SCIENCE

12 November 1965

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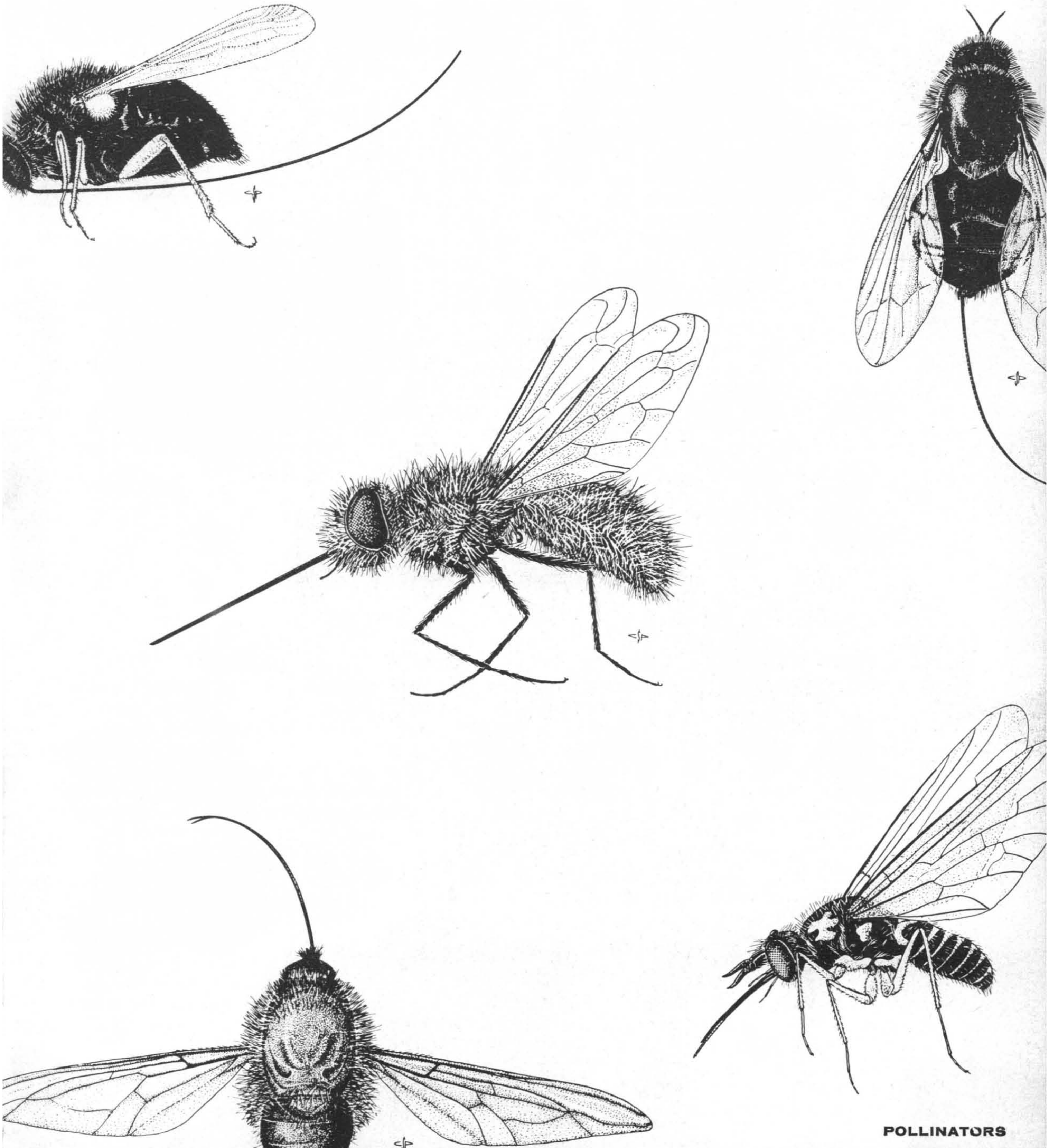
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



POLLINATORS

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SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Western American long-tongued flies. These medium-sized flies hover before flowers, stand still in the air, or dart swiftly from spot to spot. Their mouth parts, often very long and slender, are well adapted for securing nectar and pollen. See review of *Flower Pollination in the Phlox Family*, page 872. [Charles Papp, Riverside, California]

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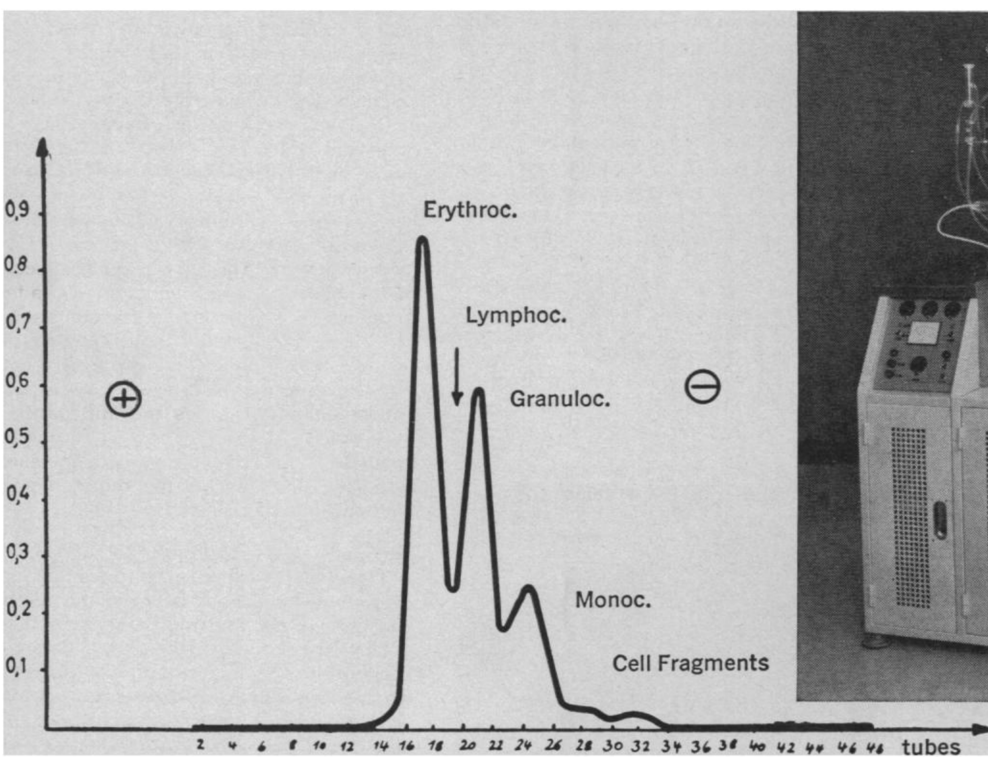

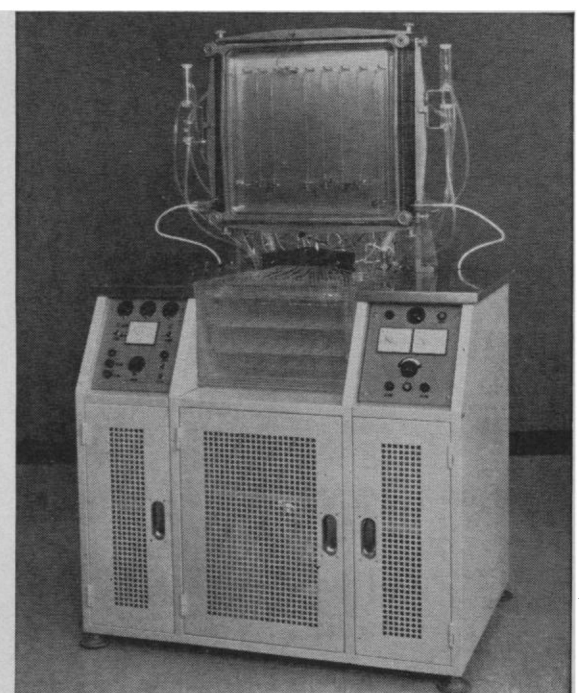

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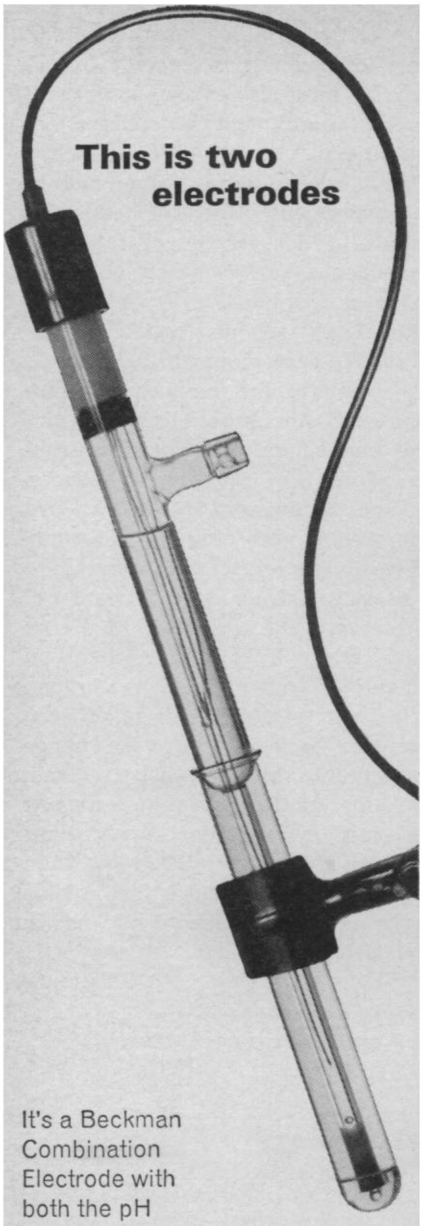

will speak to you about a greater art, that of cybernetics, which saves, not only souls, but also bodies and possessions, from the greatest dangers." In the *Statesman* (299b-c), the Stranger suggests to the Younger Socrates that a law be passed to prevent people from "persuading other younger men to essay cybernetics and medicine not according to the laws." And in the *Cleitophon* (408b), we find "the cybernetics of men, as you, Socrates, often call politics."

Many centuries later, the French mathematician and physicist André Marie Ampère (1775–1836) employed the word "cybernetics" in his great *Essai sur la philosophie des sciences* (1834). By this, of course, Ampère meant only the "means of governing" people, not Wiener's important new science.

PANOS D. BARDIS
Social Science, *University of Toledo, Toledo, Ohio*

Readers, Foreign and Domestic

In his letter about the readership of *Contributions to Geology* ("Who reads the journals?", 17 Sept., p. 1325), R. B. Parker reports that "apparently our foreign readers outnumber the domestic ones by a very large factor," basing that conclusion on the fact that "we see references [to the journal] in many foreign journals, and reprint requests from abroad are numerous." He goes on to say, "The fact that many such requests and references are from respected and influential scientists reflects discredit upon American scientists," and he suggests that American scientists should "spend more time reading and less writing."

One is tempted to ask: How many journals has Parker canvassed in a search for references to *Contributions to Geology*? And in comparing reprint requests, has he taken into account that many American scientists mail reprints routinely to their colleagues without waiting for requests?

Having been associated with a perhaps similar publication (*Tulane Studies in Zoology*), I am aware of the tremendous response by institutions in foreign countries to an offer to exchange journals. American journals do not, to my knowledge, make a practice of exchanging. Thus an equally plausible explanation of the large number of foreign reprint requests may be that the distribution system favors them.

I object to the castigation of the reading habits of "American scientists" (presumably of all disciplines) on the basis of an unsubstantiated opinion concerning the reading of one journal primarily of interest to scientists in a single discipline. There may be some truth to Parker's accusation, but it is not supported by the statements in his letter.

ROBERT K. CHIPMAN
University of Vermont, Burlington

Parker concludes from the active foreign readership of *Contributions to Geology* that "our colleagues in Europe and Asia are apparently vastly better informed than we are." I should like to suggest that exactly the reverse may be indicated. For most scientists serious reading represents an acknowledgement of the need to be informed. Those scientists who are geographically farthest removed from personal contacts with fellow specialists are quite likely to feel the greatest need for journals. It does not necessarily follow that they will become the best informed. Personal observation leads me to the opposite conclusion—that the man who is best informed relies least upon the journals for enlightenment. He is served by a number of other communication channels—personal contacts, conferences, correspondence, preprints —most of them considerably faster and more efficient. There may even be a continuous negative correlation across the spectrum of informedness, leading finally to the nervous neophyte who reads all the journals for fear of missing something.

VANCE WEAVER
2465 Broadway, New York 10025

. . . I should like to ask Parker why he felt it necessary to start yet another journal. I submit that American scientists do read worth-while journals, but that most of them, like me, have more and more difficulty reading through more and more publications to separate the mass of trivia from the relatively few significant contributions to scientific knowledge.

JOHN HELWIG, JR.
Cardiovascular Section, Germantown Hospital, Philadelphia, Pennsylvania 19144

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SCIENCE

Continuing Education

One consequence of the large-scale activity in research is the obsolescence, at least to some degree, of all scientists, engineers, and physicians. The problem is not new, but the rate of obsolescence has increased, while the traditional means of meeting it have become less effective. Earlier, the dedicated individual could keep his knowledge current by devoting a reasonable fraction of his time to books, journals, and meetings. Today, there are so many meetings and so many publications that such an individual can attend to only a small part of what may be relevant to his interests. We cannot be sure that we are producing knowledge at a highly accelerated rate, but we can be certain that the number of pages devoted to presenting it has increased drastically. Commercial publishers find that technical books on almost any subject sell well enough to justify publication. The publish-or-perish doctrine has had its inevitable consequence. New journals proliferate while old ones get thicker. There is increasingly wide distribution of unevaluated material. The bottleneck in utilization of knowledge is not a shortage of publications or inadequate information retrieval. The lag occurs in the step between the pile of books on a man's desk and the transfer of that information to his mind. We need to devote much more energy to determining what is significant and then conveying it in concentrated form.

One method of instilling the essence of new knowledge is through short, intensive refresher courses. In this area the continuing education program of the American Medical Association is outstanding. About 1500 courses are offered annually by some 400 sponsoring organizations, and about 100,000 physician-students are enrolled. Most of these courses last from one day to several days. Some last longer.

Scientists and engineers have been less vigorous in meeting the challenge of obsolescence. A promising exception is a new activity sponsored by the American Chemical Society. The program was initiated at the society's national meeting in Detroit in April 1965. Two-day sessions on mass spectrometry and photochemistry were held ahead of the meeting. A 3-day course on radiochemistry was given at the conclusion of the meeting. The courses were developed for the graduate chemist who completed formal training some years ago and has recently found that entirely new disciplines have become important to his research work. The courses met with an enthusiastic response, as measured by enrollment and by answers to questionnaires circulated afterward. As a result, five courses were given in conjunction with the national meeting held in Atlantic City in September 1965. A further ACS educational program is now in progress. Two traveling short courses will be offered, in a total of nine cities. These are encouraging beginnings which should stimulate similar activity on the part of other societies.

The problem of continuing education is bigger than that of maintaining competence in a professional specialty. Men must also prepare for broader responsibilities. Some must develop new specialties to replace those no longer in demand. These activities require more resources than the average individual commands. Professional societies can be helpful, but universities, business, and government organizations must share the load.—PHILIP H. ABELSON

2–3. **Bone Marrow**, conf., San Francisco, Calif. (L. J. Cole, Experimental Pathology Branch, U.S. Naval Radiological Defense Laboratory, Hunter Point, San Francisco 94135)

2–3. Society of **Plastics Engineers**, regional technical conf., Newark, N.J. (SPE, 65 Prospect St., Stamford, Conn. 06902)

3–5. **Leptospiras**, intern. colloquium, Antwerp, Belgium. (A. Grare, Inst. de Médicine, Tropicale Prince-Leopold, Antwerp)

3–5. Academy of **Psychoanalysis**, midwinter meeting, New York, N.Y. (H. Davidman, 125 E. 65 St., New York 10021)

3–5. American **Psychoanalytic** Assoc., fall meeting, New York, N.Y. (APA, 1 E. 57 St., New York 10022)

3–4. **Macromolecular Metabolism**, symp., New York, N.Y. (New York Heart Assoc., 10 Columbus Circle, New York 10019)

5. American Acad. of **Dental Medicine**, mid-winter annual meeting, New York, N.Y. (S. Conrad, 133–28 228th St., Laurelton, N.Y. 11413)

5–9. American Inst. of **Chemical Engineers**, Philadelphia, Pa. (AICE, 345 E. 47 St., New York 10017)

5–11. American **Rheumatism** Assoc., congr., Mar del Plata, Argentina. (G. Speyer, 10 Columbus Circle, New York)

6. **Food Law** Inst. and Food and Drug Administration, joint educational conf., Washington, D.C. (FDA, Washington, D.C.)

6–7. Medical and Social Aspects of **Migration**, Ciba Foundation guest symp., London, England. (Ciba, 41 Portland Pl., London, W.1)

6–8. **Transmission of Viruses** by the Water Route, symp., Cincinnati, Ohio. (G. Berg, U.S. Public Health Service, 4676 Columbia Parkway, Cincinnati 45226)

6–10. **Space Communication**, Paris, France. (UNESCO, Pl. de Fontenoy, Paris 7^e)

6–10. Practices in the Treatment of Low and Intermediate Level **Radioactive Wastes**, symp., Vienna, Austria. (Intern. Atomic Energy Agency, Kärtner Ring 11, Vienna 1)

6–10. Structure and Function of the **Nucleolus**, symp., Montevideo, Uruguay. (F. A. Saez, Instituto de Investigaciones de Ciencias Biológicas, avda. Italia 3318, Montevideo)

6–12. **Hydraulics and Fluid Mechanics**, 2nd Australasian conf., Auckland, New Zealand. (A. J. Raudkivi, Univ. of Auckland, School of Engineering, Ardmore College Post Office, Auckland)

7–10. American Soc. of **Agricultural Engineers**, winter meeting, Chicago, Ill. (J. L. Butt, P.O. Box 229, St. Joseph, Mich.)

8–10. **Coccidioidomycosis**, 2nd natl. symp., Phoenix, Ariz. (Arizona Tuberculosis and Health Assoc., 733 W. McDowell Rd., Phoenix 85007)

8–10. Changing Concepts of **Human Habitation**, symp., Roorkee, India. (D. Mohan, Central Building Research Inst., Roorkee)

8–10. New Concepts in **Gynecological Oncology**, symp., Hahnemann Medical College and Hospital, Philadelphia, Pa.

(Miss S. Rosen, Hahnemann Medical College and Hospital, 230 N. Broad St., Philadelphia 19102)

8–15. American Acad. of **Optometry**, Chicago, Ill. (C. C. Koch, 1506 Foshay Tower, Minneapolis, Minn.)

9–10. **Ciba Foundation** guest meeting European Pancreatic Club. London, England. (H. T. Howat, 41 Portland Pl., London, W.1)

12–14. **Lymphatic System**, intern. conf., New Orleans, La. (H. S. Mayerson, Dept. of Physiology, School of Medicine, Tulane Univ., New Orleans 70112)

13–15. **Aerothermochemistry of Turbulent Flows**, conf., American Inst. of Aeronautics and Astronautics, San Diego, Calif. (H. Yoshihara, Space Sciences Laboratory, Mail Zone, 596–00, General Dynamics/Astronautics, Kearny Villa Rd., San Diego)

13–15. European **Biological Editors**, Paris, France. (D. S. Ferner, Dept. of Biology, Univ. of Washington, Seattle)

13–15. Radiological Protection in the **Industrial Use of Radioisotopes**, intern. conf., Paris, France. (J Pradel, 66 rue Augustin Dumont, Malakoff, Seine, France)

13–18. **Engineering and Technological Sciences**, conf., Bangkok, Thailand. (P. Purachatra, Assoc. of Southeast Asian Insts. of Higher Learning, Chulalongkorn Univ., Race Course Rd., Bangkok)

15–18. **Microbiology**, 1st Central American congr., Univ. of Costa Rica, San José. (F. Montero-Gei, School of Microbiology, Univ. of Costa Rica, Apartado 2157, San José)

19–21. Middle East **Neurological** Soc., Jerusalem, Jordan. (F. S. Haddad, Orient Hospital, Beirut, Lebanon)

19–23. Indian **Statistical** Inst., Malleswaram, Bangalore. (S. R. Ranganathan, Indian Statistical Inst., Documentation Research and Training Centre, 112 Cross Rd. 11, Malleswaram)

20–21. **Nuclear Medicine**, 2nd natl. congr., Tel Aviv, Israel. (P. Czerniak, Israel Atomic Commission, Soreq Nuclear Research Center, Doar Yavne)

20–22. British **Biophysical** Soc., 20th winter meeting, London, England. (R. E. Burge, Physics Dept., Queen Elizabeth College, Campden Hill Rd., London W.8)

20–22. American **Physical** Soc., Los Angeles, Calif. (W. Whaling, California Inst. of Technology, Pasadena 91109)

26–31. **American Assoc. for the Advancement of Science**, annual, Berkeley, Calif. (R. L. Taylor, AAAS, 1515 Massachusetts Ave., NW, Washington, D.C.)

In addition to the 20 sections of the Association and five AAAS committees, the following organizations have arranged sessions at AAAS annual meeting 26–31 December in Berkeley:

Mathematics

American Mathematical Soc. (R. S. Pierce, Univ. of Washington, Seattle)

Association for Computing Machinery. (H. D. Huskey, Univ. of California, Berkeley)

National Council of Teachers of Mathematics. (J. D. Gates, 1201 16 St., NW, Washington, D.C.)

Society for Industrial and Applied Mathematics (J. H. Griesmer, IBM, Yorktown Heights, N.Y.)

Physics

American Astronautical Soc. (P. B. Richards, General Precision, Little Falls, N.J.)

Chemistry

American Chemical Soc., California Section. (R. L. LeTourneau, Chevron Research Co., Richmond, Calif.)

Astronomy

American Astronomical Soc. (G. C. McVittie, Univ. of Illinois, Urbana)

Geology and Geography

Association of American Geographers. (M. Mikesell, Univ. of Chicago, Chicago, Ill.)
National Geographic Soc. (R. Gray, 17th & M Sts., NW, Washington, D.C.)
National Speleological Soc. (G. W. Moore, U.S. Geological Survey, Menlo Park, Calif.)

Zoological Sciences

American Fisheries Soc. (H. K. Chadwick, California Dept. of Fish and Game, Sacramento)
American Soc. of Zoologists. (A. G. Richards, Univ. of Minnesota, St. Paul)
Animal Behavior Soc. (E. M. Banks, Univ. of Illinois, Urbana)
Herpetologists' League. (F. B. Turner, Univ. of California, Los Angeles)
Society of Systematic Zoology. (J. G. Rozen, Jr., American Museum of Natural History New York, N.Y.)

Zoological and Botanical Sciences

American Soc. of Naturalists. (C. Hubbs, Scripps Inst. of Oceanography, La Jolla, Calif.)
Ecological Soc. of America. (G. M. Woodwell, Brookhaven Natl. Laboratory, Upton, L.I., N.Y.)
Western Soc. of Naturalists. (J. M. Craig, San Jose State College, San Jose, Calif.)

Psychology

Western Psychological Assoc. (G. A. Mendelsohn, Univ. of California, Berkeley)

Social and Economic Sciences

American Economic Assoc. (R. R. Nelson, RAND Corp., Santa Monica, Calif.)
American Political Science Assoc. (J. F. Triska, Stanford Univ., Stanford, Calif.)
American Soc. of Criminology. (C. Newman, Univ. of Louisville, Louisville, Ky.)
American Sociological Assoc. (W. Form, Michigan State Univ., East Lansing)
Metric Assoc. (R. Fischelis, Ohio Northern Univ., Ada)
National Inst. of Social and Behavioral Science. (D. P. Ray, 863 Benjamin Franklin Station, Washington, D.C.)
Population Assoc. of America. (E. S. Lee, Univ. of Pennsylvania, Philadelphia)
Society for the Scientific Study of Religion. (C. Y. Glock, Univ. of California, Berkeley)

History and Philosophy of Science

Philosophy of Science Assoc. (C. W. Churchman, Univ. of California, Berkeley)
Society for General Systems Research. (H. Thal-Larsen, Univ. of California, Berkeley)
Science Courses for Baccalaureate Education Project. (V. L. Parsegian, Rensselaer Polytechnic Inst., Troy, N.Y.)

Medical Sciences

Alpha Epsilon Delta. (M. L. Moore, 7 Brookside Circle, Bronxville, N.Y.)
American Assoc. of Bioanalysts, Western Region. (M. Menesini, 1287 Rudgear Rd., Walnut Creek, Calif.)
American Physiological Soc. (R. M. Iverson, Univ. of Miami, Coral Gables, Fla.)
American Soc. for Microbiology, Northern California–Hawaiian Branch. (K. J. Taylor, Cutter Laboratories, Berkeley, Calif.)
California Veterinary Medical Assoc. (A. G. Edward, Univ. of California, Davis)
Society for Experimental Biology and Medicine, Pacific Coast Section. (E. L. Dobson, Donner Laboratories, Univ. of California, Berkeley)

Education

Commission on Science Education. (J. R. Mayor, AAAS, 1515 Massachusetts Ave., NW, Washington, D.C. 20005)
American Nature Study Soc. (H. E. Weaver, Univ. of Illinois, Urbana)
National Assoc. for Research in Science Teaching. (F. B. Dutton, Michigan State Univ., East Lansing)
National Assoc. of Biology Teachers. (H. K. Wong, Menlo-Atherton High School, Atherton, Calif.)
National Science Teachers Assoc. (A. F. Eiss, 1201 16 St., NW, Washington, D.C. 20005)

Information and Communication

National Assoc. of Science Writers. (L. S. Zahn, Hill and Knowlton Inc., 150 E. 42 St., New York, N.Y.)
Society of Technical Writers and Publishers. (G. Marx, Illinois Inst. of Technology, Chicago)

Statistics

BIO: Biomedical Information-Processing Organization. (M. Woodbury, New York Univ. Medical Center, New York, N.Y.)
Biometric Soc., ENAR. (D. S. Robson, Cornell Univ., Ithaca, N.Y.)
Biometric Soc., WNAR. (S. W. Nash, Univ. of British Columbia, Vancouver, Canada)
Mathematical Statistics and Probability, 5th Berkeley symp. (J. Neyman, Statistical Laboratory, Univ. of California, Berkeley)

Science in General

Academy Conf. (J. T. Self, Univ. of Oklahoma, Norman)
Scientific Research Soc. of America (D. B. Prentice, 51 Prospect St., New Haven, Conn.)
Sigma Delta Epsilon. (Miss A. Hanson, Univ. of Minnesota, Minneapolis)
Society of the Sigma Xi. (T. T. Holme, 51 Prospect St., New Haven, Conn.)

27–29. Academy of **Management**, New York, N.Y. (P. P. LeBreton, College of Business Administration, Univ. of Washington, Seattle)

27–30. **Differential Equations and Dynamical Systems.** Univ. of Puerto Rico, Mayaguez. (Center for Dynamical Systems, Brown Univ., Providence, R.I.)