

SCIENCE

13 February 1959

Volume 129, Number 3346

Editorial	A National Curriculum	359
Articles	Shape of the Nucleus: <i>L. Wilets</i>	361
	It varies widely, from spherical for doubly magic nuclei to ellipsoidal and sometimes pear shapes.	
	Basic Research—Description versus Definition: <i>C. V. Kidd</i>	368
	A definition of basic research in probability terms is useful, but statistics based thereon are not.	
	Carotene-Donor-Acceptor Complexes in Photosynthesis: <i>J. R. Platt</i>	372
	The predicted lowering of the excited states of carotenoids may offer a new photosynthetic pathway.	
News of Science	Congressional Atomic Energy Group Studies Waste Disposal Problem; other events ..	375
Book Reviews	<i>The American High School Today</i> , by <i>J. B. Conant</i> , and <i>An Essay on Quality in Public Education</i> , reviewed by <i>D. Wolfe</i> ; other reviews	382
Reports	Schedules of Irrelevant Signals and Maintenance of Monitoring Behavior: <i>R. Lawson</i>	387
	Biliary Excretion by the Rat of Bromsulfalein as a Conjugate of Glycine and Glutamic Acid: <i>B. Combes</i>	388
	An Artificial Reagent for the Diagnosis of Classical Hemophilia: <i>P. Didisheim</i>	389
	Fusion Contour for Intermittent Photic Stimuli of Alternating Duration: <i>C. R. Brown</i> and <i>D. M. Forsyth</i>	390
	Continuous Protein Synthesis in Nuclei, Shown by Radioautography with H ³ -Labeled Amino Acids: <i>J. Carneiro</i> and <i>C. P. Leblond</i>	391
	Effect of Temperature on Isolated Stretch-Receptor Organ of the Crayfish: <i>D. Burkhardt</i>	392
	Second Spectroscopically Abnormal Methemoglobin Associated with Hereditary Cyanosis: <i>P. S. Gerald</i> and <i>P. George</i>	393
	Field Observations on Effects of Alaska Earthquake of 10 July 1958: <i>D. Tocher</i> and <i>D. J. Miller</i>	394
Departments	Letters	357
	Collegiate Academy of Science; Forthcoming Events; Equipment	396

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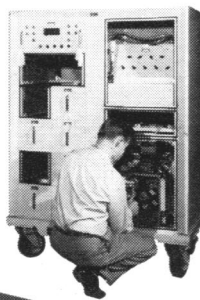
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By Louis Gordon, *Case Institute of Technology*; Murrell L. Salutsky, *W. R. Grace & Company*; and Hobart H. Willard, *University of Michigan*. Written by three men who have contributed most of the existing literature in the field, this book presents analytical methods for accomplishing precipitation from homogeneous solution so efficiently as to make re-precipitation unnecessary. The authors believe that experimentation with homogeneous solutions will eventually lead to the discovery of techniques providing easy multistage precipitation operations. More recent theories are examined for co-precipitation phenomena arising from research work on homogeneous solution. 1959. 187 pages. \$7.50.

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By William Taussig Scott, *Smith College*. Offering a full descriptive treatment of the subject, this new book uses vector, integrals, and derivatives to build up the reader's physical intuition on a logically sound basis. Simple mathematical proofs are used for the fundamental theorems needed to understand the electromagnetic field and Maxwell's equations. The author treats basic theory in a rigorous way, using the physicist's rather than the mathematician's concept of rigor. He introduces concepts one at a time and develops each with examples before the next is introduced. 1959. Approx. 600 pages. Prob. \$8.50.

BASIC PHYSICS OF ATOMS AND MOLECULES

By U. Fano and L. Fano, *both of the National Bureau of Standards*. This text offers a systematic treatment of quantum physics, yet does not require an extensive familiarity with its mathematical procedures. The authors develop ideas and establish laws through inductive analysis of experiments and only then formulate the mathematical symbols, equations, and calculations that represent them. As starting points of the inductive analysis, they have chosen a few experiments that illustrate most directly the characteristic properties of atomic systems. The book gives a qualitative picture of the properties of atoms. 1959. Approx. 421 pages. College Edition Prob. \$8.25.

THE CHEMISTRY OF INDUSTRIAL TOXICOLOGY Second Edition

By Hervey B. Elkins, *Department of Labor and Industries, Commonwealth of Massachusetts*. Retaining the first edition's extensive treatment of the subject and at the same time containing much specific information on industrial hazards and chemical procedures, this second edition includes a wealth of new material. It offers additional and revised information on all of the new or newly recognized hazards. Also included are discussions of new developments in the field of industrial toxicology in relation to standard permissible concentrations, and analytical methods, with particular emphasis on the analysis of body fluids. 1959. 452 pages. Prob. \$11.50.

GROWTH AND PERFECTION OF CRYSTALS

Edited by R. H. Doremus, B. W. Roberts, and David Turnbull; *all of General Electric Research Laboratory, Schenectady*. With 51 internationally known contributors. Contains up-to-date reports and discussion on crystal phenomena, polymer crystallization, and crystallization of simpler molecules, presented at an International Conference on Crystal Growth held at Cooperstown, New York, 1958. Organic, inorganic and polymeric substances are investigated from the standpoint of crystal perfection, formation and structure of whiskers, presence of dislocation and the mechanism of crystal growth from the melt, solution and vapor. Several reports emphasize the important differences and points of similarity between polymer and ordinary crystallization. 1958. 609 pages. \$12.50.

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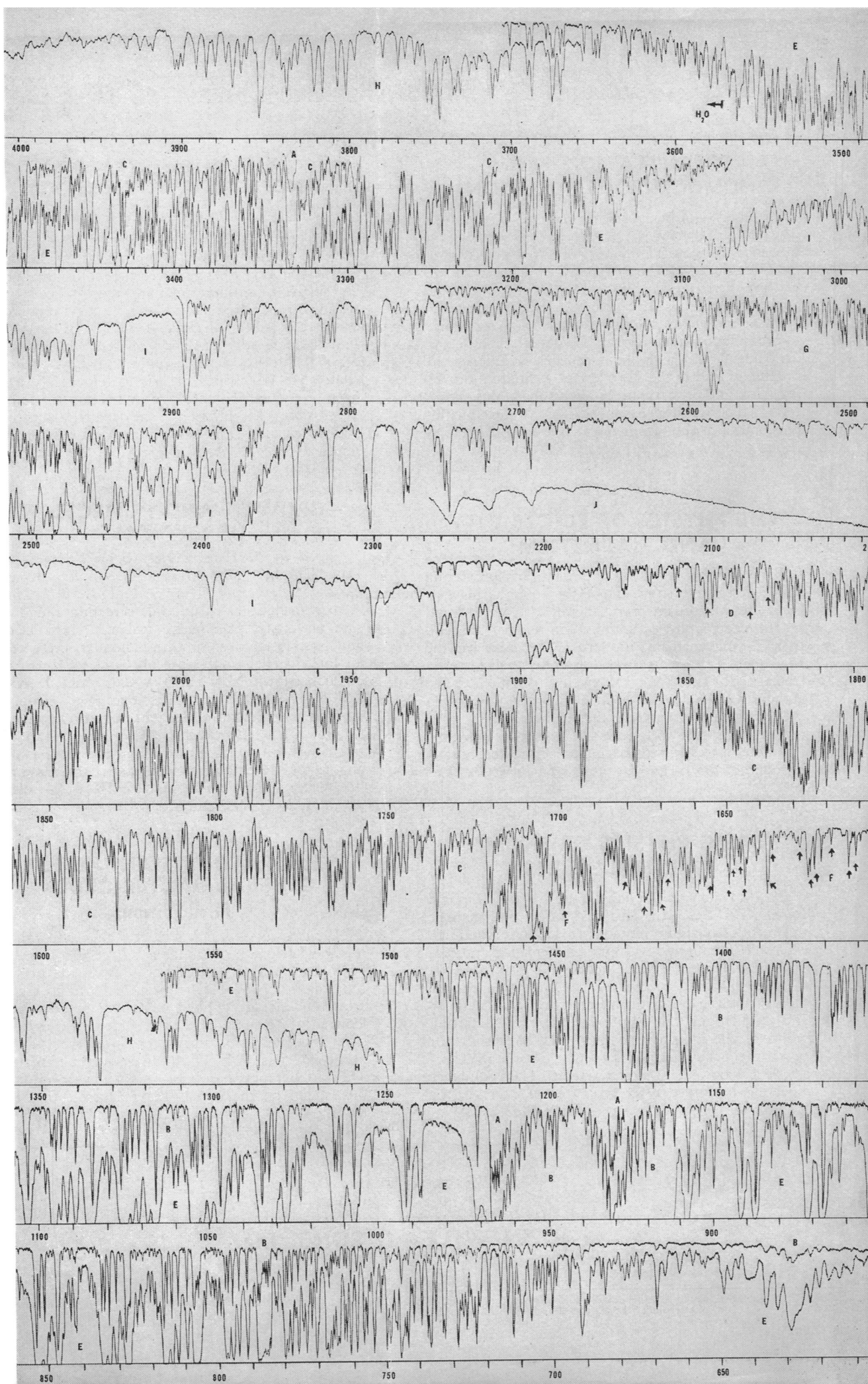
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Letters

Adenine and Plant Growth

The provocative article entitled "Chemical basis for adaptation in plants," by E. B. Kurtz, Jr., which appeared in the 7 November issue of *Science* [128, 1115 (1958)] carries a brief description of some work which I did some years ago at the California Institute of Technology. I believe that Kurtz has unintentionally attributed much greater significance to this work than I myself would, and I am eager to have the situation set straight before other individuals draw unduly optimistic conclusions from the brief description in the article.

Some years ago the late Margery Hand and I found that subapical sections of etiolated pea epicotyls grew increasingly well up to temperatures of about 30°C but suffered a sharp thermal inactivation of their growth mechanism at about 35°C. Knowing that certain strains of *Neurospora* were temperature-sensitive adenineless mutants, we decided to apply adenine to these sections in an attempt to reverse the thermal inactivation of growth. This was partially successful, and, in fact, in certain experiments the presence in the culture medium of as little as 5 μg of adenine per milliliter was the difference between life and death for these little etiolated pea sections in an overnight growth test.

In subsequent experiments, described in chapter 25 of *The Experimental Control of Plant Growth* by F. W. Went (Chronica Botanica, Waltham, Mass., 1957), we attempted to extend these findings to green growing pea plants in the phytotron at Pasadena. We did find that at the higher temperatures adenine consistently increased the area and fresh weight of the leaves but had no effect on survival, or on the stem length or total dry-weight deposition. Adenine did not cure the entire plant of the symptoms of high-temperature injury.

There does, of course, exist a distinct possibility, fortified by the data of Highkin, as cited by Kurtz, that in more properly conducted experiments the adenine effects would show up more dramatically. For instance, we gave the high-temperature treatment only during the dark period, on the supposition that pea growth followed the general pattern of nocturnal growth, as outlined by Went for the tomato. However, it is now clear that the thermal effects on growth of peas could be expected to be great during the light period. We were also unable, in our experiments, to grow the plants at a high enough temperature, since the phytotron at that time had no chambers at temperatures over 30°C.

Certainly the chemical cure of cli-

matic lesions is an attractive concept as well as a catchy phrase, and research in this area is very promising. One should also remember that adenine is only one of many substances which may prove to be of some aid in combating the thermal inactivation of growth. There are many temperature-sensitive genes in *Neurospora*, and indeed many probably exist in higher plants as well. One could reasonably expect that in particular plants specific amino acids, purines, pyrimidines, vitamins, and still other compounds would be effective in extending the temperature and perhaps geographic range of the plants.

ARTHUR W. GALSTON

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Yale University,
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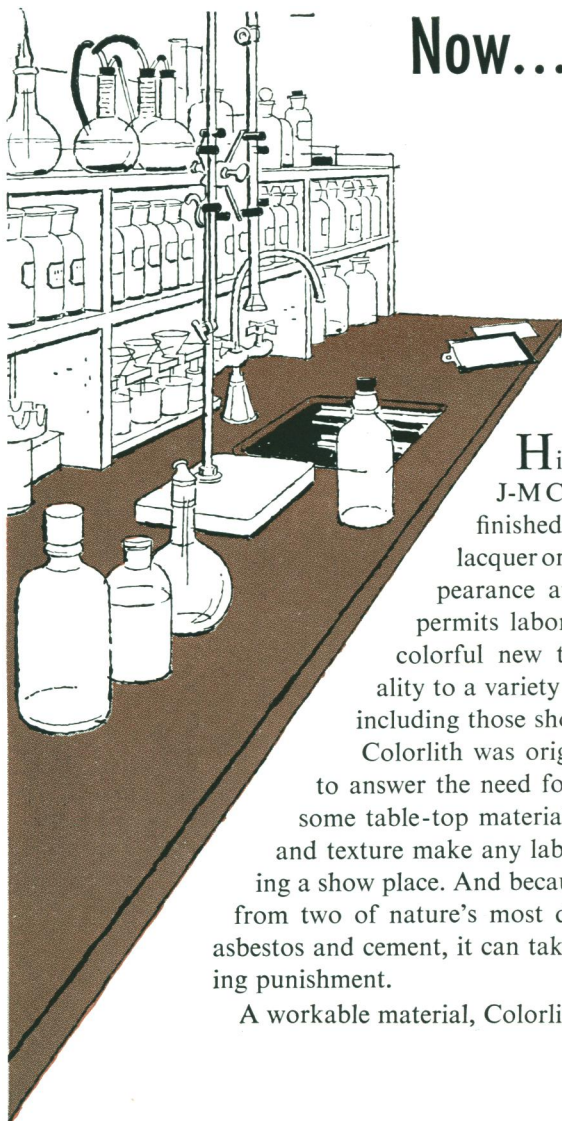
Teaching and Research

In their book *The Academic Market Place* (Basic Books, New York), two sociologists, Theodore Caplow and Reece McGee, report the results of a survey of 371 college professors and administrators. Only 4 percent believe that the test of a college teacher's ability lies in the way he teaches; about 33 percent consider the worth of a professor by the number of papers he publishes, and the remaining 63 percent give confusing answers. This survey evidently reflects a general opinion among many professors and administrators, especially in graduate schools, where the publication of papers is often considered of more importance than the clarification of ideas, which is the quintessence of teaching.

Many papers are of great value in scholarly investigations, but unfortunately some are only of use to obtain promotions for their authors. One cynic has observed that papers of this type are abstracted, quoted, and cited in a stream of other papers which in turn are abstracted, quoted, and cited. A faculty member whose chief interest is teaching often remains unknown and unsung except among a relatively limited group of students. During his academic life-time of perhaps 40 years he may reach 10,000 young people. But in a journal of international circulation a larger audience than this is obtained with the publication of only one significant paper—an audience composed of many readers of understanding and influence in the author's chosen field. This presents a temptation and one explanation of the widespread desire to become an author rather than a teacher.

To be sure, some are so gifted and energetic that they are able to publish brilliant papers, deliver inspiring lec-

(Continued on page 403)



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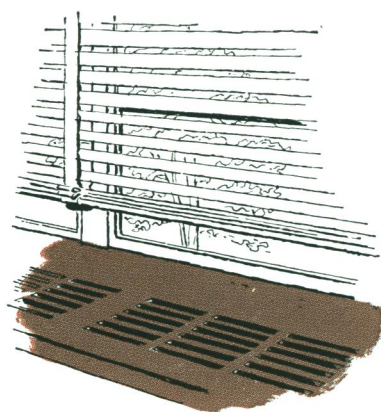
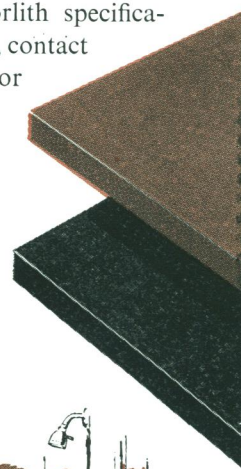
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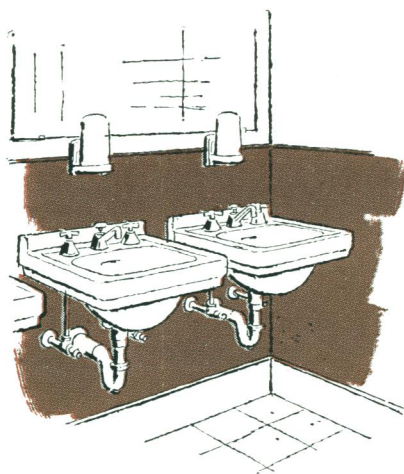
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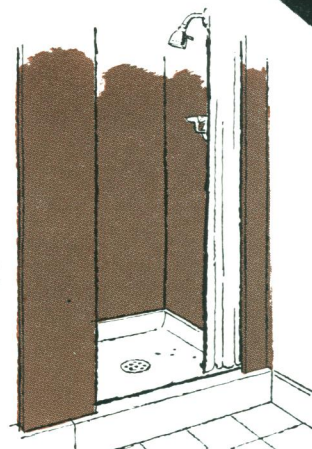
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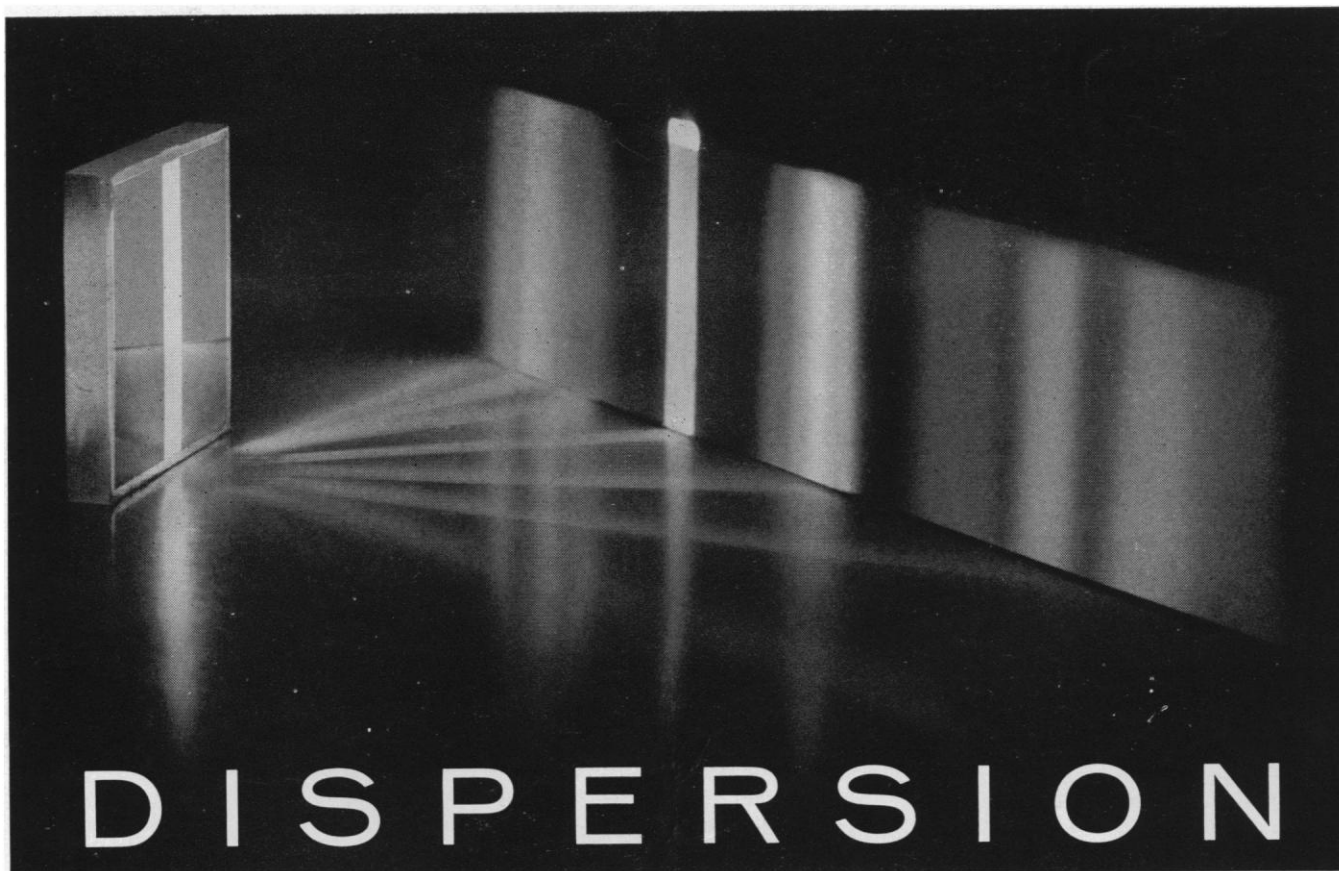


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Meetings

Collegiate Academy of Science

Developments during the past few years have aroused an interest in science and scientists which has become national in scope. Many people believe that our country fails to secure the full benefit of many of its gifted young people because these superior students do not obtain the education requisite to reach the level for which they are qualified.

Only about six out of ten of the top five percent of high school graduates ever earn college degrees. Why is this true? The decision to continue in college depends upon several factors, one of which is motivation. Talented students do not want to do just what everyone else is doing—they want an opportunity to do something creative. Are our college science students being properly motivated? Are there opportunities for a talented college student who is a potential scientist to act like one? One organization formed to stimulate superior undergraduate students to do independent scientific research is the Collegiate Academy of Science. The collegiate academy not only offers a stimulus to increase interest in science, but also provides for the undergraduate a medium through which he can publish his results. Through its an-

nual meeting, the organization also offers students an opportunity to prepare and read scientific papers.

The members of the Academy Conference Committee on Collegiate Academies of Science believe that such an organization is a distinct need. Students sometimes come from high schools that have active junior academies or science clubs to colleges that have no agency for encouraging and promoting their interest in science. The Collegiate Academy of Science stimulates continued interest in science and prevents much scientific talent from being lost. Therefore, the committee is of the opinion that the absence of collegiate academies in most of the state academies of science is a serious matter. It is hoped that the following information on the purposes, organization, and procedures of a collegiate academy will stimulate interest in this important group.

The purpose of a collegiate academy is to stimulate scholarship and research among the undergraduate students in the colleges and universities of the state who are interested in the sciences; to cooperate with the state academy of science and to aid in accomplishing the objectives of that organization; and to encourage and facilitate the exchange of information and ideas among students interested in the sciences.

Active members are usually members

of clubs affiliated with the collegiate academy. However, undergraduate students in colleges and universities of a state where there is no affiliated club may also become members. Any undergraduate science club or society of a college or university of a state may affiliate with the collegiate academy by sending an application to the executive committee (or to some designated person). Annual dues for individual members should be about \$1.00. These may be the only dues collected or there may also be dues for each affiliated club. In the past, some collegiate academy groups were supported by the state academy of science, but experience has proved that self-support, made possible by annual dues, is preferable.

The officers should include a president, a vice president, and a secretary. A treasurer and an editor could also be included. In some instances, a faculty member serves as treasurer. If there is a large number of affiliated clubs, it might be useful to divide the state into regions (as northeast, northwest, southeast, southwest) with a director for each region. The officers should be elected at the annual meeting from students who will be in college for one more year and should hold office for one year. The faculty sponsor (or counselor) may be appointed by the state academy of science, or he may be elected by the collegiate academy and be approved by the state academy. A collegiate academy committee composed of faculty members from several colleges may be appointed by the executive committee of the state academy of science to assist and advise the counselor. The executive committee should consist of the officers, the regional directors (if any), the faculty sponsor, and the collegiate committee (if any). The immediate past president might also be a member of the committee.

The annual meeting, which is the principal activity of the collegiate academy, should be held in conjunction with that of the state academy of science. Members should be encouraged to attend the general meetings of the senior academy. Regional meetings or other special meetings might be held at times and places determined by the executive committee. At the annual meeting, the most important part of the program is the presentation of scientific papers by student members. Interest may be stimulated by offering a small prize for the best paper. This may simply consist in having the prize-winning paper published in the senior academy journal. In some cases, certificates of merit are awarded to authors of outstanding papers, while in other instances cash prizes are given. In any case, the greatest benefit to the student comes from the experience of preparing and delivering a scientific paper.

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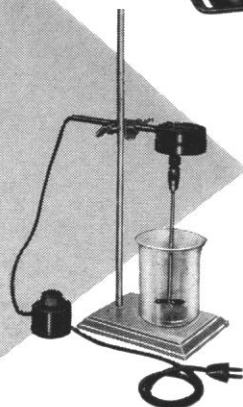
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nual meeting are as follows: (i) a discussion of opportunities in the different fields of science, followed by a question period (one or more members of the senior academy may indicate the types of positions available, salaries, opportunities for graduate study, and other related points); (ii) scientific exhibits (both commercial exhibits and exhibits prepared by students); (iii) scientific films; (iv) field trips to local places of scientific interest; (v) a collegiate academy banquet at which the president gives an address; (vi) a social hour or cafeteria lunch together to give students from the

various colleges an opportunity to become acquainted; and (vii) a business meeting for committee reports, election of officers, and so forth.

A collegiate academy publication is, next to the annual meeting, the best means for maintaining interest. This journal should be devoted largely to the publication of papers written by the collegiates. The publication may also include a column by the president, the faculty counselor, or both, in which they discuss items of interest to all of the collegiates. News from the various chapters may also be included.

The following are additional activities which have proved successful in some of the collegiate academies now in existence: (i) local meetings; (ii) regional meetings, similar to the annual meeting but on a smaller scale; (iii) meetings of the executive committee (including one such meeting held several weeks in advance of the annual convention and another at the time of the annual convention); (iv) circular letters sent occasionally to each chapter by the president or the faculty sponsor to help maintain interest; (v) requests by the faculty sponsor for senior academy members to serve as speakers for local chapter meetings during the year (several chapters in the same city or within a few miles of one another may hold occasional joint "academy night" programs at which a senior-academy member gives a talk); and (vi) field trips sponsored by the collegiate academy.

It is the hope of the committee members that this statement of ideas concerning the purpose of and suggested activities for a collegiate academy will prove helpful to many who may wish to develop such an organization.

SISTER JOSEPH MARIE ARMER
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San Antonio, Texas*

AMY LEVESCONTE
*Mary Hardin-Baylor College,
Belton, Texas*

T. W. JOHNSON, JR.
*Duke University,
Durham, North Carolina*

Forthcoming Events

March

11-14. American Cong. on Surveying and Mapping, Washington, D.C. (J. H. Wickham, Jr., 1959 ASP-ACSM Consecutive Meetings, 610 Montgomery St., Alexandria, Va.)

13-14. American Otological Soc., Hot Springs, Va. (L. R. Boies, University Hospital, Minneapolis 14, Minn.)

13-15. Alabama Acad. of Sciences, Auburn. (H. M. Kaylor, Dept. of Physics, Birmingham-Southern College, Birmingham, Ala.)

14-15. Southwestern Soc. of Nuclear Medicine, 4th annual, New Orleans, La. (S. B. Nadler, SSNM, 1520 Louisiana Ave., New Orleans 15, La.)

15-20. American College of Allergists, San Francisco, Calif. (M. C. Harris, 450 Sutter St., San Francisco.)

16-19. American Assoc. of Petroleum Geologists, Soc. of Economic Paleontologists and Mineralogists, 44th annual, Dallas, Tex. (W. A. Waldschmidt, AAPG, 311 Leggett Building, Midland, Tex.)

16-20. American Inst. of Chemical Engineers, Atlantic City, N.J. (F. J. Van Antwerpen, American Inst. of Chemical Engineers, 25 W. 45 St., New York 36.)

16-20. National Assoc. of Corrosion Engineers, 15th annual conf., Chicago,

28

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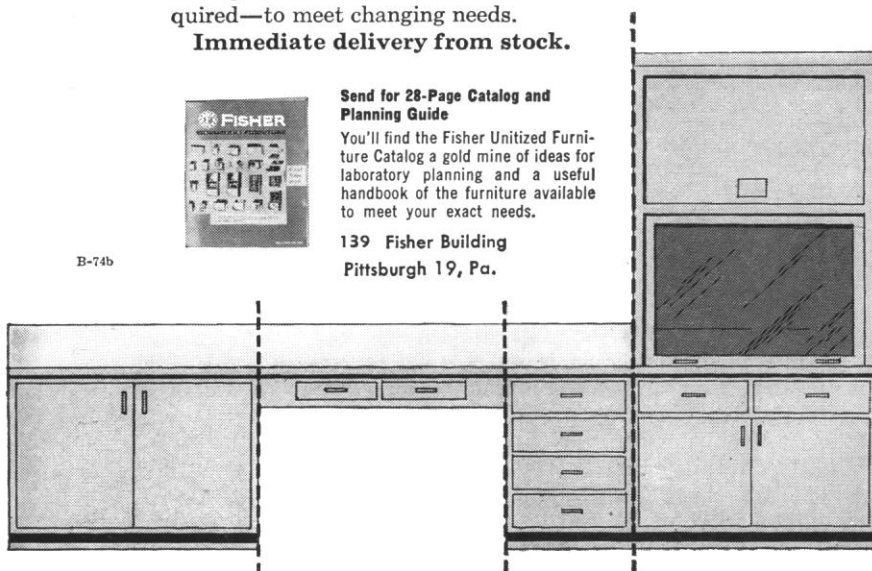


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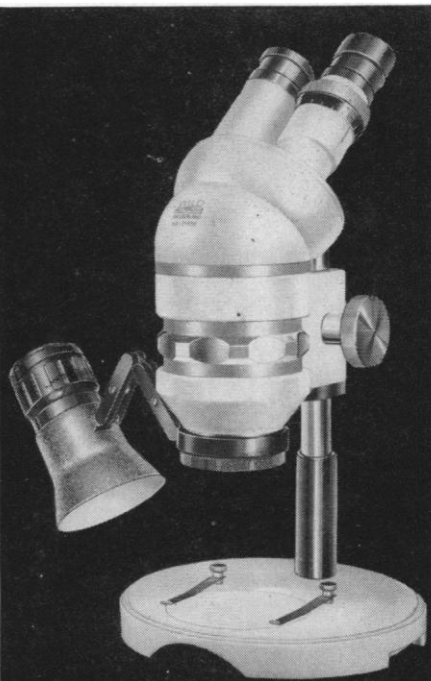
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16-20. Western Metal Exposition and Cong., 11th, Los Angeles, Calif. (R. T. Bayless, 7301 Euclid Ave., Cleveland 3, Ohio)

17-19. National Health Council, Chicago, Ill. (P. E. Ryan, 1790 Broadway, New York, 19.)

17-20. Organization of Research, 4th intern, symp., Milan, Italy. (I. Svergie, Produktivitetsnamnden, Linnegatan 87, Stockholm Ö, Sweden.)

18-25. International Social Science Council, 4th general assembly (by invitation), Paris, France. (C. Levi-Strauss, Secretary-General, International Social Science Council, 19, avenue Kleber, Paris.)

19-21. Society for Research in Child Development, NIH, Bethesda, Md. (Miss N. Bayley, Laboratory of Psychology, National Inst. of Mental Health, Bethesda 14, Md.)

19-22. International Assoc. for Dental Research, 37th general, San Francisco, Calif. (D. Y. Burrill, Northwestern Univ., 311 E. Chicago Ave., Chicago 11, Ill.)

20. New Jersey Acad. of Science, annual, New Brunswick. (H. L. Silverman, 361 Highland Ave., Newark 4, N.J.)

23-24. Theory of Fluid Flow through Porous Media, 2nd conf., Norman, Okla. (C. G. Dodd, School of Petroleum Engineering, Univ. of Oklahoma, Norman.)

23-26. Institute of Radio Engineers, natl. conv., New York, N.Y. (G. L. Haller, IRE, 1 E. 79 St., New York 21.)

24-27. American Meteorological Soc., general, Chicago, Ill. (K. C. Spengler, AMS, 3 Joy Street, Boston, Mass.)

27-28. Michigan Acad. of Sciences, East Lansing. (D. A. Rings, Univ. of Michigan, Dept. of Engineering, Ann Arbor.)

27-28. Pennsylvania Acad. of Sciences, Gettysburg. (K. Dearolf, Public Museum and Art Gallery, Reading, Pa.)

28. South Carolina Acad. of Sciences, Columbia. (H. W. Freeman, Dept. of Biology, Winthrop College, Rock Hill, S.C.)

29-3. Latin American Congress of Chemistry, 7th, Mexico D.F., Mexico. (R. I. Frisbie, Calle Ciprés No. 176, Zone 4 Mexico, D.F.)

30-31. Third Teratology Conf., Portland, Ore. (D. L. Gunberg, Dept. of Anatomy, Univ. of Oregon Medical School, Portland.)

30-1. American Orthopsychiatric As soc., San Francisco, Calif. (M. F. Lange, 1790 Broadway, New York 19.)

30-12. Bahamas Medical Conf., 7th, Nassau. (B. L. Frank, 1290 Pine Ave., W. Montreal, Canada.)

31-2. American Power Conf., 21st annual, Chicago, Ill. (N. S. Hibshman, AIEE, 33 W. 39 St., New York 18.)

31-2. Symposium on Millimeter Waves. 9th, New York, N.Y. (H. J. Carlin, Microwave Research Inst., 55 Johnson St. Brooklyn 1, N.Y.)

31-5. International Committee of Military Medicine and Pharmacy, 21st session. Paris, France. (Comité International de Médecine et de Pharmacie Militaires, Hôpital Militaire, 79, rue Saint Laurent. Liège, Belgium.)

(See issue of 16 January for comprehensive list)

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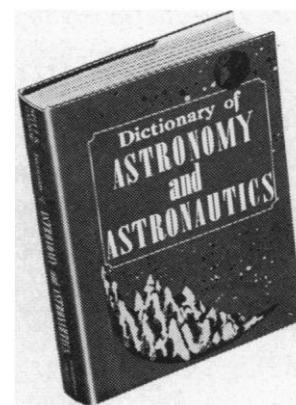
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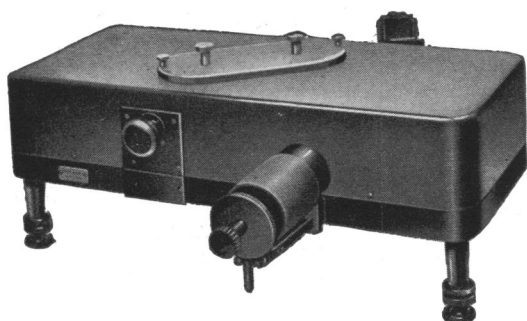
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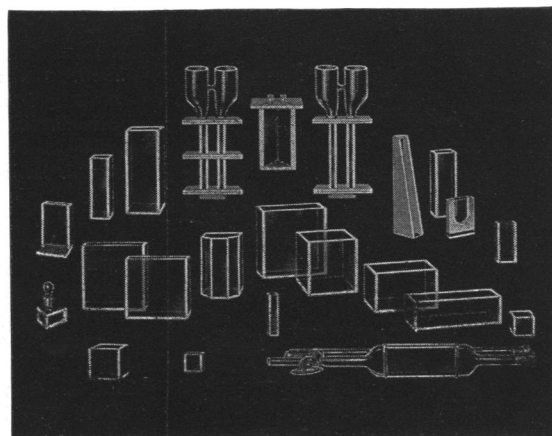
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■ **SURFACE-MOISTURE AND SURFACE-DENSITY GAGES** use a probe containing a fast-neutron source for moisture testing and a probe containing a gamma-ray source for density measurement. To perform tests, the probes are placed in contact with the surface, and the scatter of the radiation by the material is measured. Calibration curves relate scatter to moisture or density. Probes are used interchangeably with a portable scaler. The measurements sample a hemispherical volume of material of depth varying from approximately 3 to 8 in. (Nuclear-Chicago Corp., Dept. 624)

■ **CONTINUOUS-TAPE CARTRIDGE** is designed to accept up to 100 ft of paper or plastic punched tape for computer and similar applications. The cartridge does not require a driving belt or other external mechanism other than the tape punch or reader itself. (Brooks Research, Inc., Dept. 627)

■ **MCLEOD VACUUM GAGE** reads with high sensitivity to 10^{-6} mm-Hg and moderate sensitivity in the 10^{-7} mm-Hg decade. The entire range of the instrument is covered in one quadratic scale from 2×10^{-3} to 1×10^{-7} mm-Hg. Error is within ± 2.5 percent at the high-pressure end of the range. For safety, the mercury reservoir is set into a plaster of Paris base which in turn is encased in a metal container. (Consolidated Electrodynamics Corp., Dept. 629)

■ **FREQUENCY DETECTOR** produces an output of 0 to 500 μ a d-c in response to input frequencies of 0 to 500 cy/sec. Accuracy is better than ± 1 percent. Only static magnetic components are used, and the signal being measured is the sole source of power for the instrument. Plug-in design and hermetic sealing are used. Shock resistance is 100 g. (Acromag Incorporated, Dept. 631)

■ **PLANIMETER** is designed especially for integrating records produced on 4-in.-wide strip charts of the manufacturer's recorders. Either linear or square-root totalization is available by interchange of cams. The chart feeds at the rate of 0 to 12 chart-hr/min, set by a rheostat. A pointer is positioned over the record line by means of a manually operated knob. Totals accumulate on a five-digit manual-reset counter. Accuracy is ± 1 percent of full-scale count in a 24-hr period. (Fischer and Porter Co., Dept. 634)

■ **INFRARED SPECTROPHOTOMETER** combines a replica grating and a single prism in a double-beam double-monochromator optical system. The instrument records automatically on a horizontal strip chart with variable abscissa and ordinate expansion. Scanning speed is variable; provision is made for repetitive scanning. Switching from double-beam to single-beam operation is conveniently accomplished. An automatic wave-member drive scans continuously from 650 to 4000 cm^{-1} and preserves linear wave-member presentation. Resolution is 0.3 cm^{-1} over the entire range. Wave-member accuracy is 0.5 at 670 cm^{-1} and 5 at 4000 cm^{-1} . Photometric accuracy is 0.1 percent for any one reading, single beam. (Beckman Instruments, Inc., Dept. 619)

■ **TEMPERATURE INDICATORS** are disposable paper strips that respond to temperatures by exhibiting an irreversible color change. Strips are available for temperatures in the range 100° to 490°F. Response time is less than 1 sec; accuracy is ± 1 percent. (Paper Thermometer Co., Dept. 643)

■ **HYPERTHERMAL WIND TUNNEL** uses a plasma-jet head coupled to an evacuated chamber to produce thermal effects corresponding to those encountered at Mach 20. The plasma jet is formed by air heated in an arc chamber and produces a flow smoothed and shaped by a supersonic secondary nozzle, producing a test section diameter of 1 in. The equipment is capable of continuous operation. (Giannini Plasmadyne Corporation, Dept. 636)

■ **MOTION ANALYZER** provides digital output of coordinates of position on a film frame. A projected image is viewed on a screen 11 in. in diameter. After positioning the crosshairs and angle screen, the operator presses a button that causes the data to be read into a card-punch or printer. Readout is in increments of 0.001 in. at the magnified image, and angle is measured to 0.1 deg. (Vanguard Instrument Corp., Dept. 646)

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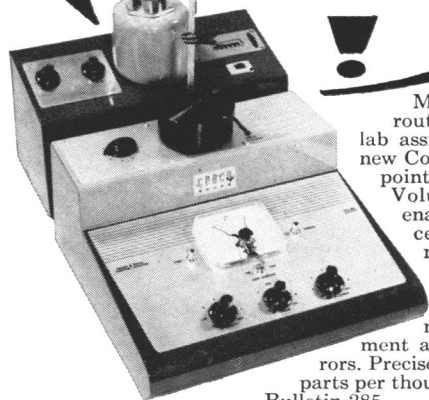
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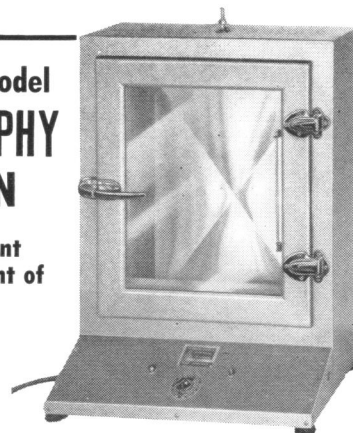
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