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The editorial board of Modern Medicine, international medical journal, has presented ten Distinguished Achievement Awards for work which has directly influenced medical progress in the United States. The award winners follow.

David P. Barr, president and medical director of the Health Insurance Plan of Greater New York, for his contributions in the fields of parathyroid disease and atherosclerosis and as a teacher of teachers. He recently retired as professor of medicine at Cornell University and as physician-in-chief at New York Hospital.

Lowell T. Coggeshall, vice president in charge of medical affairs at the University of Chicago, for his service as an administrator and medical statesman and for achievements in tropical medicine.

Julius H. Comroe, Jr., director of the Cardiovascular Research Institute of the University of California, for leadership in the investigation of pulmonary function and the clinical use of autonomic drugs.

Frank J. Dixon, Jr., professor and chairman of the department of pathology at the University of Pittsburgh, for contributions to the understanding of antibody production and diseases of connective tissue. Dixon this year will take over as director of experimental pathology at the Scripps Clinic and Research Foundation at La Jolla, Calif.

Rene J. Dubos, Rockefeller Institute for Medical Research, for fundamental work that helped usher in the era of antibiotics.

William F. Hamilton, professor emeritus of physiology at the Medical College of Georgia, for work in cardiovascular physiology and pathology that laid the basis for cardiac surgery.

Charles A. Hufnagel, professor of surgery at Georgetown University, for development of surgical techniques for treating heart and great-vessel disorders.

Severo Ochoa, professor and chairman of the department of biochemistry at New York University, for his demonstrations of enzyme catalysis, ribonucleic acid biosynthesis, and muscle function.

Marion B. Sulzberger, director of the Skin and Cancer Unit of New York University–Bellevue Medical Center, for integration of basic science and clinical dermatology.

George W. Thorn, physician-in-chief of Peter Bent Brigham hospital and Hersey professor of the theory and practice of physic at Harvard, for contributions to the understanding of metabolic disease and stress patterns.

Carl S. Marvel will join the University of Arizona faculty on 1 February as professor of organic chemistry, after a long and distinguished career in teaching and research at the University of Illinois. Some 150 graduate students have earned Ph.D. degrees in organic chemistry under his direction.

Marvel, a past president of the American Chemical Society, is a specialist in the synthesis of organic compounds. He has done extensive research on the chemistry of sulfur in university, industrial, and government laboratories and has made significant contributions in work on synthetic rubber.

P. J. W. Debye, professor emeritus of chemistry, Cornell University, will be Cornell's George Fisher Baker lecturer in chemistry during the spring term. He will discuss molecular forces, between 14 February and 9 March.

Thomas A. Nevin, bacteriologist at the National Institute of Dental Research, Bethesda, Md., resigned last month to become assistant director for administration of the Germfree Life Research Center, Tampa, Fla.

Gertrude M. Cox of North Carolina State College has received the 1960 Gamma Sigma Delta Award for distinguished service to agriculture. She is recognized internationally for her outstanding contributions to statistics.

Dr. Cox has directed the college's Institute of Statistics since it was organized in 1944. In 1946 the institute became a part of the Consolidated University of North Carolina at Chapel Hill, and a department devoted to research and teaching in theoretical statistics was established on the Chapel Hill campus. On 1 July 1960, Dr. Cox became head of the Statistics Research Division of the newly formed Research Triangle Institute, a nonprofit research group supported by the three institutions of the area—Duke University, North Carolina State College, and the University of North Carolina.

Clifford F. Johnson has been named chief of the Office of Research Information at the National Institutes of Health, Bethesda, Md. For the past several months he has been chief of public information in the office he now heads. Prior to his transfer to NIH in April 1957, Johnson was assistant chief of technical information in the Office of the Army Surgeon General, where he had served for 16 years.

Recent Deaths

Edward Block, Baltimore, Md.; 58; senior vice president and general manager of the Chemicals Division, Olin Mathieson Chemical Corporation, New York; 4 Jan.

Daniel F. Brophy, Westport, Conn.; 61; psychiatrist and dean of students at City College, New York, for the last 14 years; 18 Dec.

Edith Bowen Chase, Leonia, N.J.; 61; assistant dean of faculty and associate professor of biological sciences at Hunter College; had taught at Wellesley and Hood colleges; 8 Jan.

Jefferson H. Clark, Philadelphia, Pa.; 70; chief of laboratories for Philadelphia General Hospital for 27 years before his retirement, 3 years ago; former associate professor of pathology at the University of Pennsylvania and director of laboratories for Temple University; 8 Jan.

Charles H. Heacock, Memphis, Tenn., 72; professor of radiology at the University of Tennessee Medical School; 30 Dec.

Lester S. Hill, Bronxville, N.Y.; 70; retired professor of mathematics at Hunter College and a noted cryptographer; before joining Hunter in 1927, taught at the University of Montana, Princeton University, the University of Maine, and Yale University; 9 Jan.

Leo Kaplan, Carbondale, Ill.; 42; associate professor of botany, Southern Illinois University; 2 Dec.

John A. Lapp, Macapawa, Mich.; 80; sociologist, specialist in vocational education, and labor arbitrator; former professor of sociology at Marquette University, where he wrote several high-school textbooks in civics and sociology; throughout the Roosevelt and Truman Administrations served as referee in labor disputes; 30 Dec.

Rev. William F. Lynch, Davenport, Iowa; chairman of the department of biology at St. Ambrose College; 5 Dec.

Roland McKeel, San Francisco, Calif.; 80; retired horticulturist and agronomist; served the U.S. Department of Agriculture for more than 43 years; 19 Dec.

David Rapaport, Stockbridge, Mass.; 49; psychologist and a member of the Austin Riggs Foundation since 1948; previously was chairman of research at the Menninger Foundation in Topeka, Kan.; specialist in diagnostic psychological testing procedures, the psychology of general paresis, and the organization and pathology of memory and thinking; 14 Dec.
in this volume. Incidentally, the volume can boast of only an 18 percent reduction when compared with its parent text, but that figure tells only a small part of the story. In reading the smaller volume one feels that the authors were strongly aware of the need for brevity and strove hard to compensate with a gain in punch and lucidity. The illustrations are definitely far more meaningful than in the larger text, and significant bits of new material have been added here and there, out of respect to their timeliness. I am particularly pleased to see that many of the historical references in the older text, which showed the stamp of 19th century distortions, have been significantly mollified to bring them more in line with recent findings. The style is snappy and crisp. The placement of the questions and answers at the end of the book and the economical use of references will please both teachers and students. This book, more than any other in the field, may well be read with profit and pleasure by any literate man who wishes to know the alphabet and scope of modern physical science.

A few general comments may not be out of place here. It is hard to conceive that any college student (or high-school senior), even those who are neither particularly interested nor gifted in scientific-mathematical discipline, can fail to be deeply stirred intellectually by a course which employs a volume such as this one and which has a teacher that can give the text its real meaning. Such a student is bound to be better informed in science than is the average contemporary engineer in history, American literature, or modern painting. There is hardly a chapter in this book that does not pry the mind loose, challenge its latent powers to their limits, and enrich it with factual knowledge. Therefore, one cannot help being depressed by the post-Sputnik hysteria that erupted on several American campuses, one symptom of which was a blind rage against the general science courses and a demand for students, one and all, to return to the orthodox course of the 1920’s. As a chemist on one campus put it: A year of real chemistry with holes in one’s pants from nitric acid will teach a fellow more science and logic than 10 general science courses. And a friendly botanist beside him chimed in: And get his hands dirty.

How many people with holes in their pants and dirty hands, and feet too, learned little about science! No teacher using this volume would want to teach its contents without exhaustive demonstrations and some meaningful laboratory work. Moreover, on one campus it is a fact that, on senior college entry tests, nonscience students who had had the general science course (using the older Krauskopf text) did just as well as students who specialized in science, since, I presume, the tests dealt with general questions. Because the controversy is still dormant in many minds, it is a pleasure to see books such as the one under review, for their very existence speaks louder than words for the educational cause they serve.

MARK GRAUBARD
Natural Science, Interdisciplinary Studies, University of Minnesota

New Books

Mathematics, Physical Sciences, and Engineering


Background Material for the Development of Radiation Protection Standards. 13 May 1960. Staff Report No. 1. Federal Radiation Council, Washington D.C., 1960 (order from Sup't of Documents, GPO, Washington 25). 39 pp. $0.30. The Council, established by executive order in 1959, advises the President with respect to radiation matters affecting health and offers guidance to federal agencies in the formulation of radiation standards. Its first staff report provides information on human exposure from radiation sources, the present state of our knowledge of the genetic and somatic effects of radiation, the problems of formulating radiation protection standards from available scientific data, and the basic and derived radiation protection guides. It also makes recommendations for further work by the Council and indicates areas where research is needed.


The Encyclopedia of Spectroscopy. George L. Clark, Ed. Reinhold, New York; Chapman and Hall, London, 1961. 803 pp. Illus. $25. More than 100 contributors have provided original articles for the volume, which are grouped under the following sections: absorption spectroscopy (spectrophotometry)—visible and ultraviolet; “Band spectroscopy” (one article, 6 pages); “Beta-ray spectroscopy”; “Differential thermal analysis” (one article, 3 pages); “Electron paramagnetic resonance spectroscopy”; “Emission spectroscopy—light” (47 articles covering 231 pages); “Flame photometry”; “Fluorophotometry and phosphorimetry”; “Gamma-ray spectroscopy”; “Infrared emission spectroscopy”; “Infrared spectrophotometry” (35 articles covering 197 pages); “Mass spectrometry”; “Microwave spectroscopy”; Monochromators”; “Neutron spectrometry” (one article, 6 pages); “Raman spectroscopy”; “Solar spectroscopy” (one article, 9 pages); “Vacuum spectroscopy” (one article, 10 pages); “X-ray and gamma-ray absorption photometry (absorptiometry); “X-ray characteristic absorption spectroscopy” (one article, 2 pages); “X-ray diffraction spectrometry” (one article, 3 pages); and “X-ray emission spectroscopy.”


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. Colder 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 peave. 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—and 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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If the pristine purity of the publishers is at the heart of the matter, then that species of books we call scholarly may soon be extinct—a victim of inability to adapt to an unfavorable environment.

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 *embarrass 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

**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 pitibly short half-life in memory."

The preparation of good secondary school and college teachers involves
more than a series of unrelated courses capped with a research paper or a thesis. It should include a well-articulated program of scope and depth in general and professional education. College teachers who prepare secondary school science teachers need to know something about the problems of secondary school science teaching, and the graduate schools that prepare college teachers of science need to have some idea of science teaching in small colleges.

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 are important in science teaching. How and where would a student get the background in the history of science for this kind of teaching? Possibly through leisure reading, for there is limited chance for him to receive such training as a required part of his preparation for teaching.

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, representing 54.1 percent, answered that they did not include in their curriculum in any form whatever a course directly or indirectly connected with the teaching of the history of science. Ten of the schools included the course in both the department of history and the department of philosophy. In all except four of the institutions the course was at the undergraduate level, and in every instance except two the subject was listed as an elective.

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 (1) 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.

R. H. Simmons
Albany State College, Albany, Georgia

Reference

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 theoretical 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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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
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


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.

There are at least ten species of...
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 criticising 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, Emmaus, Pennsylvania

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 that is not present the hybrid has little if any superiority over good old varieties.

On the dark-colored soils of the corn belt the hybrids gave an immediate response on many farms because of the excellent soils. But elsewhere it was much more difficult to get the same effects because the other soil management practices had to be devel-
The recognition of interactions between plant varieties and other growing conditions is exceedingly important for any understanding of modern farming. Our greatly increased efficiency during the last 20 years is clear evidence that successful American farmers have learned this principle. What they have learned is to develop proper combinations of practices to suit their soils.

I am fully mindful and appreciative of the great contributions of plant breeders, but the apparent increases in yield due to hybrid seed would be only a fraction of what they are without improved fertilization, water management, and the other essential practices for producing a corn crop. Then, too, the fivefold increase in the use of fertilizers since 1935 would not have given nearly the increases some attribute to it with the old crop varieties.

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 1938).

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 recent 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. Cockerrell 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 what not. 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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* In April 1960 issue of Lab World.

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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 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," "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 Veterinary 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
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 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-zine lobby group or the western reclamation lobby group.

6) Too many stories promise a
“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.

Then 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 research; 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 science 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 conversations 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.


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
John M. Parker
Rocky Mountain District, Kirby Petroleum Company, Denver, Colorado

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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 neurologial, 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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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. Multunit 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.

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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.

Bruce P. Halpern
Morley R. Kare
College of Arts and Sciences and
New York State Veterinary College,
Cornell University, Ithaca, New York

Forthcoming Events

February


2-4. Congress on Administration, 4th annual, Chicago, Ill. (R. E. Brown, Amer-
ican College of Hospital Administrators, 840 N. Lake Shore Dr., Chicago 11
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 Kin- near Road, Columbus 12)
9-15. Second Allergy Conf., Nassau, Bahamas. (I. M. Wechsler, P.O. Box 1454, Nassau)
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)

March

2-4. Optical Soc. of America, spring meeting, Pittsburgh, Pa. (Miss M. Warga, 1155 16th St., NW, Washington 6, D.C.)
7-9. American Railway Engineering Assoc., annual, Chicago, Ill. (N. D. Howard, 59 E. Van Buren St., Chicago 5)
8-11. Neurosurgical Soc. of America, Boca Raton, Fla. (R. K. Thompson, 803 Cathedral St., Baltimore 1, Md.)
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12-17. American College of Allergists, annual, Dallas, Tex. (P. Gottlieb, 818 Medical Arts Bldg., Philadelphia, Pa.)
13-24. Radiological Health, course in, Cincinnati, Ohio. (Chief, Training Programme, Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26)
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)
17-19. International Medical Conf., Lüttich, Belgium. (Medical Commission of the F.I.R., Castellegazses, Vienna II, Austria)
20-22. American Physical Soc., Monterey, Calif. (W. A. Nierenberg, Univ. of California, Berkeley 4)
20-24. American Surgical Assoc., Boca Raton, Fla. (W. A. Atleneimer, Cincinnati General Hospital, Cincinnati 29, Ohio)
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)
21-30. American Chemical Soc., 139th, St. Louis, Mo. (A. T. Winstead, ACS, 1155 16th St., NW, Washington 6)
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  1 v. 0.1 ma.
  10 v. 1 ma.
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**SERUM-PROTEIN METER** (Fig. 2) provides three-step analysis for protein in serum. The serum sample is centrifuged, the instrument is zeroed with distilled water, and the sample cell containing serum is then placed on the instrument, which reads directly in grams of protein per 100 ml. Sensitivity is 0.1 gram; range is 0 to 12 g/ml. A second scale reads refractive index difference to 0.0234. Measurement requires 2.5 ml of serum. (Bausch & Lomb, Inc., Dept. Sci60, Rochester 2, N.Y.)

**PULSE GENERATOR** furnishes pulses of variable repetition rate from 10 Mcy/sec to 100 cy/sec; duration variable between 0.05 and 1000 μsec; delay variable between 0.02 and 1000 μsec; rise time less than 10 nsec; and output amplitude 12 volts on open circuit and 8 volts into 180-ohm load. The instrument is transistorized and of modular construction. (Electro-Pulse, Inc., Dept. Sci37, 11861 Teale St., Culver City, Calif.)

**MASS SPECTROMETER,** type 21-110, is of the Mattauch-Herzog type in which a tandem arrangement of electric and magnetic fields focuses ions having the same mass but different initial velocities and directions. Mass range is 2 to 2000, and molecules differing in mass by 1 part in 2500 are said to be separable.

The high resolution permits extension to analysis of solids by combination of the spectrometer with a radio-frequency-spark ion source. Metal samples are clamped by pin vises into the electrodes of the ion source. The spark across the samples sends ionized molecules of the sample into the mass resolving system. For use with gas or liquids, the spark source is replaced by an electron-bombardment source. Either a photographic plate or an ion-collector plate may be used as the detector. (Consolidated Electrodynamics Corp., Dept. Sci45, 360 Sierra Madre Villa, Pasadena, Calif.)

**TRANSFER-FUNCTION ANALYZER** obtains transfer functions, frequency by frequency, for random, complex, periodic, or sine wave driving signals. Output is provided in the form of Nyquist or Bode plots. The two signals to be analyzed are respectively the cause and effect signals from the device or system under test. Input-signal voltage levels between 1.0 and 10 volts r.m.s. are accepted. Input impedance is 1.5 Mohm. Operating frequency ranges are 0.5 to 3, 3 to 20, 20 to 200, and 200 to 2000 cy/sec. The input frequency to the unit is swept at a maximum rate of 1 octave in 15 sec; dynamic range is 50 db. Output signals, the in-phase and out-of-phase vector voltages within ±10 volts d-c, are fed to an X-Y recorder. Output signal errors are stated to be ±5 percent. (Gulton Industries, Inc., Dept. Sci40, P.O. Box 37, Princeton Junction, N.J.)

**FLYING-SPOT PARTICLE RESOLVER** is capable of automatically counting, sizing, and determining the area of microscopic particles within the field of view and of producing a picture of this field on a cathode-ray tube. The instrument also produces an electronic signal suitable for transmission to remote indicators. Magnification up to 8000 diameters is provided with 700-line definition and resolution of 10⁻⁴ cm. Alternative arrangements permit operation with microscope slides, 35-mm film, and 2-by-2-in. electron micrographs. The instrument can be applied to phase-contrast and dark-field microscope samples by first photographing the samples and using a 35-mm film adapter. (Instrument Corporation of America, Dept. Sci46, 1545 Kennewick Rd., Baltimore 18, Md.)

**INTEGRATOR** for standard strip-chart recorders reads out the integral on demand with accuracy said to be ±0.25 percent of full scale. On a 10-in. wide strip chart moving at 1 in./min, read-out accuracy corresponds to 0.004 in.³ of input. The integral is read back into the recorder itself when the operator judges that integration has been completed. The integrator is then reset automatically, and the pen is returned to zero for the next integration. With the addition of a zero-sensing device, the integrator becomes a fully automatic integrating and peak-transmitting device for gas chromatograms. (Schlumberger Well Surveying Corp., Dept. Sci41, Ridgefield, Conn.)

**MAGNETIC-TAPE TESTER** is said to detect tape defects as small as one bit in length at speeds up to 150 in./sec and packing densities as high as 1500 bits per inch. Faults are indicated by a pilot lamp on each channel; the tape transport stops on the fault which is then
easily accessible for inspection and repair. Included in the tester are a tape transport, a push-button control unit, dual record-playback head, amplifiers, and a logic chassis with fault detector plug-in cards and space for 16 channels. (Potter Instrument Co., Dept. Sci13, Sunnyside Blvd., Plainview, N.Y.)

**PULSE GENERATOR** is capable of delivering simultaneously a positive and negative pulse of 2 to 100 nanosecond duration. Rise time is 0.5 nsec, and repetition rate is adjustable between 10 and 100,000 pulses per second. Pulse amplitude is fixed at approximately 8 volts into 50 ohms. Output pulses are preceded by trigger pulses with time difference adjustable over a 100-nsec range. Triggering can be effected by an external source delivering a positive pulse. Because the instrument is all electronic (no mercury switches are used), it can operate in any position. (Edgerton, Germeshausen & Grier, Inc., Dept. Sci19, Boston, Mass.)

**VACUUM PUMPING SYSTEM** is a fractionating 6-in. diffusion pump complete with refrigeration, Chevron-type baffle, and hand-operated butterfly valve. The baffle is refrigerated to approximately -30°C by a self-contained, hermetically sealed unit. The system is designed particularly for compactness, over-all height being less than 28 in. Ultimate pressure is said to be less than 5 x 10^-4 mm-Hg. (Edward High Vacuum Inc., Dept. Sci36, 1920 Buffalo Ave., Niagara Falls, N.Y.)

**COLOR GENERATOR** for color matching, reconstructs natural daylight by use of color filters, and incandescent, fluorescent, and ultraviolet tubes which are blended by simple preset controls to duplicate the desired type of light. Two table-top models are available, one of which is equipped with a shield that keeps extraneous light away from the object being illuminated. (Gamain Company, Dept. Sci63, 5th and Richmond Sts., Kansas City, Kan.)

**THERMAL TEST SET** for measurement of transistor and diode temperatures and other temperatures encountered in electronic equipment design is direct reading; ambient temperature compensation is provided. Accessories include small thermoelectric junctions, a thermometer probe, and evacuated glass thermocouples. Switches permit selection of any one of four outputs. (Rescon Electronics Corp., Dept. Sci62, 151 Bear Hill Rd., Waltham 54, Mass.)

**OZONE RECORDER**, model 725-3B, covers the operating range 0 to 100 parts per million by volume. The record is produced on a 6-in. strip chart directly in terms of ozone concentration. Measurement of ozone is based on an electrochemical reaction occurring at polarizing electrodes immersed in a potassium iodide reagent solution. Sampling rate is approximately 140 cm^3/min. Sensitivity is ±2 percent of full scale, and response time is 1 min for 75-percent response. Power requirement is 110 volt a-c (100 watts) and one 1.34-volt mercury cell. The instrument will operate unattended for approximately 3 days. (Mast Development Co., Dept. Sci68, Davenport, Iowa)

**HYDRAULIC JACK** is designed to apply and maintain the precise loads necessary for use with calibrating instruments, such as proving rings, in the calibration of mechanical-force measuring equipment. A large piston in the pump operates until the pressure reaches approximately 750 lb/in.², after which smaller piston becomes effective. Available capacities are 10,000, 30,000, 60,000, and 100,000 lb. (Morehouse Machine Co., Dept. Sci49, 1742 Sixth Ave., York, Pa.)

**CROSSBAR SCANNER** provides a 100-channel, six-pole-per-channel capacity which can be readily altered to exchange poles for increased channels. According to the manufacturer, life of the scanner is 20,000,000 operations per cross point. Scanning speeds range up to 50 closures per second per pole. A logic chassis provides commands of start, stop, stop, return to “off,” reset to zero, designate channel N as first, designate...
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channel $X$ as last, and scan continuously. Appropriately combined examples of these commands provide flexible programming. (James Cunningham, Son & Co., Dept. Sci16, Rochester 8, N.Y.)

- REMOTELY OPERATED MICROMETER consists of a micrometer head operating on the screw principle, an electronic control console, and connecting cable. Digital readout to $\pm 10^{-3}$ in. is displayed on the console. Measuring range is 1 in. The head can be remotely zeroed at any point within its measuring range. The micrometer head is said to exert negligible pressure on the work. (J. W. Dice, Dept. Sci7, Englewood, N.J.)

- LIQUID NITROGEN LEVEL CONTROLLER uses a temperature sensing element that sends a signal to a magnetic amplifier if the temperature is above a pre-set range. The amplifier will then cause a solenoid valve to open, admitting more liquid coolant to the baffle. When the required lower temperature is again reached, a second signal from the sensing element causes the solenoid valve to close and turn off the coolant supply. (Consolidated Vacuum Corp., Dept. Sci51, 1775 Mt. Read Blvd., Rochester 3, N.Y.)

- MONITORING OSCILLOSCOPE will simultaneously display up to eight waveforms on a vertically mounted 17-in. cathode-ray tube. Repetitive and single-sweep speeds of 5, 2.5, and 1.5 in./sec are provided. A 25-sec single sweep is also available. Sweep linearity is said to be better than 3 percent. Frequency response of the gating amplifiers is said to be from d-c to 1000 cy/sec; response is 3 db down at 1000 cy/sec. (Sanborn Co., Dept. Sci42, 175 Wyman St., Waltham 54, Mass.)

- MICROORGANISM MILL reduces bacteria, spores, molds, yeast, and pollen granules in hopper capacities ranging from 150 ml to 2 lit. Glass beads, approximately 120 $\mu$ in diameter, are incorporated to mix with the slurry, and a set of cutter knives assists in keeping the slurry in suspension. Final refining is performed by hard-faced 2-in. rotor and stator with gap adjustable between 0.0005 and 0.125 in. The equipment is completely enclosed to provide a controlled atmosphere. (Gifford-Wood Co., Dept. Sci33, Hudson, N.Y.)

- X-RAY DIFFRACTOMETER, manufactured by Hilger & Watts, can be used with x-ray equipment having a tube window not less than 10/$\pi$ in. above the table on which the diffractometer stands. The diffractometer has double-beam operation and six scanning speeds with continuous scanning. A powder sample holder, a block sample holder, and an integrating holder for heterogeneous
samples may be interchanged. Alternative detectors include Geiger-Mueller counter, scintillation counter, or semi-proportional counters. A two-circle version of the diffractometer is intended for work with single crystals. Its detector can be tilted up to 50 deg for measuring reflections above the equatorial plane. (Engis Equipment Co., Dept. Sci61, 431 S. Dearborn St., Chicago 5, Ill.)

- **ELECTROLYTIC PROCESS UNIT** for hard anodizing, plating, or electrochemical milling consists of a Lucite plating tank equipped with anode and cathode racks, cooling coil, and agitator; a 20-amp rectifier; and a ¼-ton refrigeration unit; the components are assembled into a desk-size unit 45 by 22 by 40 in. high. Optional equipment includes an immersion heater. Operation is on 120 volts a-c. (Allen Aircraft Products, Inc., Dept. Sci39, Ravenna, Ohio)

- **POLAROGRAPHIC ANALYZER** provides 23 current ranges from 0.5 to 300 μA full scale and ten polarizing ranges, from +1½ to -5 volts. Accuracy of the unit is said to be ±½ percent for current and voltage, repeatability ±½ percent. The recorder chart is 5 in. wide; chart speed is ½ in./min. Bridge drive is synchronous, with a rotation time of 10 min. Standardization is manual against an internal cell. (Nesco Instruments, Inc., Dept. Sci43, 638 W. 17 St., Costa Mesa, Calif.)

- **PHASE-SHIFTING TRANSDUCERS** are designed for use at specific frequencies to provide an output signal the phase of which is a function of shaft rotation. Maximum operating speed is 5000 rev/min. The transducers are complete phase-shifting systems, consisting of capacitor, bridge network, and balanced-line components in a single housing; components are capacitance coupled." (Nilsen Manufacturing Co., Dept. Sci48, 23 N. Church St., Addison, Ill.)

- **TWO-PEN, TWO-AXIS RECORDER** includes three servo-actuated drives for x, y, and z, isolated from ground. Recording speed is 1½ sec full scale on x-axis and ½ sec full scale on the y-axes. Full-range zero set and one full scale of zero suppression are provided on each axis. Ten input voltage ranges from 7.5 mv to 150 v are provided on the x-axis, and ten ranges from 0.5 mv to 100 v are provided on the y-axes. (F. L. Mosley Co., Dept. Sci15, 409 Fair Oaks Ave., Pasadena, Calif.)

- **CONDUCTIVITY INSTRUMENT** for measurement of flowing solutions covers a range of 5 x 10⁻⁴ to 4 mho with three continuous flow cells. Hold-up volumes are 0.02 to 0.05 ml. A discriminator
circuit reduces the influence of varying cell resistance. Connection can be made to a Z jack for impedance measurements. (LKB Instruments, Inc., Dept. Sci17, 4840 Rugby Ave., Washington 14, D.C.)

- **RUNNING-TIME METERS**, housed in multiples of ten in a 7-by-13-in. housing, are available for reading to the nearest hour and tenth, tenth and hundredth, or minute and tenth. Signal lights, one for each meter, indicate when time is being accumulated. The unit operates on 26 volts. (Gorrell & Gorrell, Dept. Sci30, Westwood, N.J.)

- **SEMICONDUCTOR STRAIN GAGE**, model MS 105-350, is said to be bondable to practically all surfaces. The gage, measuring 1 by 0.5 in., consists of a thin silicon element 5/6 in. long, 0.020 in. wide and 0.0005 in. thick, attached to an epoxy based carrier for application to test surfaces. Integral lead tabs are provided for connection to instrumentation systems. Resistance of the gage is 350 ohms; gage factor is approximately 130. Operating temperature range is -65° to +180° F. Maximum operating strain is greater than 3000 μin./in. (Micro Systems, Inc., Dept. Sci64, 2925 E. Foothill Blvd., Pasadena, Calif.)

- **STANDARD-GAIN ANTENNAS** consist of a series of 14 broad-band waveguide horns that cover the microwave bands from 0.95 to 90 kMc/sec. Horns are made of anodized aluminum or plated brass of light-weight construction. Each horn is furnished with data on gain versus frequency characteristics. (Scientific Atlanta, Inc., Dept. Sci55, 2162 Piedmont Rd., N.E., Atlanta 9, Ga.)

- **ELECTRONIC STETHOSCOPE**, manufactured by Primo Sound Research Ltd., Tokyo, Japan, is said to amplify up to 100 times more than the conventional stethoscope. High and low filters permit unwanted sounds to be eliminated. An output is provided to feed a tape recorder, oscilloscope, or other instrument. Power is supplied by 6 penlite cells. (Trans-Pacific Electronics, Inc., Dept. Sci18, 4216 Lankershim Blvd., North Hollywood, Calif.)

- **SLIDE FILING CABINET** accommodates 2340 slides, 2 by 2 in., or 78 slides, 4 by 3½ in., or combinations. Slides are said to be easily removed and replaced and can be viewed against a light-diffusing frame included in the cabinet. (Multiplex Display Fixtures Co., Dept. Sci23, 910 N. 10 St., St. Louis 1, Mo.)

- **RECORDER** of null-balance servo potentiometer type with chopper-stabilized system has a full-scale span of 1 mv. Maximum source resistance is 50 kohm. Pen speed is ½ sec for full-scale traverse, and accuracy is said to be ±0.5 percent of full scale. Voltage ranges up to 10 v can be selected from a front-panel attenuator. Chart width is 5 in.; chart speed can be changed. (Nesco Instruments Inc., Dept. Sci53, 638 W. 17 St., Costa Mesa, Calif.)

- **VACUUM GAGE** uses tritium to provide ionization. The isotope forms part of the inner metal surface of the instrument. The gage covers the range 0.001 to 100 mm-Hg. Ionization current is produced by a 45-volt battery and is measured by a microammeter. According to the manufacturer, there is no detectable external radiation; no special licensing is required. (Radiation Research Corp., Dept. Sci54, 1114 First Ave., New York 21, N.Y.)

- **COMPONENT DISPENSER** cuts and bends axial leads of electronic components into desired configuration automatically or semiautomatically. Cutting and bending dies are said to be adjustable in less than 1 min.; runs of 10 to 20 components are economical. Storage capacity is 48 in six hopper chutes. (Schmit Engineering Co., Dept. Sci56, 4062 Fabian Way, Palo Alto, Calif.)

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