SCIENCE

19 August 1960

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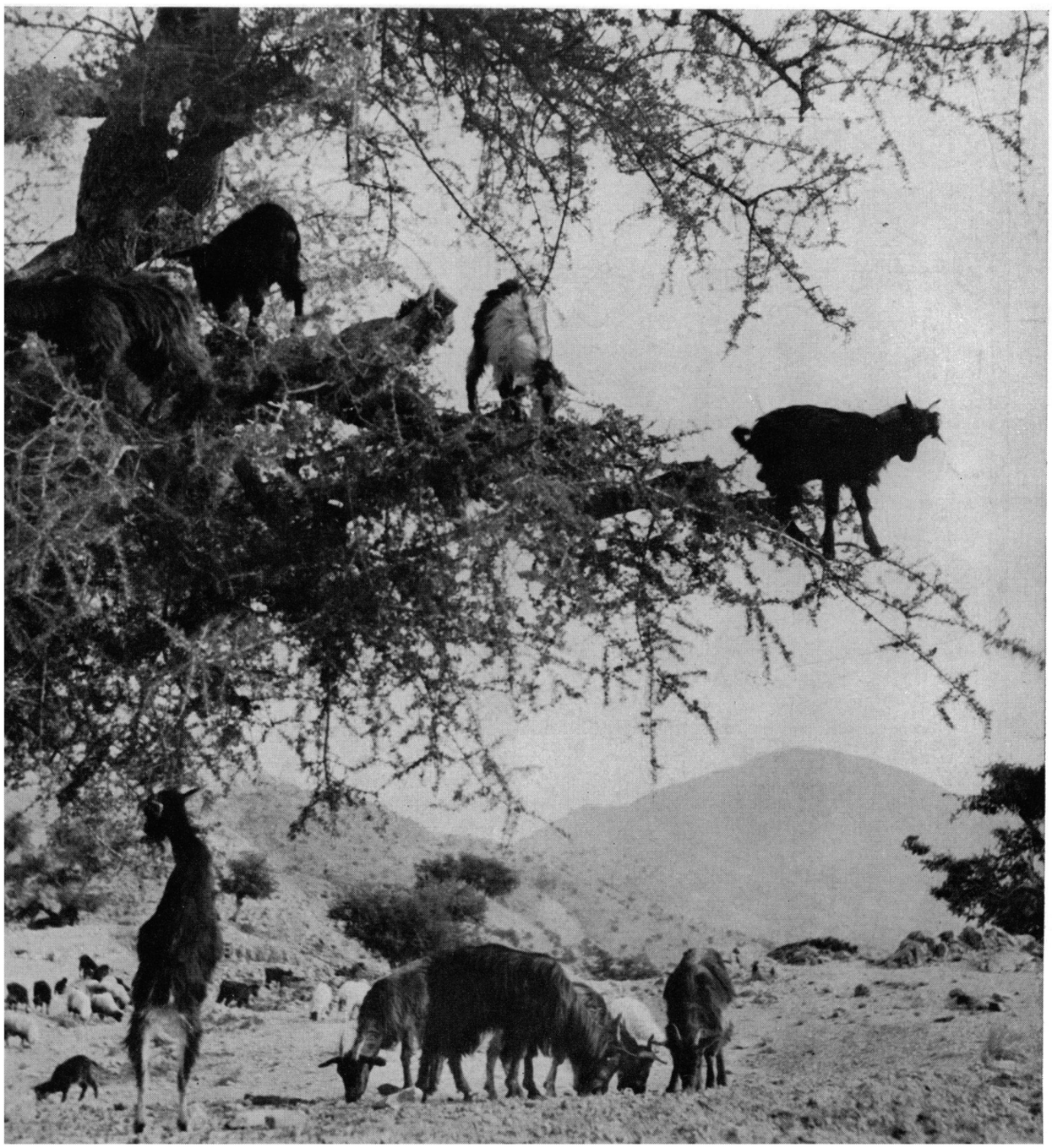
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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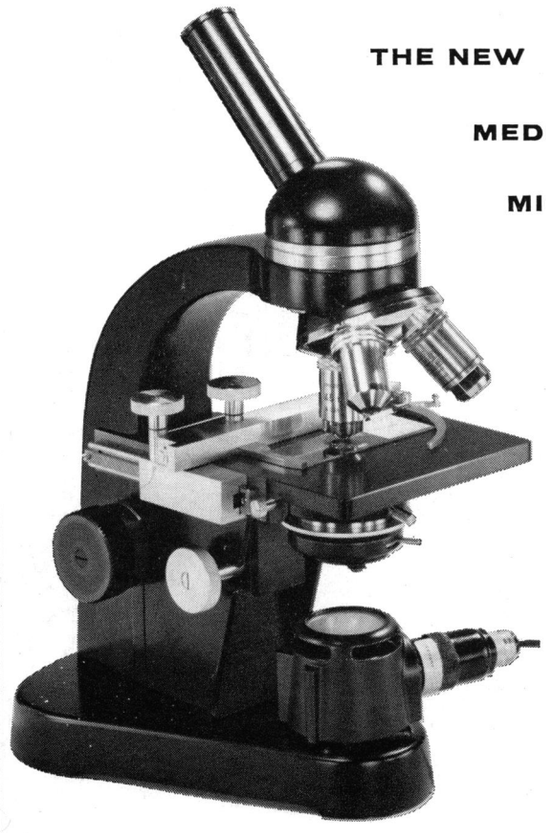

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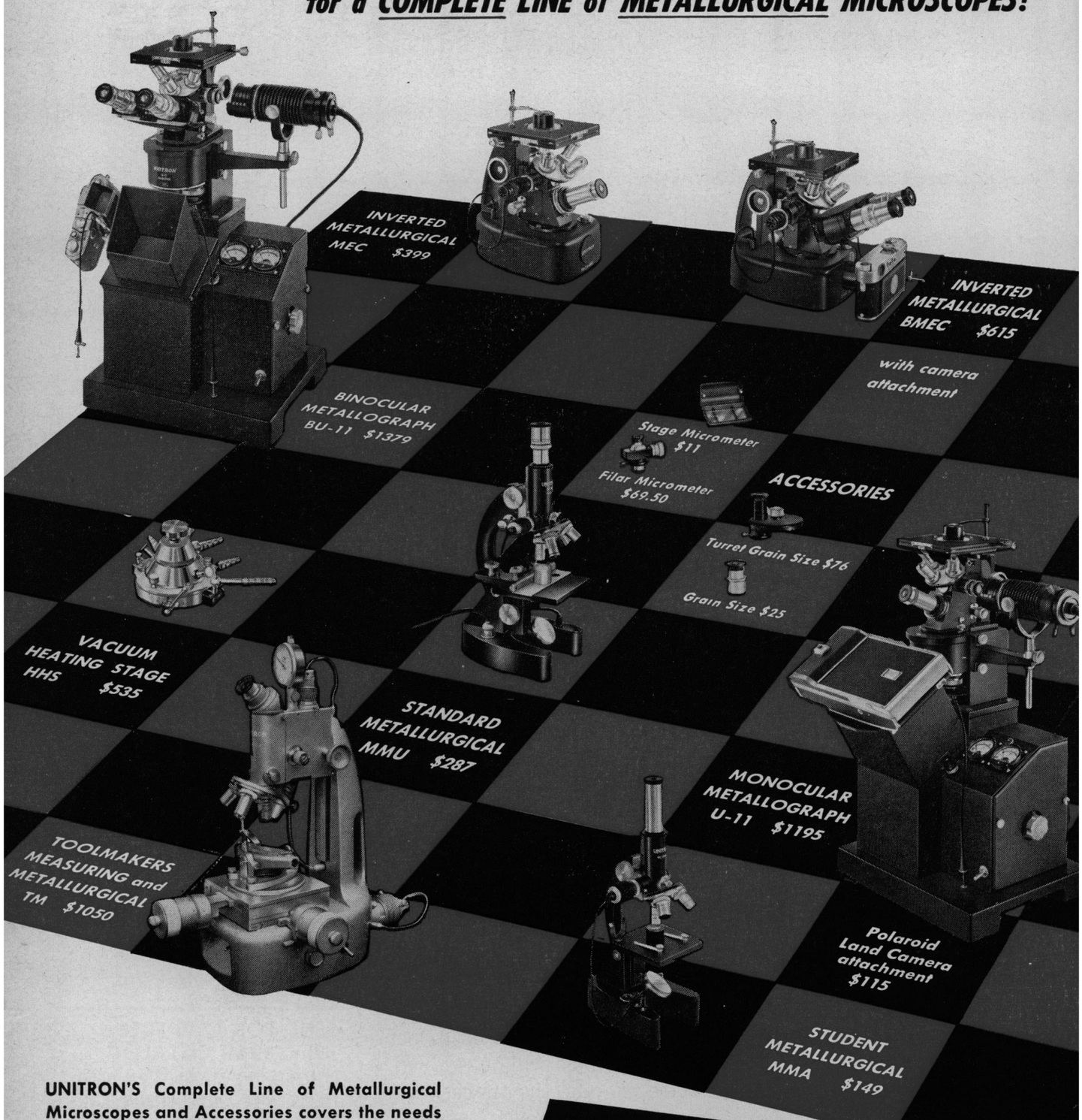

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19 August 1960, Volume 132, Number 3425

SCIENCE

Cover

Goats browsing in the crown of an argan tree (*Argania spinosa*). See page 441. [Moroccan Tourist Office]

19 August 1960, Volume 132, Number 3425 **SCIENCE**

SCIENCE, which is now combined with **THE** SCIENTIFIC MONTHLY, is published each Friday by the American Association for the Advancement of Science at National Publishing Company, Washington, D.C. The joint journal is published in the SCIENCE format. SCIENCE is indexed in the *Reader's Guide to Periodical Literature.*

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Real Professionalism

College faculty members, like teachers in public elementary and secondary schools, should be required to hold state licenses. They should also be required to study the theory and practice of education in the course of their professional preparation. Such are two of the recommendations offered in "New Horizons," a preliminary report by the National Commission on Teacher Education and Professional Standards. The commission is a unit of the National Education Association, whose nearly three quarters of a million members are drawn principally from the ranks of school teachers and school administrators. The commission plans to publish a detailed analysis of its recommendations early next year, but in the meantime it invites discussion of its efforts to achieve what the preliminary report calls "real professionalism."

The recommendations for enlarging the licensing responsibilities of the states actually go beyond the inclusion of just college faculty members. Details are not fully spelled out, but apparently just about everyone in education but the students is to be included. At the school level, the report recommends the licensing of teachers in private and parochial schools as well as teachers in tax-supported schools. Attention is paid not only to those in front of blackboards, but also to those behind the scenes. The report recommends the licensing of all of what it calls "leadership personnel"—school principals, supervisors, and guidance officers. At the college level things get more hazy, but we may assume that in the interests of consistency, not only are all instructors in private and state institutions to be licensed, but also admissions officers, deans, and presidents. No specific mention is made of instructors at graduate faculties or professional schools, or of *their* leadership personnel, and perhaps the commission draws the line at this point.

The logic behind the push for equal treatment for all educational personnel is the belief that the whole of education will benefit if the parts are united. The idea of closing educational ranks is not new, and some of the present efforts in which those experienced in education at the school level are cooperating with those experienced at the university level are producing valuable results. The National Association of State Directors of Teacher Education and Certification, in conjunction with the AAAS, is conducting one such program. Its work even bears on the licensing of teachers, although instead of seeking to extend the present system, the program is seeking to correct present operating deficiencies. This cooperative effort is attempting to establish a national system of reciprocity among the states, based on national standards that include a specified minimum of subject-matter preparation, so that a teacher licensed in one state can move to another state and still be permitted to teach in public schools.

Although bringing together school and college educators may produce good results, it will not necessarily do so. The commission's interest in educational unity is commendable, but the report itself is an illustration of one kind of difficulty the search for unity presents: the groups brought together may hope for different things from such cooperation. Licenses might well change the composition of college faculties, but our guess is that the academic community as it is now composed would not regard the change as an improvement. At one point, the report offers a list of criteria in terms of which prospective teachers should be selected, and heading the list is "emotional maturity." If candidates for academic careers, not to mention present faculty members, are to face with equanimity the consequences of a closing of educational ranks as conceived in the report—assuming such circumstances ever could come to pass—then emotional maturity is something they will surely need in abundance.—J.T.

25–30. North American Assoc. of Alcoholism Programs, 11th annual conf., Banff, Alberta, Canada. (J. G. Strachan, Alcoholism Foundation of Alberta, 9910 103rd St., Edmonton, Alberta, Canada)

26–28. American Inst. of Electrical Engineers, petroleum industry conf., Oklahoma City, Okla. (R. S. Gardner, AIEE, 33 W. 39 St., New York 18)

26–28. American Soc. of Mechanical Engineers, petroleum mechanical engineering conf., New Orleans, La. (A. B. Conlin, Jr., ASME, 29 W. 39 St., New York 18)

26–28. Electronic Industries Assoc., natl. conv., Pittsburgh, Pa. (V. M. Graham, EIA, 11 W. 42 St., New York 36)

26–28. Standards Engineers Soc., annual, Pittsburgh, Pa. (J. A. Caffiaux, SES, 11 W. 42 St., New York 36)

26–30. Instrument Soc. of America, New York, N.Y. (W. H. Kushnick, ISA, 313 Sixth Ave., Pittsburgh 22, Pa.)

26–1. Natural Rubber Research Conf., Kuala Lumpur, Malaya. (Rubber Research Inst. of Malaya, P.O. Box 150, Kuala Lumpur)

27–29. Relative Humidity and Paper Test Methods, symp., Grand Rapids, Mich. (Technical Assoc. of the Pulp and Paper Industry, 155 E. 44 St., New York 17)

27–30. American Rocket Soc.—Power Systems Conf., Santa Monica, Calif. (R. L. Hohl, ARS, 500 Fifth Ave., New York 36)

27–30. American Roentgen Ray Soc., Atlantic City, N.J. (N. Jones, 20 N. Wacker Dr., Chicago 6, Ill.)

27–30. Association of Iron and Steel Engineers, annual conv., Cleveland, Ohio. (T. J. Ess, AISE, 1010 Empire Bldg., Pittsburgh, 22, Pa.)

27–30. Medical Photography, 1st intern. cong., Cologne, Germany. (Deutsche Gesellschaft für Photographie e.V., Köln, Nurmarkt 49, Germany)

28–1. International Soc. of Audiology, 5th cong., Bonn., Germany. (Prof. Langenbeck, Baumschuallee 29, Bonn)

28–5. Pan-Pacific Surgical Assoc., 8th cong., Honolulu, Hawaii. (F. J. Pinkerton, 230 Alexander Young Bldg., Honolulu 13)

30–1. American College of Radiology, Atlantic City, N.J. (F. H. Squire, Presbyterian-St. Luke's Hospital, 1753 W. Congress St., Chicago 12, Ill.)

30–1. American Medical Writer's Assoc., Chicago, Ill. (H. Swanberg, 510 Maine St., Quincy, Ill.)

October

1–2. Enzymes in the Manufacture, Storage and Distribution of Food, symp., London, England. (Society of Chemical Industry, 14 Belgrave Sq., London, S.W. 1)

2–5. American Inst. of Mining, Metallurgical and Petroleum Engineers, fall, Denver, Colo. (E. O. Kirkendall, AIME, 29 W. 39 St., New York 18)

2–6. Water Pollution Control Federation, 33rd annual, Philadelphia, Pa. (WPCF, 4435 Wisconsin Ave., Washington 16)

2–7. American Soc. of Plastic and Reconstructive Surgery, Los Angeles, Calif. (T. R. Broadbent, 508 E. S. Temple, Salt Lake City, Utah)

3–5. Applied Spectroscopy, 7th symp., Ottawa, Canada. (C. R. Langdon, Alu-

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Program Content

1. The two-session AAAS General Symposium, "Moving Frontiers of Science V"—Speakers: Edward Anders, H. W. Magoun, George Wald, and H. H. Goldstine; Thomas Park, presiding.
2. The "Challenge to Science" evening with Sir Charles P. Snow, Theodore M. Hesburgh, and W. O. Baker; Warren Weaver, presiding.
3. On "AAAS Day," the three broad, interdisciplinary symposia—Plasma: Fourth State of Matter; Life under Extreme Conditions; and Urban Renewal and Development, arranged by AAAS Sections jointly.
4. The Special Sessions: AAAS Presidential Address and Reception; Joint Address of Sigma Xi and Phi Beta Kappa by Polykarp Kusch; the Tau Beta Pi Address; National Geographic Society Illustrated Lecture; and the first George Sarton Memorial Address by René Dubos.
5. The programs of all 18 AAAS Sections (specialized symposia and contributed papers).
6. The programs of the national meetings of the American Astronomical Society, American Nature Study Society, American Society of Zoologists, History of Science Society, National Association of Biology Teachers, Scientific Research Society of America, Sigma Delta Epsilon, Society for General Systems Research, Society for the Study of Evolution, Society for the History of Technology, Society of Systematic Zoology, and the Society of the Sigma Xi.
7. The multi-sessioned special programs of the American Association of Clinical Chemists, American Astronautical Society, American Geophysical Union, American Physiological Society, American Psychiatric Association, American Society of Criminology, Association of American Geographers, Ecological Society of America, Mycological Society of America, National Science Teachers Association, New York Academy of Sciences—and still others, a total of some 90 participating organizations.
8. The four-session program of the Conference on Scientific Communication: The Sciences in Communist China, cosponsored by the AAAS, NSF, and ten societies.
9. The sessions of the Academy Conference, the Conference on Scientific Manpower, and the conference of the American Council on Women in Science.
10. The sessions of the AAAS Cooperative Committee on the Teaching of Science and Mathematics, and of the AAAS Committee on Science in the Promotion of Human Welfare.
11. Titles of the latest foreign and domestic scientific films to be shown in the AAAS Science Theatre.
12. Exhibitors in the 1960 Annual Exposition of Science and Industry—103 booths—and descriptions of their exhibits.

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minium Co. of Canada, Ltd., Arvida, Quebec, Canada)

3–5. Communications, 6th natl. symp., Utica, N.Y. (B. H. Baldridge, Communications Symp., Light Military Electronics Dept., General Electric Co., Utica)

3–5. Nuclear Science, 7th annual, Gatlinburg, Tenn. (H. E. Banta, Oak Ridge National Lab., P.O. Box X, Oak Ridge, Tenn.)

3–7. Atomic Energy, 5th intern. seminar, Wiesbaden, Germany. (Mr. Trebst, Diplom-Volkswirt, Generalsekretär, Internationale Studiengesellschaft e.V., Theodorenstr. 6-8, Wiesbaden)

4–6. Radio Interference Reduction, 6th conf., Chicago, Ill. (S. I. Cohn, Armour Research Foundation, 10 W. 35 St., Chicago)

4–7. Recent Developments in Research Methods and Instrumentation, 10th annual symp., Bethesda, Md. (J. B. Davis, Natl. Institutes of Health, Bethesda 14)

5–7. Accelerator Conf., Amsterdam, Netherlands. [J. S. Woldringh, High Voltage Engineering (Europa) N.V., Amersfoort, Netherlands]

5–8. American Acad. of Cerebral Palsy, 14th annual, Pittsburgh, Pa. (J. D. Russ, 1520 Louisiana Ave., New Orleans 15, La.)

6–10. American Assoc. of Textile Chemists and Colorists, natl. conf., Philadelphia, Pa. (G. P. Paine, AATCC, P.O. Box 28, Lowell, Mass.)

6–8. Clay Conf., 9th natl., Lafayette, Ind. (J. L. White, Agronomy Dept., Purdue Univ., Lafayette)

6–8. Society of Experimental Test Pilots, annual symp., Los Angeles, Calif. (SETP, 44919 N. Cedar Ave., Lancaster, Calif.)

8. Helminthological Soc. of Washington, 50th, College Park, Md. (Publicity Committee, HSW, Animal Disease and Parasite Research Branch, ARS, U.S. Department of Agriculture, Beltsville, Md.)

9–13. Electrochemical Soc., Houston, Tex. (Electrochemical Soc., 216 W. 102 St., New York 25)

9–14. American Acad. of Ophthalmology and Otolaryngology, Chicago, Ill. (W. L. Benedict, 15 Second St., S.W., Rochester, Minn.)

10–12. Human Factors and Bioastronautics, conf., Dayton, Ohio. (J. J. Harford, American Rocket Soc., 500 Fifth Ave., New York 36)

10–12. Industrial Health, cong., Charlotte, N.C. (Council on Occupational Health, AMA, 535 N. Dearborn St., Chicago 10, Ill.)

10–12. National Electronics, conf., Chicago, Ill. (T. F. Jones, Jr., School of EE, Purdue Univ., Lafayette, Ind.)

10–12. Operations Research Soc. of America, natl., Detroit, Mich. (H. J. Miser, ORSA, Research Triangle Inst., 505 W. Chapel Hill St., Durham, N.C.)

10–14. American College of Surgeons, San Francisco, Calif. (W. E. Adams, 40 E. Erie St., Chicago 11, Ill.)

10–14. American Soc. of Civil Engineers, annual conv., Boston, Mass. (W. H. Wisely, ASCE, 33 W. 39 St., New York 18)

11–13. Applications of Nuclear Energy, conf., Karlsruhe, Germany. (Ing. Küpfmüller, Deutsches Atomforum, Friedrichstr. 2 III, Düsseldorf, Germany)

11–13. Synthetic Rubber, 2nd intern. symp., London, England. (Rubber and Plastics Age, Gaywood House, Great Peter St., London, S.W. 1)

11–14. Audio Engineering Soc., 12th annual conv., New York, N.Y. (H. F. Olson, RCA Laboratories, Princeton, N.J.)

11–14. Inelastic Scattering of Neutrons in Solids and Liquids, symp., Vienna, Austria. (International Atomic Energy Agency, 11 Kärntner Ring, Vienna 1)

12–13. American Vacuum Soc., 7th natl. symp., Cleveland, Ohio. (AVS, Box 1281, Boston 9, Mass.)

12–14. Astronautics, 3rd annual symp., Los Angeles, Calif. (Maj. G. Colchagoff, Propulsion Div., Air Force Office of Scientific Research, Washington 25)

12–14. Gaseous Electronics, 13th annual conf., Monterey, Calif. (N. L. Oleson, U.S. Naval Postgraduate School, Monterey)

12–14. Nuclear Reactor Chemistry, conf., Gatlinburg, Tenn. (C. D. Susano, Oak Ridge National Lab., P.O. Box Y, Oak Ridge, Tenn.)

13–15. Academy of Psychosomatic Medicine, Philadelphia, Pa. (B. B. Moss, 55 E. Washington, Chicago 2, Ill.)

13–14. Engineering Writing and Speech, natl. symp., Chicago, Ill. (M. Whitmer, Admiral Corp., 3800 W. Cortland St., Chicago 47)

13–15. Optical Soc. of America, Boston, Mass. (M. E. Warga, OSA, 1155 16 St., N.W., Washington 6)

14–15. Society of Photographic Scientists and Engineers, symp., Washington, D.C. (F. M. Brown, Photomechanisms, Inc., Box 67, Huntington Station, N.Y.)

15. American Soc. of Safety Engineers, annual, Chicago, Ill. (A. C. Blackman, ASSE, 5 N. Wabash Ave., Chicago 2)

16. American College of Dentists, Los Angeles, Calif. (O. W. Brandhorst, 4236 Lindell Blvd., St. Louis 8, Mo.)

16–22. High-Speed Photography, 5th intern. cong., Washington, D.C. (V. H. Allen, Soc. of Motion Picture and Television Engineers, 55 W. 42 St., New York 36)

16–22. Society of Motion Picture and Television Engineers, semi-annual conv., Washington, D.C. (C. S. Stodter, SMPTE, 55 W. 42 St., New York 36)

17–19. Adaptive Control Systems, symp., New York, N.Y. (H. Levenstein, W. L. Maxon Corp., 260 W. 34 St., New York)

17–19. American Oil Chemists' Soc., fall, New York, N.Y. (W. C. Ault, U.S. Department of Agriculture, Philadelphia 18, Pa.)

17–20. American Acad. of Pediatrics, Chicago, Ill. (E. H. Christopherson, 1801 Hinman Ave., Evanston, Ill.)

17–20. American Dental Assoc., Los Angeles, Calif. (H. Hillenbrand, ADA, 222 E. Superior St., Chicago, Ill.)

17–21. Neutron Pile Research, symp., Vienna, Austria. (International Atomic Energy Agency, 11 Kärntner Ring, Vienna 1)

17–22. Diagnosis and Treatment of Acute Radiation Injury, Geneva, Switzerland. (World Health Organization, Palais de Nations, Geneva)

17–26. Plastics Processing, intern. cong. and exhibition, Amsterdam and Utrecht, Netherlands. (Secretariat, c/o N. V. 't Raedthuys, Tesselschadestraat 5, Amsterdam-W, Netherlands)

18. Oak Ridge Inst. of Nuclear Studies, Oak Ridge, Tenn. (W. G. Pollard, Box 117, Oak Ridge)

18–21. American Dietetic Assoc., 43rd annual, Cleveland, Ohio. (M. L. Ross, Simmons College, The Fenway, Boston 15, Mass.)

19–20. American Geophysical Union, Moscow, Idaho. (A. N. Sayre, U.S. Geological Survey, Washington 25, D.C.)

19–21. Design of Experiments, 6th conf. (by invitation only), Aberdeen Proving Ground, Md. (F. G. Dressel, Office of Ordnance Research, Box CM, Duke Station, Durham, N.C.)

19–21. Space Navigation, symp., Columbus, Ohio. (Institute of Radio Engineers, 1 E. 79 St., New York 21)

19–26. Measuring Techniques and Automation, 2nd intern. cong., Düsseldorf, Germany. (Nordwestdeutsche Ausstellungs-Gesellschaft, Ehrenhof 4, Düsseldorf)

20–21. Hypervelocity, symp., Denver, Colo. (R. R. Dexter, IAS, 2 E. 64 St., New York 21)

20–22. Acoustical Soc. of America, San Francisco, Calif. (V. Salmon, Stanford Research Inst., Menlo Park, Calif.)

20–22. Institute of Management Sciences, 7th intern., New York, N.Y. (J. Townsend, IMS, 30 E. 42 St., New York 17)

21–22. Research Approaches to Psychiatric Problems, symp., Galesburg, Ill. (T. T. Tourlentes, Galesburg State Research Hospital, Galesburg)

21–25. American Heart Assoc., annual, St. Louis, Mo. (AHA, 44 E. 23 St., New York 10)

22. Midwest Solid State Conf., 8th annual, Lincoln, Neb. (J. W. Weymouth, Physics Dept., Univ. of Nebraska, Lincoln)

23–26. American College of Gastroenterology, Philadelphia, Pa. (D. Weiss, 33 W. 60 St., New York 23)

24–27. Hot Atom Effects, symp., Prague, Czechoslovakia. (International Atomic Energy Agency, 11 Kärntner Ring, Vienna 1, Austria)

25–27. American Standards Assoc., natl. conf., New York, N.Y. (G. F. Hussey, Jr., AST, 70 E. 45 St., New York 17)

26–28. Society for Industrial Microbiology, Conf. on Antimicrobial Agents, Washington, D.C. (SIM, 2000 P St., NW, Washington 6)

27–28. Cellulose Conf., 3rd, Syracuse, N.Y. (Cellulose Research Inst., State Univ. College of Forestry, Syracuse Univ., Syracuse 10)

27–28. Electron Devices, 6th annual, Washington, D.C. (J. Hornbeck, Bell Telephone Labs., Murray Hill, N.J.)

New Products

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Neither Science *nor the writer assumes responsibility for the accuracy of the information. All inquiries concerning items listed should be addressed to the manufacturer. Include the department number in your inquiry.*

■ RADAR RECORDING CAMERA TESTER applies four basic test phases by means of a series of mechanical-optical displays. A simulated sweep display is photographed to check shutter operation and film shift; a graduated circular scale and rotating light spot measure shutter timing with accuracy said to be ±0.001 sec; a display of stationary lights stimulates an optical bombsight to test camera accuracy; a series of electrical pulses checks camera controls. (Mast Development Co., Dept. Sci696, 2212 E. 12 St., Davenport, Iowa)

■ AIR VELOCITY METER measures air speeds from 0.05 ft/sec to 30 ft/sec and temperature in two ranges, 30° to 110° and 50° to 250°F. The instrument's probe consists of a small metal cylinder in which are mounted two resistance wires, one cold and the other heated, arranged in a Wheatstone bridge circuit. The instrument is powered by a flashlight battery. (Gelman Instrument Co., Dept. Sci697, 106 N. Main St., Chelsea, Mich.)

■ HIGH-SPEED OSCILLOSCOPE is a traveling-wave deflection type said to be able to detect and display phenomena lasting 20×10^{-9} sec. Band-width is stated by the manufacturer to be d-c to 2000 Mcy/sec, usable to 3000 Mcy/sec, and risetime 0.2 mμsec. Display area may be varied from 1 by 1.5 cm at 20 kv, to approximately three times this size at 3 kv. Two metal ribbon helices with characteristic impedance of 100 ohms comprise the upper and lower vertical deflection structure. The signal is applied directly to the input of one or both helices by means of a transmission line. No signal amplification is used. Two models provide 55 mv and 5.5 mv per trace width with corresponding spot size 0.002 and 0.0015 in., respectively. (Edgerton, Germeshausen, and Greer, Inc., Dept. Sci699, 160 Brookline Ave., Boston, Mass.)

■ PULSE GENERATOR produces positive and negative output pulses with widths of 2 μsec to 20 μsec and amplitude adjustable between 0 and 15 volts into a 50-ohm load. The unit contains a variable repetition rate generator, 1 to 1000 cy/sec, and two fixed-frequency sources of 1 and 10 cy/sec. Accuracy of the fixed frequencies is that of the power line frequency. (Alto Scientific Co., Dept. Sci720, 858 Commercial St., Palo Alto, Calif.)

■ VIBRATION TRANSMISSIBILITY RECORDER records transmissability directly as a function of frequency. The recorder simultaneously accepts two synchronous signals in the frequency range 10 to 5000 cy/sec, measures their frequency, computes the average amplitude values and plots the ratio versus frequency. The instrument can be used to record input voltage, time integral of input voltage, or time derivative of input voltage. Four scale ranges are provided. Sensitivity is continuously adjustable. (Lord Manufacturing Co., Dept. Sci700, Erie, Pa.)

■ DELAY CABLE features impedance of 1500 ohms and delay of 0.08 μsec/ft. Ratios of delay-to-rise time of 100 to 1 are said to be achievable. Cable diameter is 0.4 in. It can be supplied in 100-ft lengths or in calibrated sections. (Columbia Technical Corp., Dept. Sci701, 61–02 31st Avenue, Woodside 77, N.Y.)

■ DIGITAL READOUT DEVICE forms illuminated characters by light passing through holes in opaque coating on two plates. Motion of the plates relative to one another aligns various prearranged holes and permits light from a rear-mounted lamp to pass through, forming the characters. Movement of the plates is controlled by four electromagnets, allowing choice of 16 characters. Display response time is said to be less than 50 msec. (Genesys Corp., Dept. Sci704, 10131 National Blvd., Los Angeles 34, Calif.)

■ TUNNEL-DIODE CURVE TRACER is used with a laboratory oscilloscope to present current-voltage characteristics of tunnel diodes throughout the negative resistance region. A four-position switch adjusts scale factor of the transformation from current to voltage for vertical deflection and simultaneously changes shunt impedance on the diode. Accuracy of conversion is $\pm$ 1 percent. (Trak Electronics Co., Dept. Sci705, Wilton, Conn.)

■ AUTOMATIC CHROMATOGRAM SCANNER is designed specifically for scanning tritium and other weak beta emitting isotopes. The scanner uses windowless 4π detection. The instrument is completely transistorized. (Vanguard Instrument Co., Dept. Sci706, P.O. Box 244, La Grange, Ill.)

■ 400-CHANNEL ANALYZER may be used as a pulse-height analyzer or as a time analyzer. It incorporates memory subgrouping, external programing, add-subtract logic, coded decimal storage, spectrum transfer circuit, coincidence-anticoincidence circuits, auto-print, auto-record, and automatic background subtraction. The completely transistorized basic unit includes a crystal-controlled timer and a 5-in. cathode-ray tube display. Capacity is 10^5 counts per channel and linearity is said to be 0.5 percent of full scale. (Radiation Instrument Development Laboratory, Dept. Sci707, 5737 S. Halsted St., Chicago 21, Ill.)

■ HIGH-SPEED PRINTER is comprised of a tape reader, control unit, and printer. Printing rate is 600 lines/min; each line may contain as many as 130 characters selected from a font of 51 characters. The printer is compatible with computers of other manufacture. The computer itself is not tied up while printing is being done. (Remington-Rand Division of Sperry Rand Corp., Dept. Sci708, 315 Park Avenue South, New York 10, N.Y.)

■ INCREMENTAL VOLTMETER incorporates an offset voltage source variable from 0 to 509 volts with accuracy said to be $\pm$ 0.1 percent. D-C voltage from 10 mv to 500 volts is said to be measured with an error of indication not exceeding $\pm$ 0.2 percent. The instrument is battery operated and measures 13 by 7½ by 6⅛ in. (Belleville-Hexem Corp., Dept. Sci709, 638 University Ave., Los Gatos, Calif.)

■ RESISTORS of wire-wound type for high-frequency applications are available in resistance values from 10 ohms to 1 megohm. Capacitance of the 1-megohm resistor is 0.5 pf. Tolerances as close as $\pm$ 0.1 percent and matched values or ratios to within $\pm$ 0.01 percent can be supplied. Temperature coefficient is 15 parts in 10^{-6}/°C. (Ultronix, Inc., Dept. Sci710, San Mateo, Calif.)

■ DISPLACEMENT MEASURING SYSTEM utilizing the manufacturer's T-42 ionization transducer permits noncontact static and dynamic measurements in the milli- to microinch region with an output to $\pm$ 30 volts. Sensitivity is 0.2 volt for 1 percent change of capacitance and stability is to $\pm$ 0.01 percent. (Decker Corp., Dept. Sci712, 45 Monument Rd., Bala-Cynwyd, Pa.)

■ LIGHT-BAND VERNIER is designed to be used with a monochromatic light and an optical flat for interferometric estimation of flatness. In operation, a cross hair is aligned on one band, a vernier slide is moved to align the cross hair to the next band, and the band width is read out on a vernier scale. Models are available for use with optical flats up to 6 in. in diameter. (Acme Scientific Co., Dept. Sci722, 1450 Randolph St., Chicago 7, Ill.)

JOSHUA STERN

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Letters

American Astronautical Society

I recently read in the news section of *Science* [**131**, 1658 (1960)] the item on the new International Academy of Astronautics, established by a Guggenheim grant. In the interest of accurate reporting and courtesy, I should like to point out a glaring error in this note. In describing the International Astronautical Federation, the item states, "The United States member, the American Rocket Society . . . ," implying a single member from the U.S. This is incorrect. There are, in fact, three American societies in the federation. In addition to the American Rocket Society, the American Astronautical Society has been a member since 1954, and in 1959 the Aerospace Medical Association was elected to membership.

The American Astronautical Society is the only American society devoted solely to the advancement of astronautics and was the first in this country to offer comprehensive technical programs in all fields of astronautics. It has also been very active in IAF activities through committee work in the past years.

GEORGE R. ARTHUR
American Astronautical Society, New York, New York

Federal and State Support of Science

The issue of *Science* for 22 April contained several unusually interesting and significant articles. Particularly noteworthy was the excerpt from *Notes on the Reviewing of Learned Books* [**131**, 1182 (1960)] by the late George Sarton. The procedures outlined by Sarton are such as to deserve consideration by all of us.

Paradoxically, the very next issue of *Science* [**131**, 1307 (1960)] contained a book review, by Harold L. Enarson, of *Science and State Government* by F. N. Cleaveland, which conforms to very few of Sarton's recommendations. Even more unfortunate, the review contains implied statements of fact that are undocumented, which are simply the opinions of the reviewer.

Particularly regrettable are the following passages in the review:

1) "The notion of shared responsibility between the federal government and the states in scientific activity is extravagant nonsense. The big money comes from Washington; the pattern and pace of government research effort is determined in Washington, whether in research on agriculture or on mental illness."

2) "Scientific activity in the states reflects the traditional obsessions, notably the heavy emphasis on agricultural research and on applied research generally. Perhaps the states may be 'chasing the wrong rabbits'. . . . The talents of researchers at the state university are rarely mobilized to bear on the . . . problems of a state."

I hold no brief for Cleaveland's book. It undoubtedly has shortcomings that deserve critical comment. But the above quotations from the Enarson review are the kind of sweeping generalizations, highly charged with personal opinion unsupported by evidence, that one does not expect to find in a journal read by scientists. It is because the implications and conclusions of the reviewer are so patently contrary to fact that I feel impelled to call the matter to your attention.

On page 41 of the book, the federal contributions to state expenditures for scientific activities are listed. Among the six states surveyed, the federal support ranged from 10.3 to 33.6 percent. The average was 26.9 percent.

On pages 55–56, the text shows that federal contributions to agricultural research represented only from 7 to 22 percent of the total invested in five of the states. For one state (New Mexico) it was 31 percent. Thus, in fiscal 1954, the period covered by the survey reported in the book, the big money did not come from Washington in respect to total state expenditures for scientific activities, or in respect to state expenditures for agricultural research.

It is true the survey shows that 26 to 52 percent of the total state expenditures for scientific activities were in support of agricultural research. On the other hand, it is explained on pages 24–25, "the relative importance of research in agriculture is exaggerated by the limited amount the state expended on operating programs in agriculture—less than on the operations of the other three fields of governmental activity (that use research extensively)."

The operating programs in agriculture tend to be largely the responsibility of the federal government. The U.S. Department of Agriculture conducts research, but the funds available to the department for research in agriculture and forestry are a small fraction of the billions being used annually in the department's operating programs, such as crop acreage control and price supports.

Nor is this the only, or even the most important, factor explaining the apparently more generous support of research in agricultural experiment stations than in most of the other branches or col-

leges of the state institutions to which the experiment stations are attached. The difference is due in large part to the accounting procedures in most land-grant institutions. Except in agriculture, the practice is to assume that a professor uses 10 to 50 percent of his time in research as a necessary part of his responsibility as a teacher, particularly where graduate instruction is provided. A modest estimate is that at least a quarter of the expenditures charged to instruction in the nonagricultural segments of most land-grant institutions are essentially the same as those charged to research in the experiment station.

Those who have had experience on the senior staff of representative state agricultural experiment stations know that the administrators of these stations will not take dictation from officials of the U.S. Department of Agriculture. Neither will they permit such officials to impose their will on members of the station staff.

It is true that the Congress now provides grants to the states for support of agricultural research, about 29 million dollars annually. But every dollar of this money is spent on research selected and conducted by the experiment stations in essentially the same manner as research financed by state funds provided the stations. No federal official can choose the studies on which the federal grant funds are spent, or pressure the research workers in the procedures used in doing the research.

A very considerable portion of the research conducted by the U.S. Department of Agriculture with its own funds is carried out in cooperation with the state agricultural experiment stations. This voluntary cooperation specifically recognizes, in written memoranda covering each cooperative study, the rights and independence of the cooperating parties. The fruitfulness of these joint activities of federal and state agencies engaged in agricultural research are constantly admired by agricultural research workers from abroad, who often express the wish that they could find ways of accomplishing the same teamwork in their home countries.

I would not want to imply that there never is any controversy between state and federal administrators of research. Neither group is made up of yes men. But to make the bold statement, as does the reviewer of the Cleaveland book, that "the pattern and pace of government research . . . [in the states] is determined in Washington, whether in research on agriculture or on mental illness", is to make a statement that simply is not true.

Finally, the reviewer would have been well advised to have been more discriminating when he wrote "scientific activity in the states reflects the traditional obsessions, notably the heavy emphasis on agricultural research and on applied research generally. Perhaps the states may be 'chasing the wrong rabbits.' "

I happen to be associated with the agricultural experiment station in one of the six states covered in the survey reported in the Cleaveland book. Our station has on its staff at the present time 11 members of the National Academy of Sciences. Two years ago the Nobel Prize for science was awarded to a member of our staff for work he did in this station. The professor who trained this Nobel laureate, and who was also awarded the Nobel Prize in science, was likewise trained in this station. The belittling references to research workers in agricultural experiment stations hardly deserve consideration by persons familiar with the contributions to basic science and technology which have come out of the state agricultural experiment stations. My hope is that those who do not have this information will not be misled by the Enarson review, which makes such sweeping derogatory statements.

NOBLE CLARK
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I welcome the opportunity to respond to Noble Clark, who finds my review of *Science and State Government* inadequate and unfair—inadequate by the test of Sarton, unfair by the test of his one example, the agricultural experiment station.

I reread Sarton with trepidation. Had Sarton forbidden the expression of opinion, decreed that all general comments be elaborated, documented, footnoted? If so, I—and for that matter most other reviewers—am guilty as charged. But of course Sarton said no such thing; indeed he urges that reviewers not be fearful of expressing judgment, realizing always that a judgment is "at best, imperfect and precarious."

But, enough of Sarton. His excellent advice is not in issue. Let's move to the points of difference between Clark and myself. He quarrels with my convictions that (i) "shared responsibility" between the federal government and the states in scientific activity is more myth than fact; (ii) "The big money comes from Washington; the pattern and pace of government research effort is determined in Washington . . ."; and (iii) "Scientific activity in the states reflects the traditional obsessions, notably the heavy emphasis on agricultural research and on applied research generally"—with the result that "the talents of researchers at the state university are