instruction.

Albany State College, Albany, Georgia

Reference

1. R. H. Simmons, *Sci. Educ.* **41**, No. 1 (1957).

Racial Differences

I have often wondered why some scientists (like other people) are prone to take extreme positions on a subject when there is a logical mid-ground which comes closer to the essential truth. A case in point is the letter by H. E. Garrett [*Science* **132**, 685 (1960)] taking *Science* to task for the news article entitled "Un-American science" [*Science* **132**, 24 (1960)]. It is probably true, as suggested by Garrett, that "equalitarian dogma" regarding racial differences has been too widely accepted as a basic premise. It is also probably true that this has hindered research in this field. To suggest that research in racial differences is "Un-American science" is certainly unscientific. On the other hand, to infer that any proven differences should have any effect on social treatment of the Negro (or any other race) is immoral, ridiculous, and utterly opposed to Jeffersonian equality.

The truth of the matter is that races of men do differ; else they would not be races. These differences almost certainly extend to mental as well as physical traits, just as in the case of individual people. The normal distribution curves for a particular inherent mental characteristic for different races of men would surely be different, just as the curves would differ between

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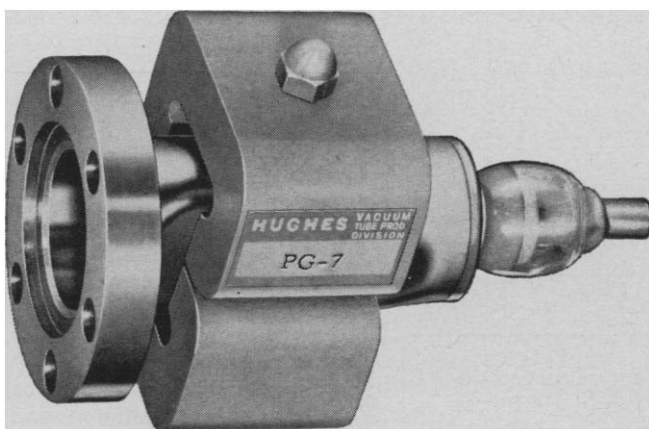
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populations of laborers and college teachers. However, these distribution curves would overlap and, furthermore, would differ for different traits. For example, there may be a higher percentage of Negroes than Scots with an inherent acute sense of rhythm. In a statistical sense U.S. Negroes apparently have greater ability than whites in short-distance running and some other athletic events. In some other traits the shape of the normal distribution curve for the two populations would favor whites. In some there would be little or no difference.

Is this view unscientific, un-American, or undemocratic? Conversely, recognition of racial differences is no excuse for branding any race as generally inferior to any other. Above all, it is no excuse for intolerance or discrimination. It is just as silly to use racial differences as a basis for discrimination as it is to label studies of racial mental differences "un-American science."

LEON S. MINCKLER
Box 760, Carbondale, Illinois

Wave-Riding Dolphins

The very interesting discussion which has recently taken place between Scholander and Hayes concerning the possible ways in which dolphins or porpoises might obtain free rides in the bow waves of ships (1) has stimulated me to keep a very close watch for such activities while at sea. This watch has resulted in the accompanying photograph (Fig. 1), which shows a dolphin (probably *Tursiops* sp.) riding motionless with its tail some 15 to 20 centimeters in front of the bow of a small ship moving at a speed of 10 knots.

This photograph was taken from the bow of the 62-foot motor vessel *Capre* at about 2 P.M. on 9 August 1960, in an absolutely flat calm about 20 miles offshore, en route from the town of Gladstone, Queensland, Australia, to Heron Island, in the Capricorn Group of islands at the southern end of the Australian Great Barrier Reef (2). A Zeiss Contaflex II camera was used, with Kodachrome film and a shutter speed of 1/125 second.

Shortly before the picture was taken three dolphins of the same species were observed doing the same thing over a period of about 5 minutes. All three would ride at once, the two outboard ones being tipped over on their sides at angles of about 30°.

My observations of these dolphins have led to further consideration of one of the major problems debated by Scholander and Hayes—namely, why, in Scholander's model, the dolphin does

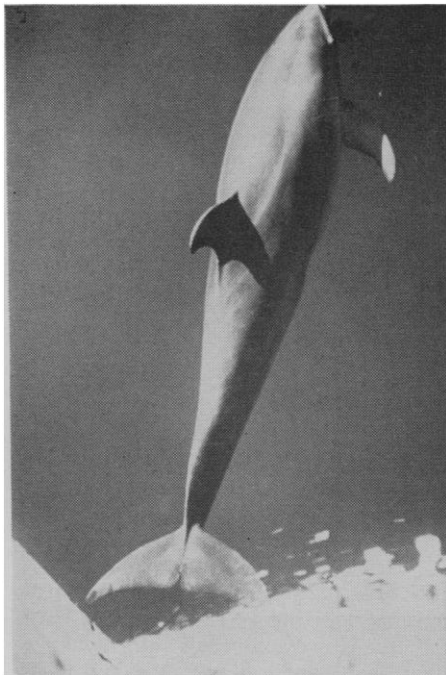


Fig. 1. A dolphin riding the bow wave of a small ship.

not topple over and out of position due to the apparent unbalanced upward force on its tail flukes. In this regard both gentlemen seem to have ignored the fact that dolphins and porpoises also have well-developed pectoral flippers. Might they not adjust the angle of attack of these pectoral flippers so as to produce an upward moment forward of their center of gravity which balances the upward moment from the tail flippers astern? Negative buoyancy, or an orientation of the total-body hydrofoil such as to produce a counteracting downward force, would, of course, be necessary in this situation to prevent the animal's being pushed to the surface.

MALCOLM S. GORDON

Department of Zoology,
University of California, Los Angeles

References and Notes

1. P. F. Scholander, *Science* **129**, 1085 (1959); W. D. Hayes, *ibid.* **130**, 1657 (1959); P. F. Scholander, *ibid.* **130**, 1658 (1959).
2. These observations were made during an expedition supported by U.S. Public Health Service grant No. RG-7114.

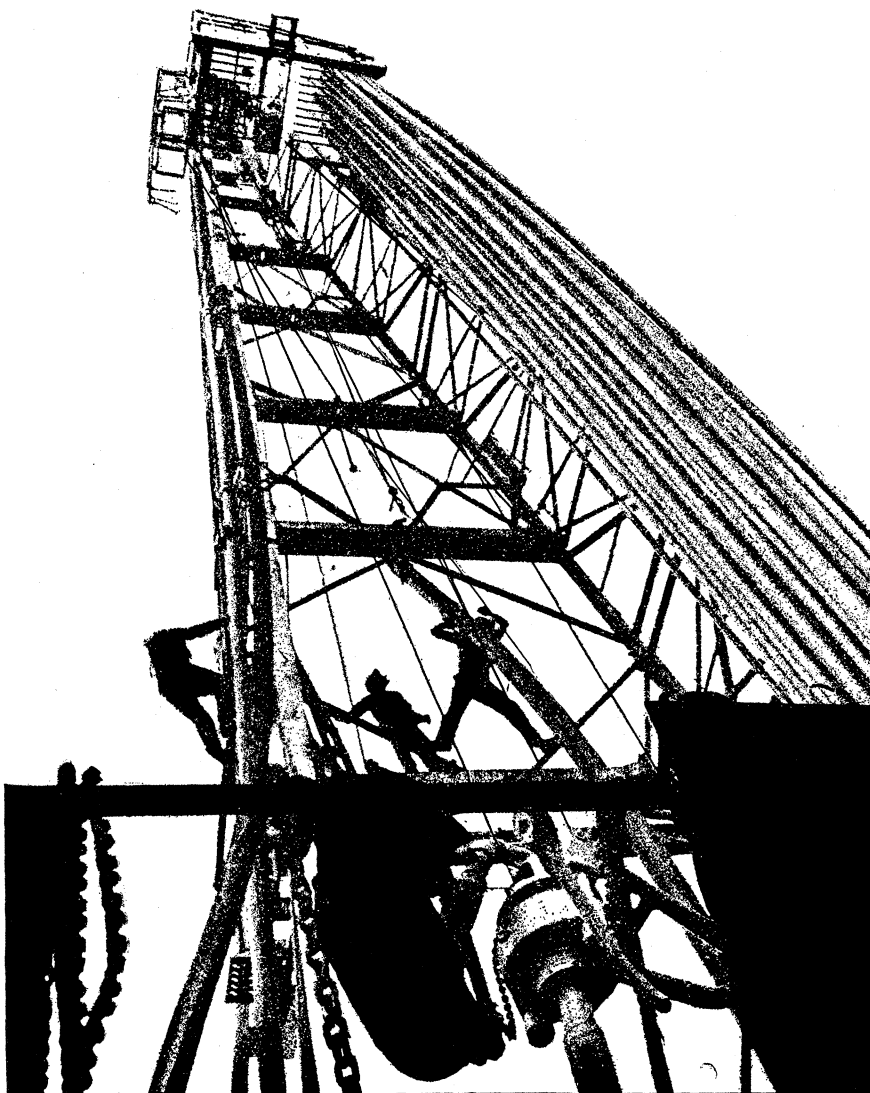
Chestnuts

Will you please ask the writers of letters on "The Chinese chestnut" [*Science* **132**, 366 (5 Aug. 1960)] what they really mean by this phrase and the phrase "the American chestnut"? I suspect that the writers are referring to *Castanea dentata* Borph. versus *C. mollissima* Blume, but they do not say so. They leave the reader to finish their work for them.

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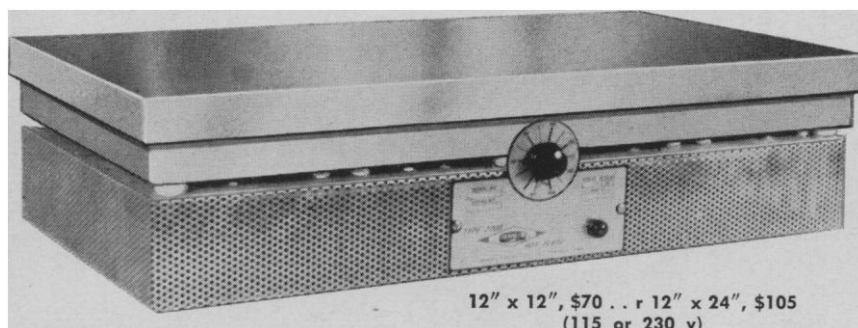


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Castanea Mill., the genus of chestnuts, in the temperate regions of the Northern Hemisphere. Three species occur in China, Japan, and Korea, and there are possibly half a dozen more in the eastern United States. To attempt to distinguish chestnuts as shrubs or trees is scarcely scientifically accurate, as one of the writers shows. In the United States there are several native shrubby chestnuts. One of the writers, incidentally, implies that "the spreading chestnut tree" of Longfellow's poem belonged to the genus *Aesculus* L., possibly *A. hippocastanum* L., instead of *C. dentata*. I agree, but it would be interesting to know whether this is an ascertainable fact.

G. NEVILLE JONES

Department of Botany,
University of Illinois, Urbana

G. Neville Jones is obviously justified in criticizing us for not using Latin names. However, each of us knew what we were referring to when we said "American chestnut" or "Chinese Chestnut." I felt that if I used the Latin names I would be trying to make people think I am a scientist, which I am not. I am just a plain old nut grower who subscribes to a magazine called *Science*.

Regarding Longfellow's chestnut tree, it is not hard to pin it down as a horse chestnut. It was located in Cambridge, Mass., within view of Longfellow's house, and did indeed shelter a blacksmith's shop. The village authorities chopped the tree down in 1876, over the vigorous protests of Longfellow and others. They said it was a menace to those driving under it with heavy loads. My source for that information is *The Horse and Buggy Age in New England* by Edwin Valentine Mitchell.

ROBERT RODALE

"Organic Gardening," Organic Park,
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Hybrids and Growing Practices

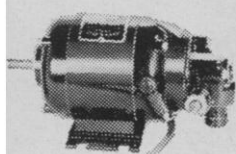
In his recent article, "Hybrid corn and the economics of innovation" [*Science*, 132, 275 (1960)] Griliches treats the use of hybrid seed as if it were an isolated practice. Actually, many practices in proper combination are needed to produce a good corn harvest. True, adapted hybrids have the genetic potential to respond to high levels of plant nutrients and to adequate supplies of soil moisture; yet where these are not present the hybrid has little if any superiority over good old varieties.

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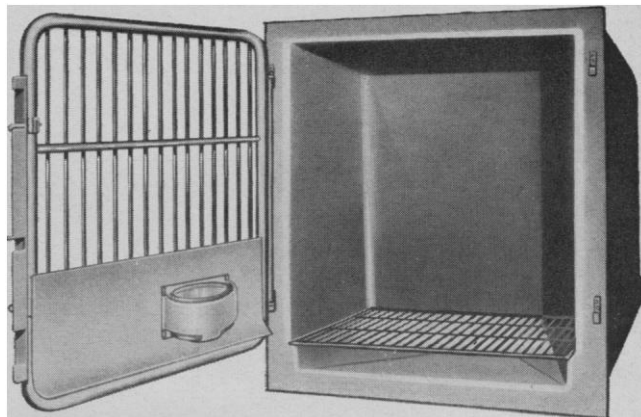
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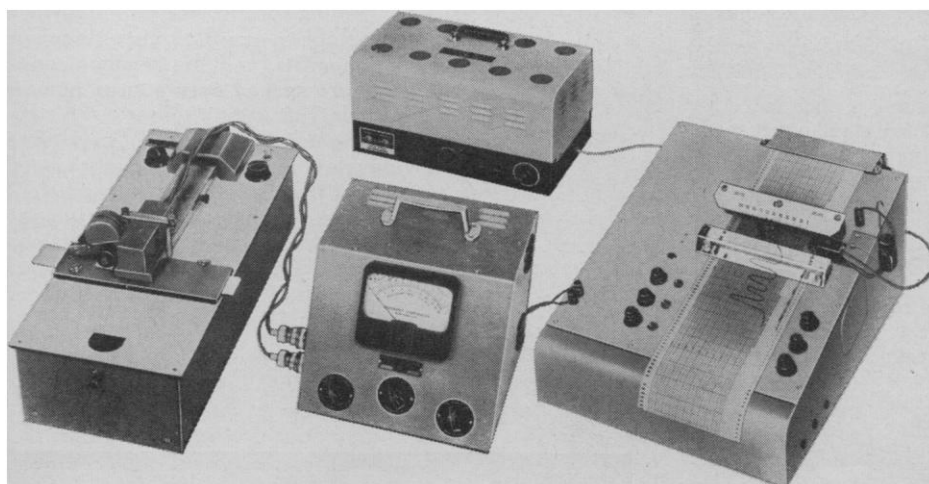
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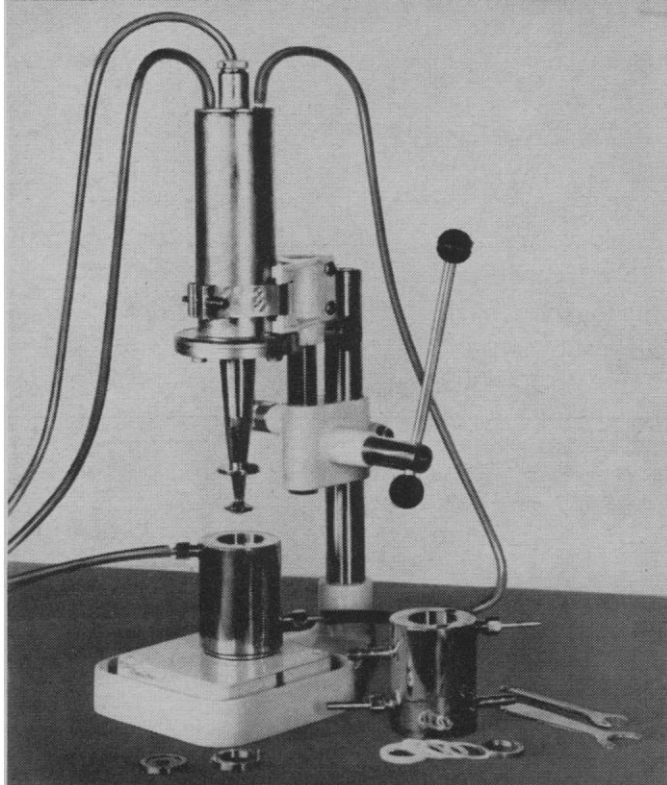
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Fundamental research on atherosclerosis and related subjects is carried out by a wide variety of specialists, including for instance pathological anatomists, physiologists, cardiologists, biochemists and physical chemists, and the resultant publications are therefore spread over a large number of scientific journals. This is felt as a serious hindrance by many investigators who wish to stay informed about new developments and trends of research in different parts of the rapidly expanding field. The publication of the Journal of Atherosclerosis Research is intended as a means of remedying this situation and of helping workers in atherosclerosis research to keep an overall view of the subject. Starting in January 1961 the Journal of Atherosclerosis Research will appear bimonthly. Each issue is to contain approximately 80 to 90 pages.

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CHARLES E. KELLOGG

United States Department of
Agriculture, Washington, D.C.

It is impossible in a brief paper to cover *all* the relevant aspects of a problem. The figures and data I used were based on experiments that attempted to hold other cultural practices constant. The interaction aspects brought out in Kellogg's letter are undoubtedly very important, and there was no intention to minimize them. The importance of the increases in the use of fertilizer is recognized and analyzed in my paper on "The demand for fertilizer: An economic interpretation of a technical change" (*J. Farm Economics*, August 1958).

ZVI GRILICHES

National Bureau of Economic
Research, New York, New York

Records for Future Historians

The report by Chauncey D. Leake on "Preserving our science archives" [*Science* 132, 158 (15 July 1960)] concerns a matter deserving greater attention than has been given it by most scientists in the past. When Samuel Henshaw succeeded Alexander Agassiz as director of the Museum of Comparative Zoology at Harvard University, he wrote to E. S. Morse, director of the Peabody Museum of Salem, as follows (1): "It is strange that Mr. Agassiz kept so few mementos of the M.C.Z. I have been getting together such data as I can find as to early workers in the museum—I want to leave a good lot of M.C.Z. data for someone if I do not get a chance to use it myself."

Many scientists do not realize the historical importance of their records. The editorial by Gerald Gruman [*Science* 127, 1471 (1958)] and the re-

cent conference on science manuscripts reported by Leake pointed up the need for more attention to the historical aspects of science. Over 40 years ago T. D. A. Cockerell at the University of Colorado wrote to Morse as follows (1): "I wish we had some systematic way of preserving data on American Science. At the New York Botanical Garden they have a good plan. For each American Botanist they have a large, open envelope or folder into which can be stuffed any letter, Ms., portrait or whatnot. Thus all sorts of data accumulate and will some day be very handy for the historian of American Botany—what a blessing it would be if naturalists habitually filed somewhere, brief accounts of all their collecting expeditions."

A few years ago a national committee of the International Union of the History and Philosophy of Science was formed [*Science* 127, 1166 (1958)]. The Academy Conference has a Committee on History of Science, and many state academies have academy historians. What is urgently needed is a more general awareness on the part of scientific workers of the need to preserve personal and professional records for our future historians of science.

RALPH W. DEXTER

Department of Biology,
Kent State University, Kent, Ohio

Note

1. The letters quoted in this communication are on file at the Peabody Museum of Salem, Mass., and are quoted with the permission of Ernest S. Dodge, director of the museum.

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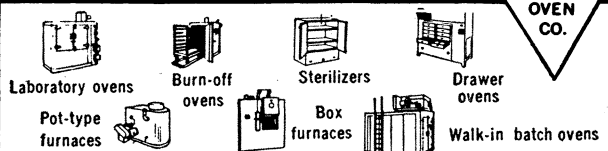
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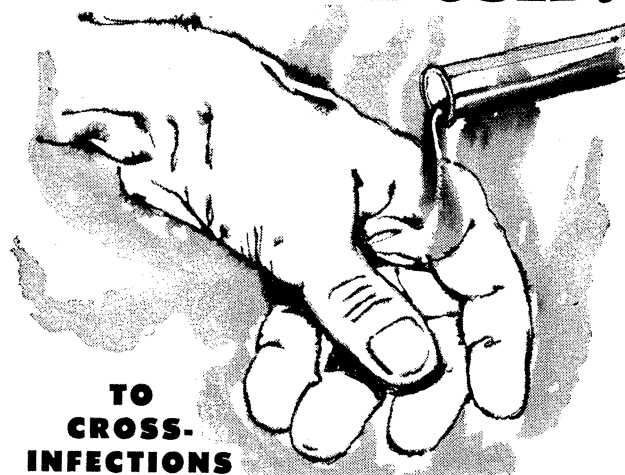
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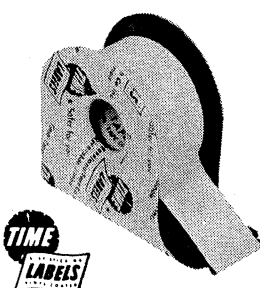


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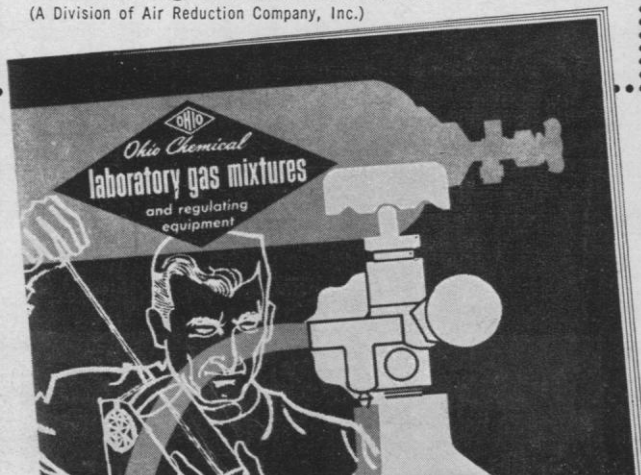
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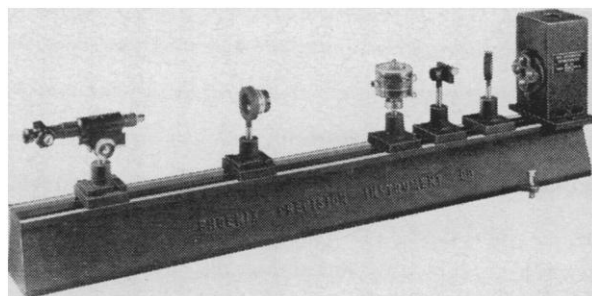
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Meetings

Science News Writing

"Learning without thinking is useless. Thinking without learning is dangerous." So wrote Confucius about 500 B.C. Concern regarding this precept prompted the National Science Foundation to underwrite costs covering six science-news-writing seminars and conferences during 1960. These conferences were held in the following localities: Chapel Hill, North Carolina; Louisville, Kentucky; New York City; Fort Collins, Colorado; Manhattan, Kansas; and northern Minnesota.

The Science News Writing Seminar held at Colorado State University in Fort Collins from 12 to 18 September was sponsored by the *Denver Post*, the Boulder Laboratories of the National Bureau of Standards, and Colorado State University. Herman Weisman of Colorado State University was seminar director; Mortimer Stern of the *Denver Post* and David M. Gates of the National Bureau of Standards were associate directors. Participation was limited to 25 science reporters, primarily from a 15-state region centered on Colorado, although several came from other parts of the United States. In addition to the science news writers in attendance, another dozen individuals in the field of communications attended sporadically, and some 20 scientists participated in one or more of the sessions.

The seminar program was arranged so that the scientists expressed their views on science, education, and science news writing early in the week. The science news writers presented their problems, attitudes, and objectives later in the week, and the final session consisted of replies and a summing up by both groups. Three basic questions represented the framework for the seminar: What is going on in the exploding world of science? How best can reporters tap the sources of scientific information? How can science news stories best be told to newspaper readers?

Keynote addresses were given by Palmer Hoyt, editor and publisher of the *Denver Post*, and Frederick W. Brown, director of the Boulder Laboratories of the National Bureau of Standards. Other addresses given during the seminar were by Theodore Puck, professor of biophysics, University of Colorado; John M. Parker, Rocky Mountain district manager of the Kirby Petroleum Co.; Henry Eyring, dean of the Graduate School, University of Utah; and Graham DuShane, editor of *Science*. Panel discussions were held on the following subjects: "Philosophy of Scientific Research," "Biology Research,"

"Soil and Water Research," "Science Writing," "Science News Writing," and "The Scientists Talk Back."

Speakers on the panels were as follows: William E. Morgan (president, Colorado State University); M. L. Albertson (director, Colorado State University Research Foundation); Robert V. Bartz (executive director, Associated Rocky Mountain Universities); S. I. Johnson (director, Denver Research Institute); William Purdy (director of engineering, the Martin Company, Denver); Willard C. Haselbush (*Denver Post*); Gene Lindberg (*Denver Post*); Richard E. Slawsky (*New York World-Telegram and Sun*); Arthur J. Snider (*Chicago Daily News*); Lawrence Durrell (dean emeritus, Colorado State University, College of Arts and Sciences); Rue Jensen (dean, Colorado State University, College of Vet-

erinary Medicine); John R. Olive (American Institute of Biological Sciences); Frank Salisbury (Colorado State University); Verne L. Van Breeman (Mercy Hospital, Denver); Watson Davis (director, Science Service); H. J. Geiger (Harvard Medical School); Harold F. Osborne (American Institute of Biological Sciences); Daniel Q. Posin (DePaul University); A. R. Chamberlain (vice president, Colorado State University); Robert Dils (Colorado State University, College of Forestry); Omar J. Kelley (U.S. Department of Agriculture); Herbert Riehl (Colorado State University); and Robert Whitney (Colorado State University).

The participants spent one day at the Boulder Laboratories of the National Bureau of Standards. They also visited the High Altitude Observatory of the University of Colorado, with

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Robert J. Low, executive officer, leading the tour. There was a half-day excursion into the Rocky Mountains, which included a visit to the National Bureau of Standards' Fritz Peak Observatory, directed by Franklin E. Roach. Each evening the sessions were continued informally, and discussion ran into the night. At week's end the participants were weary, enlightened, and still friends, despite the fact that the gap between the two professional groups had been large indeed at the beginning of the seminar. Much of the success of the seminar was due to the pleasant and efficient handling of the rigorous 14-hour day, six-day schedule.

Specific answers formulated at the Fort Collins meeting to the question, How can science news stories best be told to newspaper readers? and comments relating to the whole subject of science news writing were as follows:

1) An outstanding science reporter must first be an excellent reporter. The best possible science reporter is a true hybrid, a real journalist and a real scientist.

2) There is a lack of aggressiveness in science writing; reporters are not skeptical enough about handouts, are timid in their presentation, and seldom do interpretive writing based on a careful background study of the subject matter.

3) A science reporter should know and use a "stable of experts"—that is, he should have a friend in each of the major scientific disciplines on whom he can call for advice.

4) There is little coverage of basic research and almost no coverage of negative experiments and research projects. The public should be educated in the philosophy of science and should understand that some experiments and projects, both basic and applied, are failures. Since a large part of what the public learns is from our daily newspapers and since the public is paying very directly for most of the research going on today, it is obvious that taxpayers, legislators, and all people concerned with formulating and administering educational and research programs must have a deeper understanding of science.

5) Newspapers have too many "sacred cows" of both the inclusive and the exclusive variety. For example, there is prodigious coverage of sports despite the fact that reader surveys show that science news stories are read by approximately twice as many people as stories on sports; newspapers exclude critical and analytical reporting of technological or applied science if such stories cover one of the local sacred minorities, such as the lead-zinc lobby group or the western reclamation lobby group.

6) Too many stories promise a

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"breakthrough." This leads people to think that science evolves primarily around breakthroughs, and breakthroughs for a specific purpose, such as the control of cancer and heart disease. Further, in regard to medical stories, statistical results are sometimes accepted willy-nilly from scientists and medical men who may not qualify or properly limit the conclusions based on statistical data.

7) There is little coverage of the social sciences.

8) Being a good reporter and a good writer is not enough. A reporter must continue to educate himself in order to advance his knowledge of science. A science reporter should seek the opportunity to work in a laboratory or in the geological department of an oil company or to attend a field camp in session in order to get the "feel" of scientific investigation. This period should be at least a week and preferably a month or more, and it should be repeated. A medical reporter should make the round of the wards with an intern once every six months.

9) The "lead concept" is not necessarily the best way to tell a science news story.

10) The wire services and some newspapers at times arbitrarily limit science news stories to 150 words.

11) Managing editors wrongly think everyone can cover everything.

12) Poor techniques are frequently used in telling a science story of the expository type. The correct techniques are as follows: (i) Use graphic aids (pictures, diagrams, sketches, cartoons, and good pictures); (ii) keep the development slow, do not amaze; explain, teach, have a logical re-enactment, build up to a climax; (iii) don't use technical jargon unduly, but be willing to introduce new words to the public when necessary; (iv) write to one person—yourself.

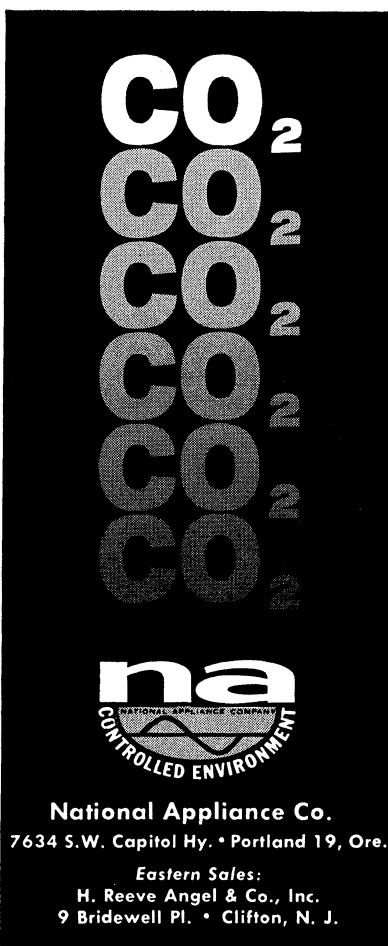
The reporters had some specific and appropriate things to say to scientists.

1) The scientist should be willing to cooperate with the press and society.

2) The scientist should have a better concept of the public that is to be informed. Scientists work with things. Reporters know about and write for people. The reporter's reader cannot be told what to read. If a science writer can convey the excitement of science he will get and hold the attention of the reader. The excitement factor is most important since newspapers, to be successful, must be read, and therefore a newspaper must appeal to both intellect and emotion.

3) The scientist should be willing to interpret his subject for the layman.

4) The scientist should realize that a reporter works with a deadline, not only on straight news stories but also on feature stories.



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5) Newspapers contribute to civic projects, and they need more help from scientists than they are getting at the present time. In the opinion of the science news writers this is particularly true with regard to crusades to raise teaching standards and teachers' salaries, wherein scientists, both as individuals and as groups, could work with the press better than they now do. Scientists appear not to accept enough public responsibility.

6) Scientists should realize that newspapers must crusade for 200 different things, of which science is only one.

7) Universities give very few honorary degrees to scientists in basic re-

search; this shows poor judgment on the part of the university and is bad public policy.

8) There is a common tie between scientists and reporters; both are curious and both are skeptical.

The 20 points listed above are representative of the general consensus of the Fort Collins meeting. Individual reactions and interpretations on these points varied widely among the reporters and the scientists present, but the general feeling was clear.

It was evident from the Fort Collins meeting that editors and publishers must be convinced of the need for improving the quality and quantity of sci-

ence news reporting. We urge *Editor and Publisher*, the National Science Foundation, and any other interested group to sponsor science reporting seminars limited to editors, publishers, and scientists.

We believe that some specific steps are in order. Presidents of scientific societies should stress the fact, in letters and in conversation with newspaper publishers, that our country needs better coverage of basic science news and research. Local scientific societies should assist with public-school reforms and projects of similar nonpartisan nature. Local or national scientific groups should not become involved in group endorsement of partisan political activities, but it is important that the consensus of professional opinion, within a scientific organization, concerning a specific issue be made known to the public through the press. Concerning nonpartisan issues, very few scientific societies avail themselves of the "poll" type of survey. If a legitimate poll is made (by a nonmember) of the membership of a scientific organization, such a poll is news for the local press and is also an effective means of influencing public opinion.

On a national level, related scientific disciplines need umbrella-type organizations in order to maintain effective professional responsibility, ethics committees, public information offices, school curricula committees, and the like. Several organizations of this type exist and are doing a good job. We believe that these organizations should be supported and strengthened.

Science, the organ of the oldest and largest of the umbrella-type associations in this country, published the following pertinent items in 1960 on the subject of science news writing and related topics: "Science reporting—today and tomorrow," by Joan Troan [131, 1193 (1960)]; "Dons or crooners?" by Eric Ashby [131, 1165 (1960)]; "Popularization of science," by Jean Rostand [131, 1491 (1960)]; "Science and human welfare" [132, 68 (1960)] and "Science teachers and the scientific attitude: An appraisal of an academic year institute," by Howard E. Gruber [132, 467 (1960)].

Nothing new regarding science news writing and scientists was said at Fort Collins, but the inspiration, the impact, and the results are new. Reporters and scientists agreed unanimously as to the tremendous value to be gained from conferences of this type and urged that other such conferences be convened in the future to further understanding between the two professions.

DAVID M. GATES

Boulder Laboratories, National Bureau of Standards, Boulder, Colorado

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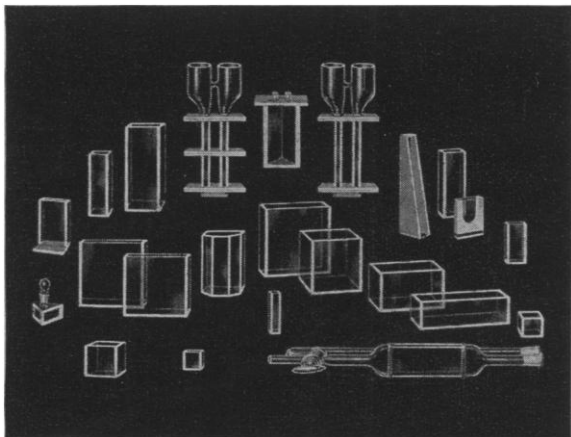
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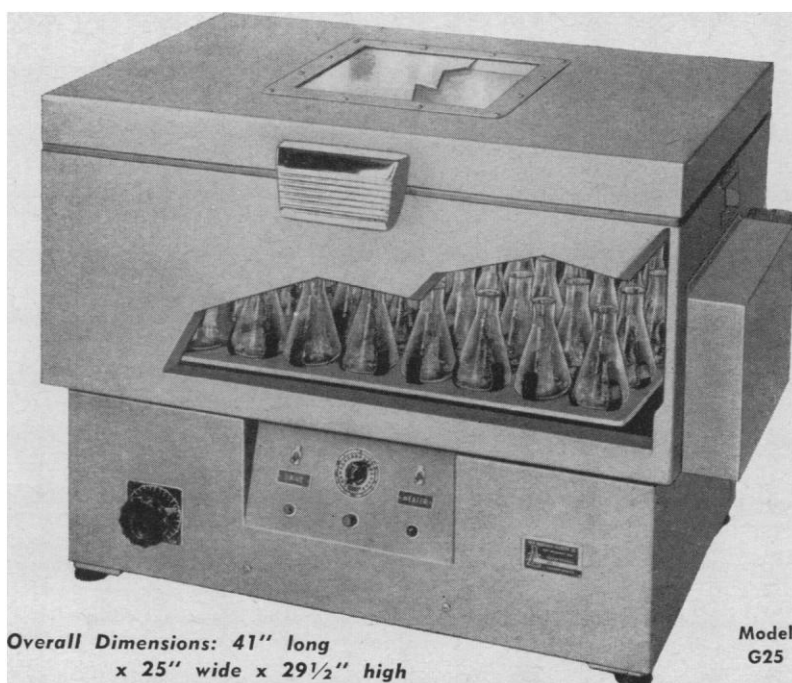
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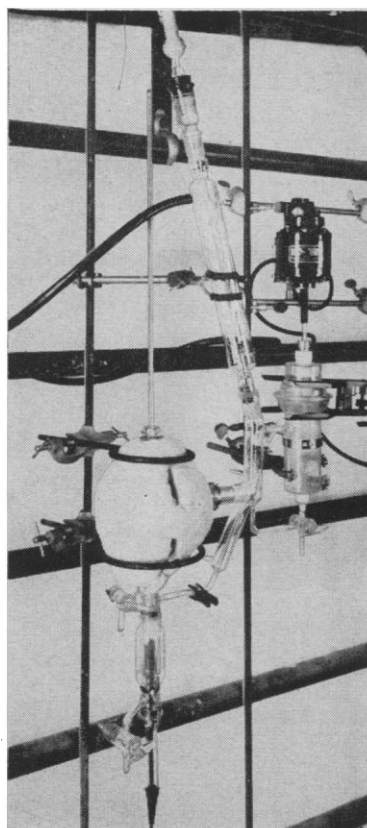


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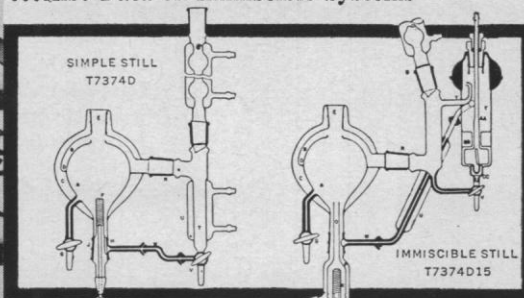


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*Othmer, D. F., Gilmont, R. and Conti, J. J. *Ind. Eng. Chem.* 52, 625 (1960) Reprints furnished on request.

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Physiological and Behavioral Aspects of Taste

Obesity and selection of a nutritionally adequate diet are human problems in many societies today. Restricted intake of feed has been established as advantageous to animal production and health. Various animals show deficiency-related specific appetites. In addition, gustatory stimuli can be powerful motivators for learning. The complex nature of the problems which the field of "taste" encompasses suggests that an interdisciplinary approach would provide wider perspective. On 27 and 28 June 1960, a Conference on Physiological and Behavioral Aspects of Taste, organized with the support of the National Science Foundation, was held at Cornell University.

The concept of senses was traced from its origin in Aristotelian philosophy by R. B. MacLeod. He argued: "There is no such thing as a sense." Rather, "We have dimensions and qualities of sensations, and these can be measured. . . . We [should] stop talking about taste and smell, audition and hearing as sensory systems, . . . look first at the dimensions of human sensory experience and then try to identify their neurological, their physiological, their anatomical, and their physical correlates." This questioning of a rigid categorization of sensory input into the usual modalities or senses was partially supported by neurophysiological data.

Human judgments of pair-mixtures of sodium chloride, citric acid, sucrose, and caffeine were reported by F. J. Pilgrim. Interactions were complex, with chemical composition and concentration of each component significant. The words *sour* and *bitter* were sometimes used interchangeably in describing these stimuli. Similar "quality confusion" was reported by R. M. Pangborn. In the light of these observations and other data, T. Engen questioned the validity of the classical four taste qualities.

In studying species differences in taste preference behavior, it is necessary to be free of preconceived ideas as to what chemical entities will be selected or rejected by each species. On the bases of several thousand trials with calves, pigs, chickens, and other animals it was obvious that man cannot use his taste reactions to predict the taste reaction of an animal. The unique individual taste behaviors described by M. R. Kare could not be related to any of a large group of physical or chemical variables incorporated into a systematic study. Further, the dozen taste buds in the fowl or the 25,000 in the ruminant could not be correlated with the distinctive taste behaviors of these two species. These data generally served to complement



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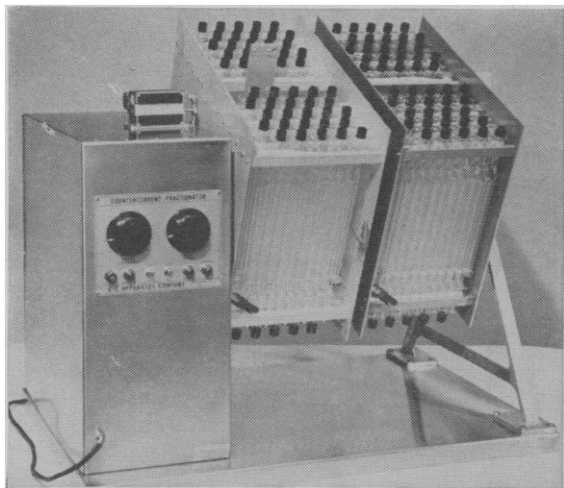
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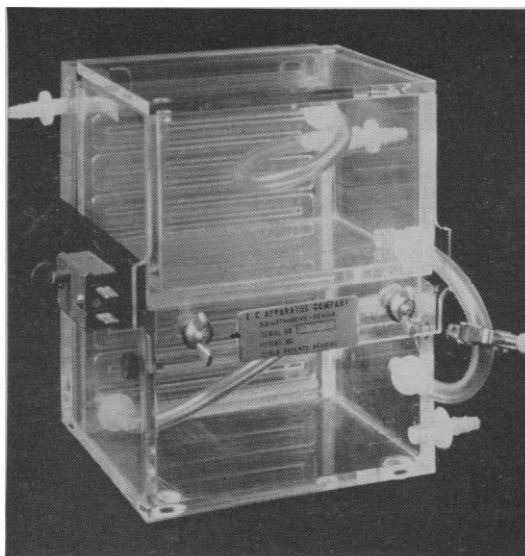
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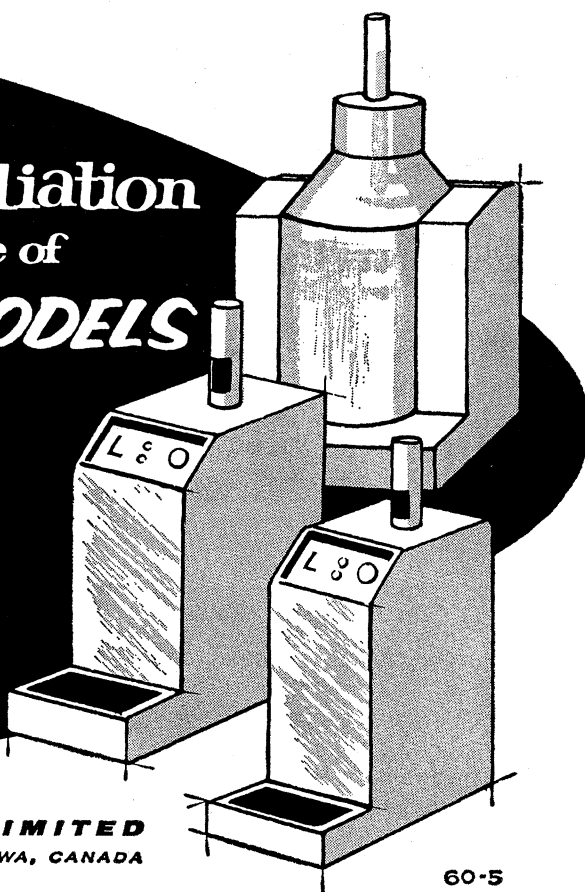
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the comparative studies of A. J. Carpenter.

Related electrophysiological data on chorda tympani and glossopharyngeal responses in chickens, goats, sheep, cats, monkeys, and human beings were reported by R. L. Kitchell. No two of these animals showed the same overall neural response pattern for the stimuli used.

Calves, rats, rabbits, and hamsters on adequate *ad libitum* diets will select a range of sucrose (glucose) solutions when offered a sucrose (glucose)-water choice. The relation between intake and sucrose (glucose) concentration

is a function of the length of exposure to the choice situation: When both fluids are constantly available for approximately 24 hours, the preference function is roughly bell-shaped, with the maximum at about 10 percent (0.3M) sucrose. A choice period of 20 minutes or less results in a roughly linear and positive function. Postingsessional factors, including all effects of the ingested material except the direct stimulation of taste receptors, are thought to underlie the differences. The osmotic dehydration effects of the ingesta have been emphasized in current research.

Experiments involving stomach loads, designed to test the osmotic dehydration hypothesis, were reported by H. L. Jacobs. In a 6-hour, two-choice situation, hypertonic glucose loads in non-water-deprived rats did not affect water intake, while water deprivation (16 hours), with or without glucose loads, significantly increased water intake. Glucose intake was reduced only by hypertonic glucose loads.

The location and functional characteristics of the thalamic gustatory relay in the rat were described by G. P. Frommer. Multiunit recording and adequate stimulation, combined with histological verification of electrode tracks, localized thalamic gustatory input in the medial portion of the tongue-like medial extension of the nucleus ventralis [according to DeGroot's terminology, *Trans. Roy. Netherlands Acad. Sci.* 52 (1959)]. Tactile and temperature inputs were localized laterally in the subnucleus. Thalamic response patterns were similar to those described in the chorda tympani (C. Pfaffmann) and in the medulla (B. P. Halpern).

This localization of the thalamic gustatory relay and the limited overlap of taste and somesthetic regions were verified by a series of lesion and recording studies described by R. M. Benjamin.

The procedures used in electrophysiological studies of neural responses to taste stimuli were discussed by R. L. Kitchell. Pre-stimulus treatment, solvent, temperature, method of applying fluids to the tongue, procedures for gaining access to the recording site, and electronic apparatus were all significant factors.

The development of brief-exposure preference testing methods (by P. T. Young) and data collected with an electronic preference tester were presented by K. Christensen. Sodium chloride-sucrose mixtures as acceptable as one of a series of pure sucrose solutions were determined for the rat on an *ad libitum* food and water regimen; for example, a 1-percent (0.03M) sucrose solution was matched by a 0.5-percent (0.1M) sodium chloride, 0.5-percent (0.015M) sucrose mixture.

Interactions between taste-determined behavior, nutritional state, and metabolic activity were discussed by J. Tepperman. Changes in any one of these may lead to alterations in the other two. The experiments of C. P. Richter were quoted as classic examples of these interactions. Recent experiments have demonstrated that modification of rate of lipogenesis, of catabolism of fatty acids, and of enzyme production can be a function of the metabolic mixture. Taste can determine the nature of the metabolic mixture.

A detailed example of interaction



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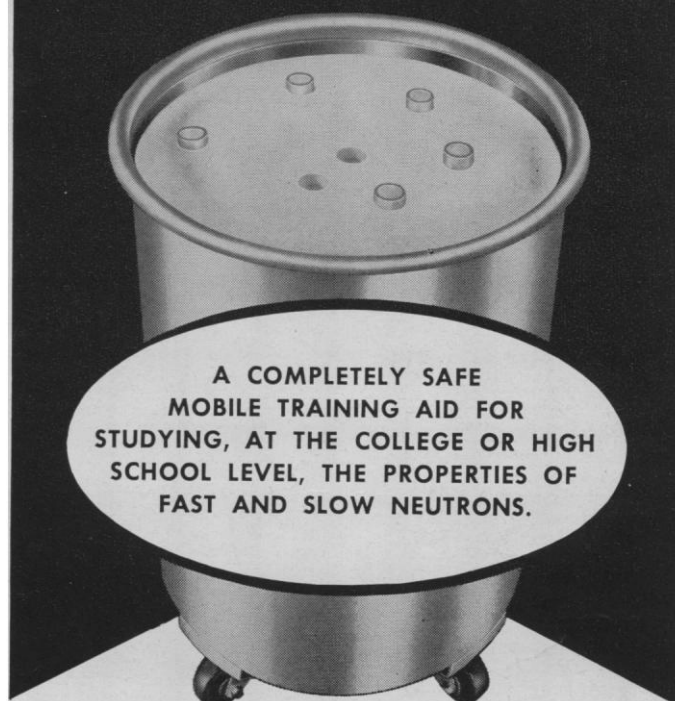
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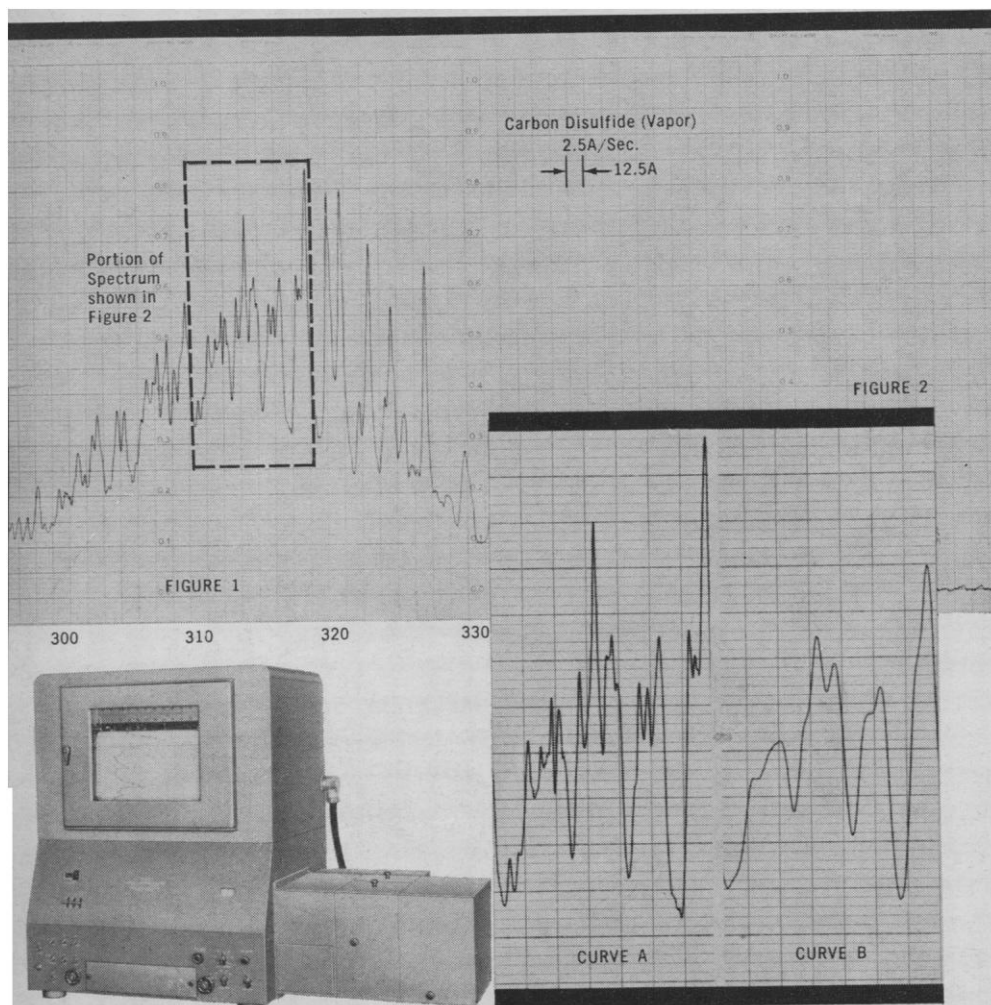
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length as curve A in Figure 2, was recorded again with about 10 Å resolution. This appears as curve B in Figure 2. A comparison of the curves in Figure 2 emphasizes the value of high resolution, which would be especially important in the case of similar materials having nearly identical spectra.

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High resolution, by sharpening absorption peaks of interest, isolates them from adjacent peaks. To illustrate this, the spectrum of carbon disulfide vapor was recorded with 1 Å resolution as shown in Figure 1. An enlarged portion of this appears as curve A in Figure 2. A portion of the spectrum, covering the same wave-

between quality and quantity of ingested food and metabolism was presented by F. W. Heggeness. Weanling rats fed high carbohydrate diets ingested calories in excess of requirements and developed a transient, self-limiting elevation in metabolism. This could be prevented by initially presenting the diets in amounts just sufficient to maintain body weight. Modification of capacity for lipogenesis appeared to be the critical factor.

The 1960 Conference on Physiological and Behavioral Aspects of Taste brought together researchers from many disciplines: L. M. Bartlett (zoology), University of Massachusetts; R. M. Benjamin (physiology), University of Wisconsin; J. A. Carpenter (applied biodynamics), Yale; K. Christensen (psychology), University of Illinois; W. C. Dilger (ornithology), Cornell; T. Engen (psychology), Brown; I. Y. Fishman (biology), Grinnell; G. P. Frommer (psychology), Brown; A. Goldstein (psychology), Cornell; E. B. Hale (poultry husbandry and psychology), Pennsylvania State; A. E. Harri-man (psychology), Franklin and Marshall; F. W. Heggeness (physiology), University of Rochester; H. L. Jacobs (physiology and psychology), University of Rochester; R. L. Kitchell (anatomy), University of Minnesota; R. B. MacLeod (psychology), Cornell; G. R. Morrison (psychology), McMaster; R. M. Pangborn (food technology), University of California; F. J. Pilgrim (food acceptance), Quartermaster Institute; M. W. Schein (poultry husbandry), Pennsylvania State; J. Tepperman (pharmacology), State University of New York, Upstate Medical Center; and L. F. Titlebaum (nutrition), Harvard.

The conference proceedings were recorded. An edited version is being prepared for publication.

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Forthcoming Events

February

1-3. Solid Propellant Rocket Conf., American Rocket Soc., Salt Lake City, Utah. (R. D. Geckler, Aerojet-General Corp., P.O. Box 1947, Sacramento, Calif.)

1-3. Winter Military Electronics Conv., 2nd. Inst. of Radio Engineers, Los Angeles, Calif. (A. N. Curtiss, IRE Business Office, 1435 S. La Cienega Blvd., Los Angeles 35)

1-4. American Physical Soc., annual, New York, N.Y. (K. K. Darrow, APS, 538 W. 120 St., New York 27)

2-4. Congress on Administration, 4th annual, Chicago, Ill. (R. E. Brown, Amer-



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6-8. American Acad. of Allergy, 17th annual, Washington, D.C. (J. O. Kelly, 756 N. Milwaukee St., Milwaukee 2, Wis.)

6-8. Geodesy in the Space Age, symp., Ohio State Univ., Columbus. (W. A. Heiskanen, Ohio State Univ., 1314 Kinnear Road, Columbus 12)

6-10. British Medical Assoc., annual, Auckland, New Zealand (E. Grey-Turner, B.M.A., Tavistock Sq., London, W.C.1)

9-15. Second Allergy Conf., Nassau, Bahamas. (I. M. Wechsler, P.O. Box 1454, Nassau)

13-16. American Soc. of Heating, Refrigerating and Air-Conditioning Engineers, Chicago, Ill. (R. C. Cross, 234 Fifth Ave., New York 1)

14-15. Conference on Microdosimetry, 2nd, Rochester, N.Y. (N. Kreidl, Bausch & Lomb Optical Co., Inc., Rochester 2)

15-17. International Solid-State Circuits Conf., Philadelphia, Pa. (J. J. Suran, Bldg. 3, Room 115, General Electric Co., Electronics Park, Syracuse, N.Y.)

16-18. Biophysical Soc., annual, St. Louis, Mo. (W. Sleator, Dept. of Physiology, Washington Univ., St. Louis 10)

22-25. American Educational Research Assoc., annual, Chicago, Ill. (G. T. Buswell, 1201 16th St., NW, Washington 6)

23-25. Fifteenth Annual Symp. on Fundamental Cancer Research, Houston, Tex. (Publications Dept., Univ. of Texas M.D. Anderson Hospital and Tumor Inst., Texas Medical Center, Houston 25)

23-25. Symposium on Molecular Basis of Neoplasia, Houston, Tex. (Publications Dept., Texas Medical Center, Houston 25)

26-1. American Inst. of Chemical Engineers, natl., New Orleans, La. (F. J. Van Antwerpen, AIChE, 25 W. 45 St., New York 36)

26-2. American Inst. of Mining, Metallurgical, and Petroleum Engineers, annual, St. Louis, Mo. (AIME, 29 W. 39 St., New York 18)

27-3. Conference on Analytical Chemistry and Applied Spectroscopy, 12th, Pittsburgh, Pa. (L. P. Melnich, U.S. Steel Corp., Monroeville, Pa.)

March

2-4. Optical Soc. of America, spring meeting, Pittsburgh, Pa. (Miss M. Wurga, 1155 16th St., NW, Washington 6, D.C.)

5-9. Gas Turbine Conf. and Products Show, 6th annual, Washington, D.C. (Meetings Dept., American Soc. of Mechanical Engineers, 29 W. 39 St., New York 18)

6-8. North American Wildlife and Natural Resources Conf., 26th, Washington, D.C. (C. R. Gutermuth, Wildlife Management Inst., 709 Wire Bldg., Washington 5)

7-9. American Railway Engineering Assoc., annual, Chicago, Ill. (N. D. Howard, 59 E. Van Buren St., Chicago 5)

8-10. Instrument Soc. of America Conf., 11th annual, Pittsburgh, Pa. (R. R. Webster, 900 Agnew Ave., Pittsburgh 30)

8-11. Neurosurgical Soc. of America, Boca Raton, Fla. (R. K. Thompson, 803 Cathedral St., Baltimore 1, Md.)

9-10. Magnetohydrodynamics, symp. on engineering aspects of, Philadelphia, Pa.

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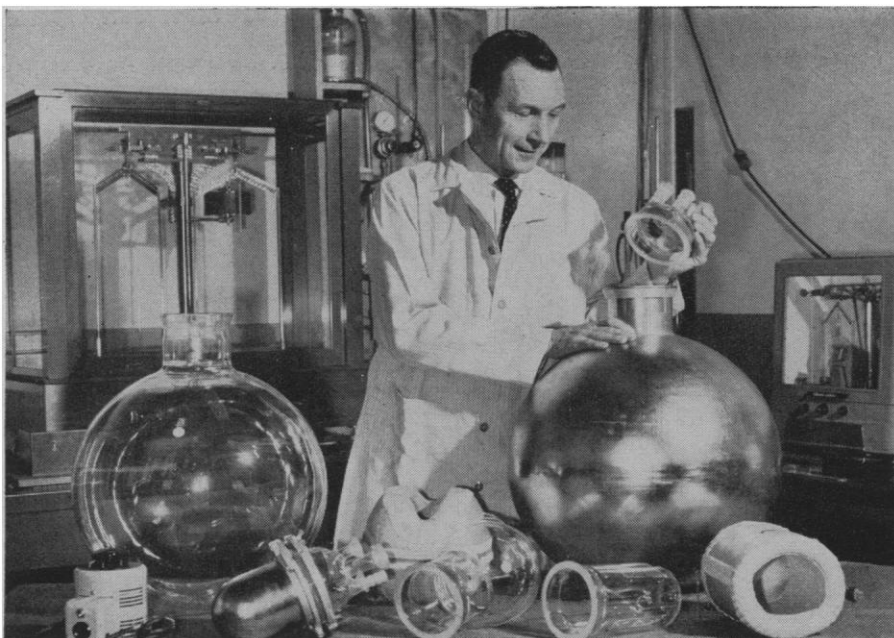
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12-17. American College of Allergists, annual, Dallas, Tex. (P. Gottlieb, 818 Medical Arts Bldg., Philadelphia, Pa.)

13-17. National Assoc. of Corrosion Engineers, annual, Buffalo, N.Y. (W. A. Mapler, 18263 W. McNichols Rd., Detroit 19, Mich.)

13-24. Radiological Health, course in, Cincinnati, Ohio. (Chief, Training Programme, Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26)

14-16. Clinico-Pathological Significance of Renal Biopsy, Ciba Foundation symp. (by invitation only), London, England. (Ciba Foundation, 41 Portland Place, London, W.1)

14-16. Inter-Station Supersonic Track Conf., 6th symp., China Lake, Calif. (U.S. Naval Ordnance Test Station, Code 307, China Lake, Calif.)

15-17. Medical Photography and Cinematography, intern. cong., Cologne, Germany. (Deutsche Ges. für Photographie, Neumarkt 49, Cologne)

16-17. Textile Engineering Conf., American Soc. of Mechanical Engineers, Clemson, S.C. (ASME Meetings Dept., 29 W. 39 St, New York 18)

16-18. Aviation/Space Education, 5th natl. conf., Washington, D.C. (Natl. Aviation Education Council, 1025 Connecticut Ave., NW, Washington 6)

17-19. International Medical Conf., Liège, Belgium. (Medical Commission of the FIR, Castellezgasse 35, Vienna II, Austria)

19-25. American Soc. of Photogrammetry, American Cong. on Surveying and Mapping, Washington, D.C. (C. E. Palmer, ASP, 1515 Massachusetts Ave., NW, Washington 5)

20-22. American Physical Soc., Monterey, Calif. (W. A. Nierenberg, Univ. of California, Berkeley 4)

20-23. Institute of Radio Engineers, 1961 intern. convention, New York, N.Y. (E. K. Gannett, IRE, 1 E. 79 St., New York 21)

20-24. American Surgical Assoc., Boca Raton, Fla. (W. A. Altemeier, Cincinnati General Hospital, Cincinnati 29, Ohio)

20-24. National Health Council, forum and annual meeting, New York, N.Y. (NHC, 1790 Broadway, New York 19)

20-24. Western Metal Cong. and Exposition, 12th, Los Angeles, Calif. (A. R. Putnam, American Soc. for Metals, Metals Park, Ohio)

21-23. American Meteorological Soc., general meeting, Chicago, Ill. (E. P. McClain, Dept. of Meteorology, Univ. of Chicago, Chicago 37)

21-23. American Physical Soc., Division of High-Polymer Physics, 21st, Monterey, Calif. (D. W. McCall, Bell Telephone Laboratories, Murray Hill, N.J.)

21-23. American Power Conf., 23rd annual, Chicago, Ill. (W. C. Astley, Philadelphia Electric Co., 900 Sansom St., Philadelphia 5, Pa.)

21-24. American Assoc. of Anatomists, 74th annual, Chicago, Ill. (O. P. Jones, Dept. of Anatomy, Univ. of Buffalo, Buffalo 14, N.Y.)

21-30. American Chemical Soc., 139th, St. Louis, Mo. (A. T. Winstead, ACS, 1155 16th St., NW, Washington 6)