SCIENCE

9 December 1960

Vol. 132, No. 3441

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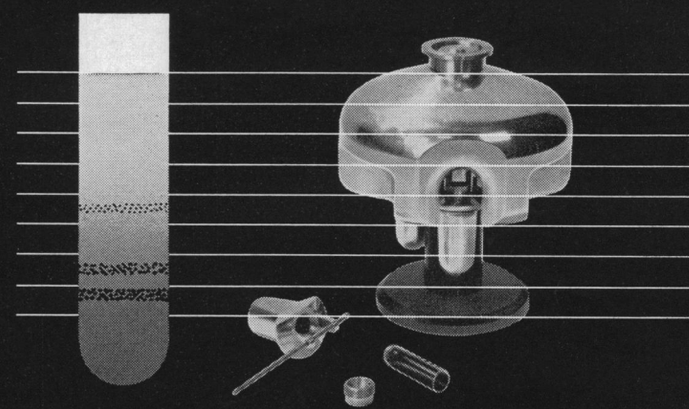

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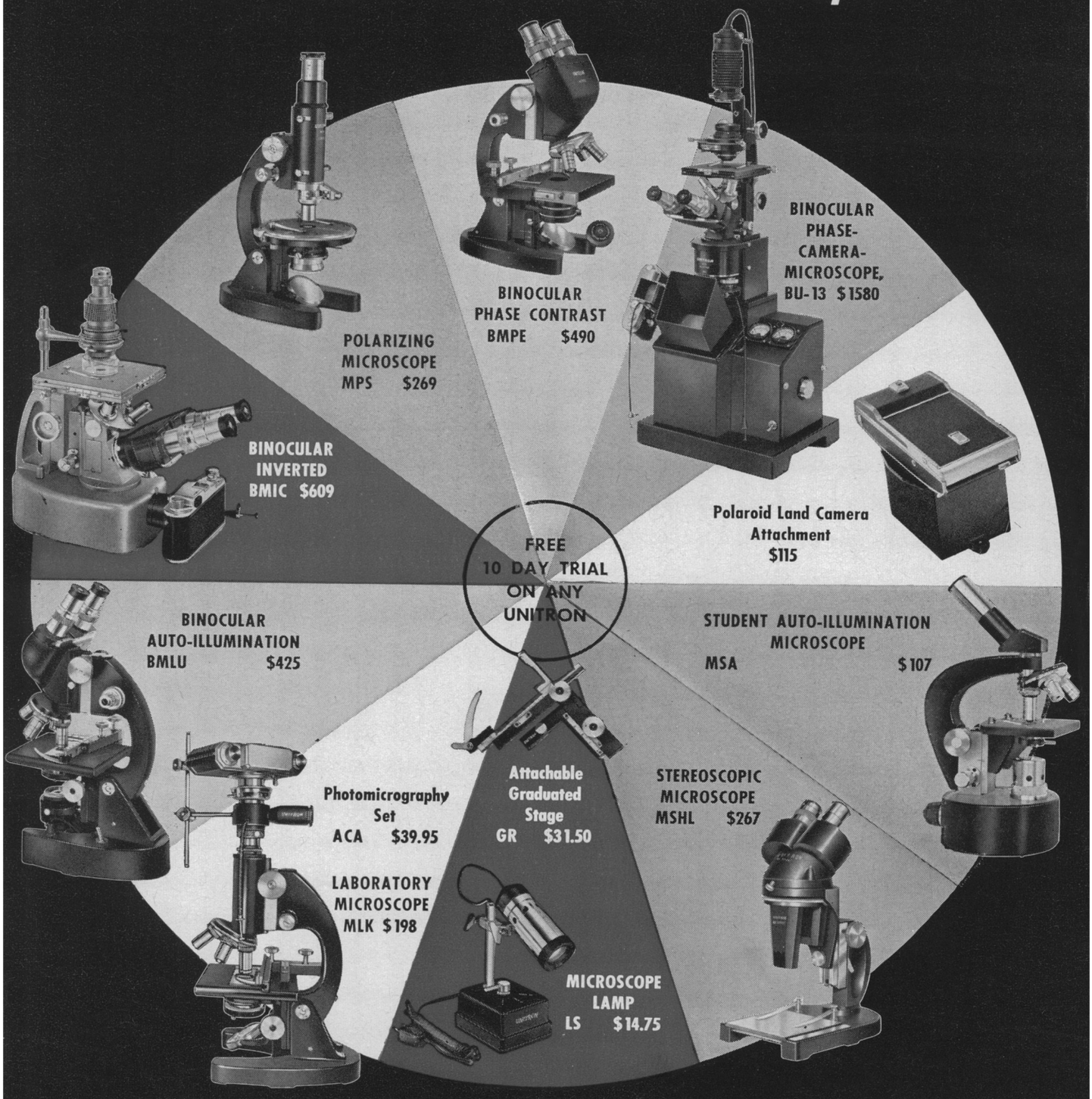

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SCIENCE

Cover

Junipers at timberline. Photograph by Cedric Wright, from the book *This Is the American Earth* by Ansel Adams and Nancy Newhall (Sierra Club, 1050 Mills Tower Building, San Francisco, Calif.). Reviewed on page 1759.

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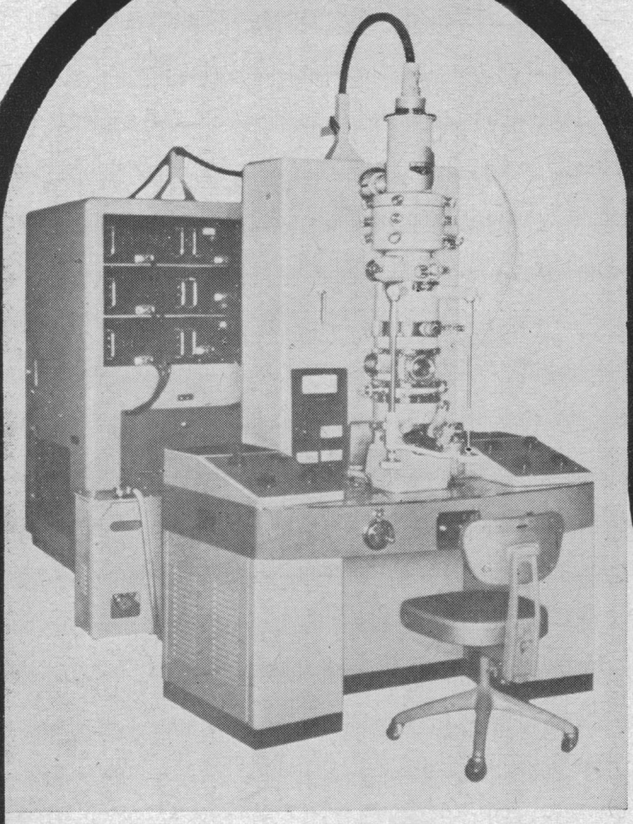

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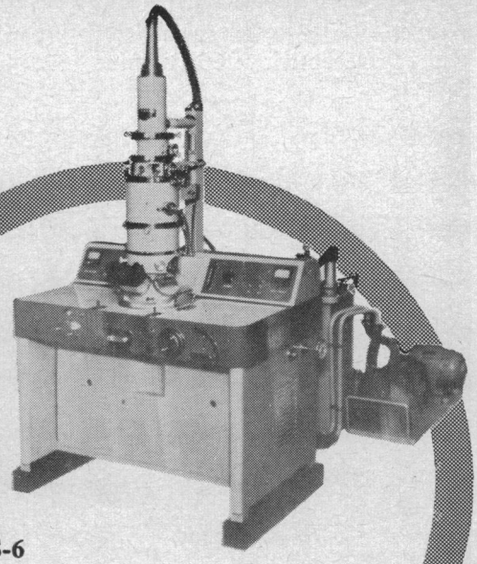

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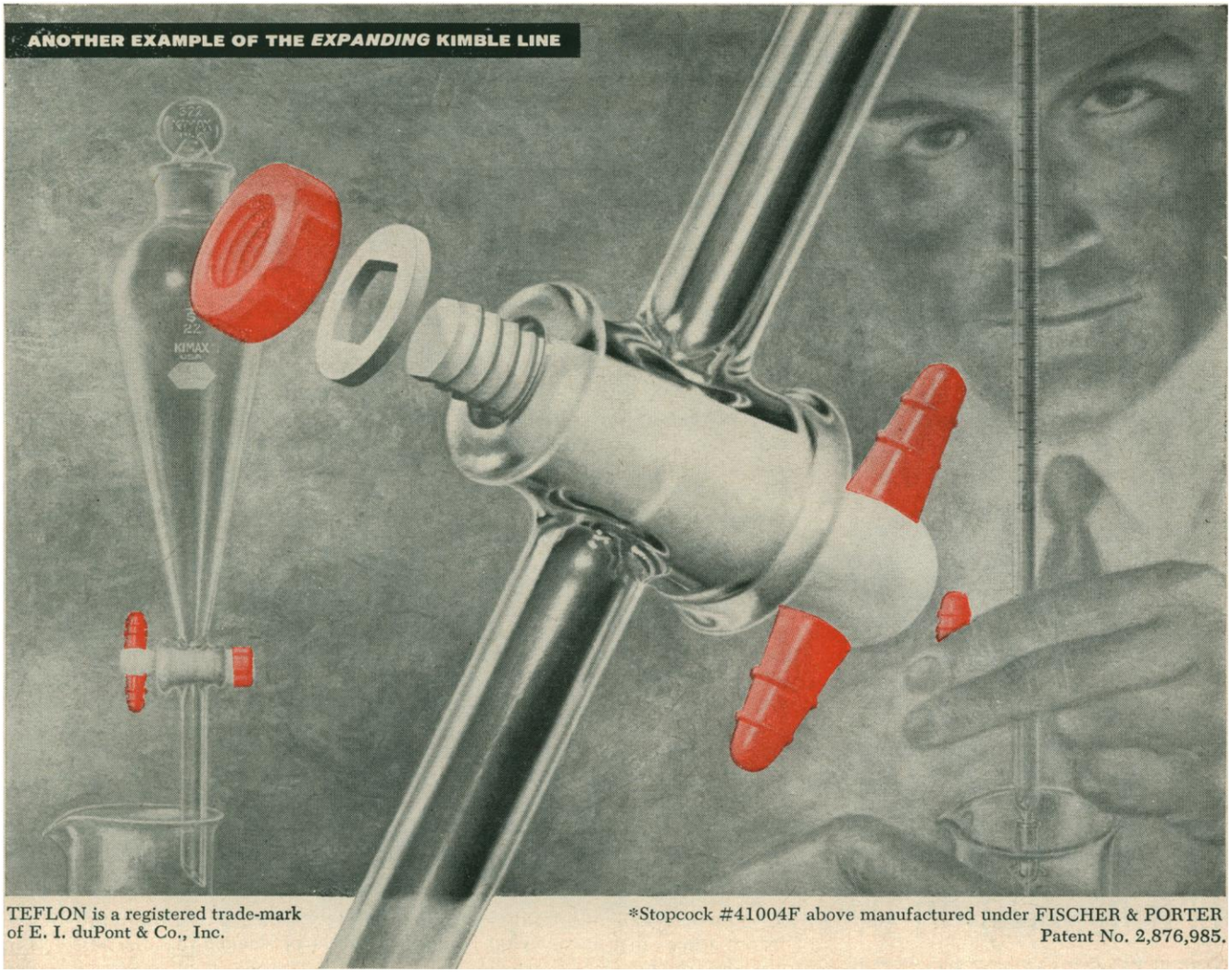

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Letters

Science and the Welfare of Mankind

I am more encouraged than I have been in years about the state of the world and its prospects for the future by the report of the AAAS Committee on Science in the Promotion of Human Welfare [*Science* **132**, 68 (8 July 1960)]. This report offers the first prospect I have seen of achieving a source of dispassionately accurate, reliable, and undistorted information on the new environmental factors of our age which are subtly but vitally affecting the course of human life throughout the world.

This country, a leader both in scientific achievement and in moral heritage, has a responsibility to humanity to understand and to state clearly to all men the facts about the reactions on human beings of the changes technology is making in our environment. Unfortunately, in many areas, this country's private industrial and merchandizing interests have seen fit to obscure or distort many of these facts. Government appears to be either unwilling or unable to make major contributions to public enlightenment.

Until I saw the report of the AAAS committee, the situation seemed pretty hopeless. Those who speak out are lone voices in the wilderness, and "authorities" are available on both sides of every issue. Nowhere can one find a source of information on the truly vital issues of our age which can be viewed as impartial, scientifically sound, and interested only in the ultimate welfare of humanity.

The special committees recommended by the Committee on Science in the Promotion of Human Welfare should provide such a source of information. I wish, therefore, to urge the AAAS to give the highest possible priority to implementation of the committee's recommendations. The accumulation and dissemination of this information is, in my view, the most important single project currently proposed by any organization in the United States. It is a project the ultimate value of which to the welfare of mankind is utterly incalculable. It should be undertaken immediately and pressed with the utmost vigor consistent with scientific accuracy.

VERNON M. ROOT
Applied Physics Laboratory,
Johns Hopkins University,
Silver Spring, Maryland

I have read with great interest the report of the AAAS Committee on Science in the Promotion of Human Welfare, and I find it singularly objective in tone and very much to the point in content. At a time when so much is being said and written on the political responsibilities of scientists from the adolescent angle of a Calamity Jane, it is most refreshing indeed to read a report on the same subject which is mature in its approach.

As the committee asks for recommendations from colleagues regarding "questions of immediate importance" for further study and discussion, may I suggest that to the six listed there be added the following: The relationship of science to the other aspects of human culture. For example, what is the relation of science to philosophy, to art, to religion? The problem of their interrelations is doubtless implicit in the whole report, but I think the problem itself deserves special attention. In any case, as I see it from a philosophical standpoint, we can hardly expect to achieve the goal of reducing the growing gap in our culture between the sciences and the humanities without a serious consideration of their similarities and differences. The attainment of such a goal will require, of course, closer cooperation between scientists and nonscientists in the years to come.

PATRICK ROMANELL
Medical Branch,
University of Texas, Galveston

The report of the Committee on Science in the Promotion of Human Welfare is the best product of the scientific method that I have seen for a long time.

Surely, since it is as a result of the progress of science that the world is in its present predicament, it can be argued that scientists have an obligation to humanity to devise methods of salvation.

Those scientists (if there be any such) who feel no such obligation may also agree with the report, as a matter of self-preservation, for it is very certain that if the problem of nuclear war is not solved there will be no science and few scientists left.

Nuclear war is only one of the problems presented to society by science, but it is the most pressing, for if it is not solved soon, none of the others will need attention.

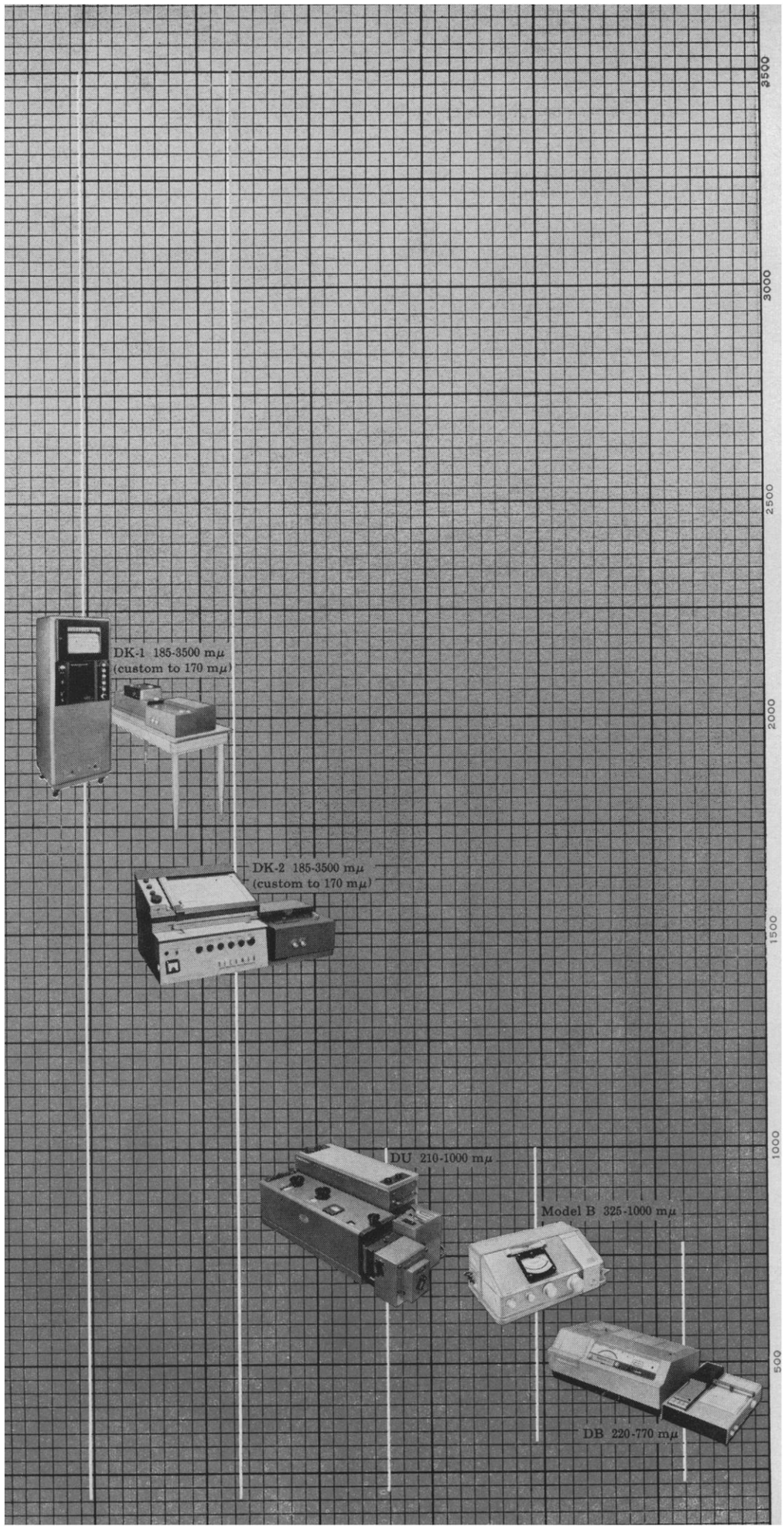
IRVING F. LAUCKS
Post Office Box 607,
Healdsburg, California

Teaching and Learning

I would like to comment on John Helwig's letter regarding the training of college teachers [*Science* **132**, 845 (23 Sept. 1960)].

I share his concern that state licensure might lead us to so much emphasis on

(Continued on page 1772)



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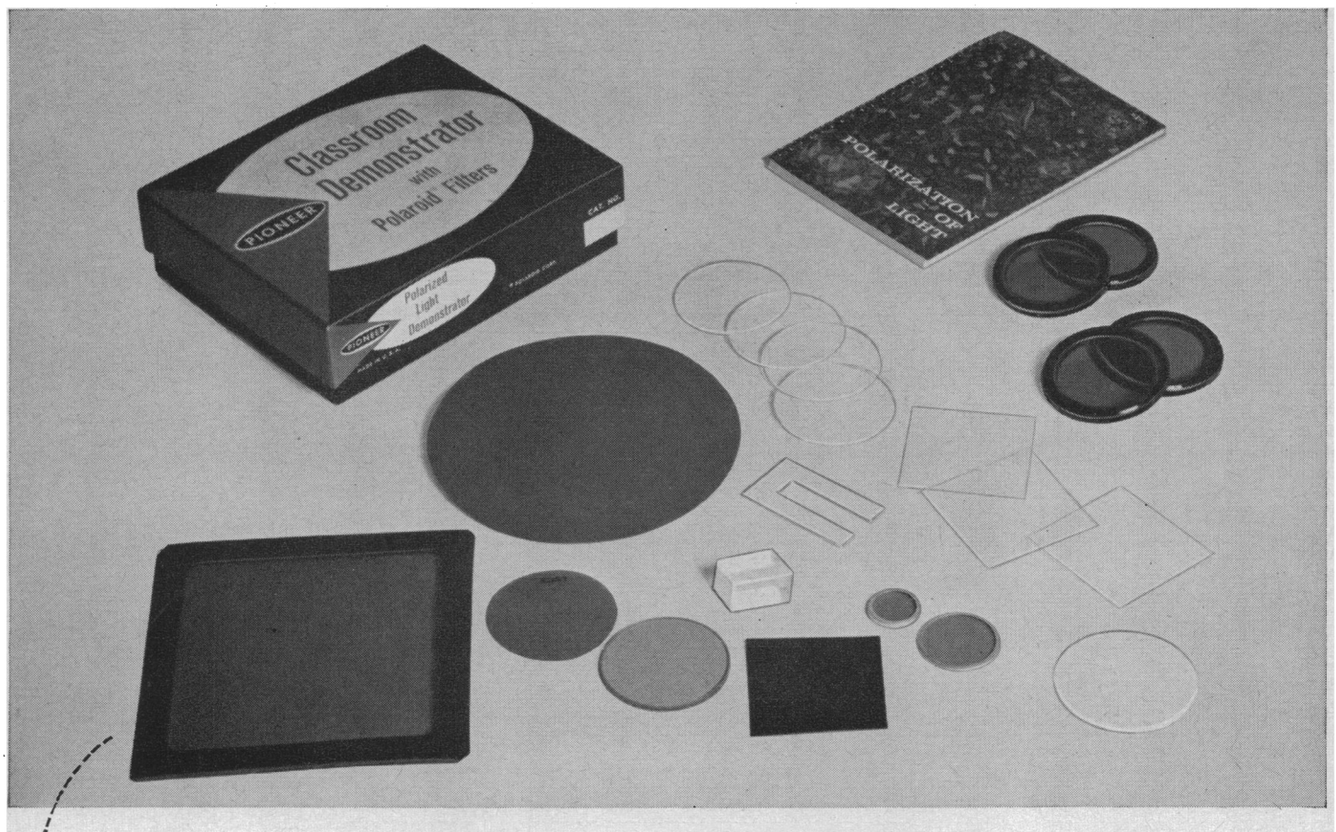

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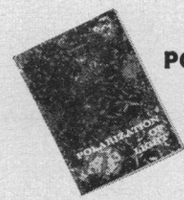

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SCIENCE

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Assisting Less Developed Countries

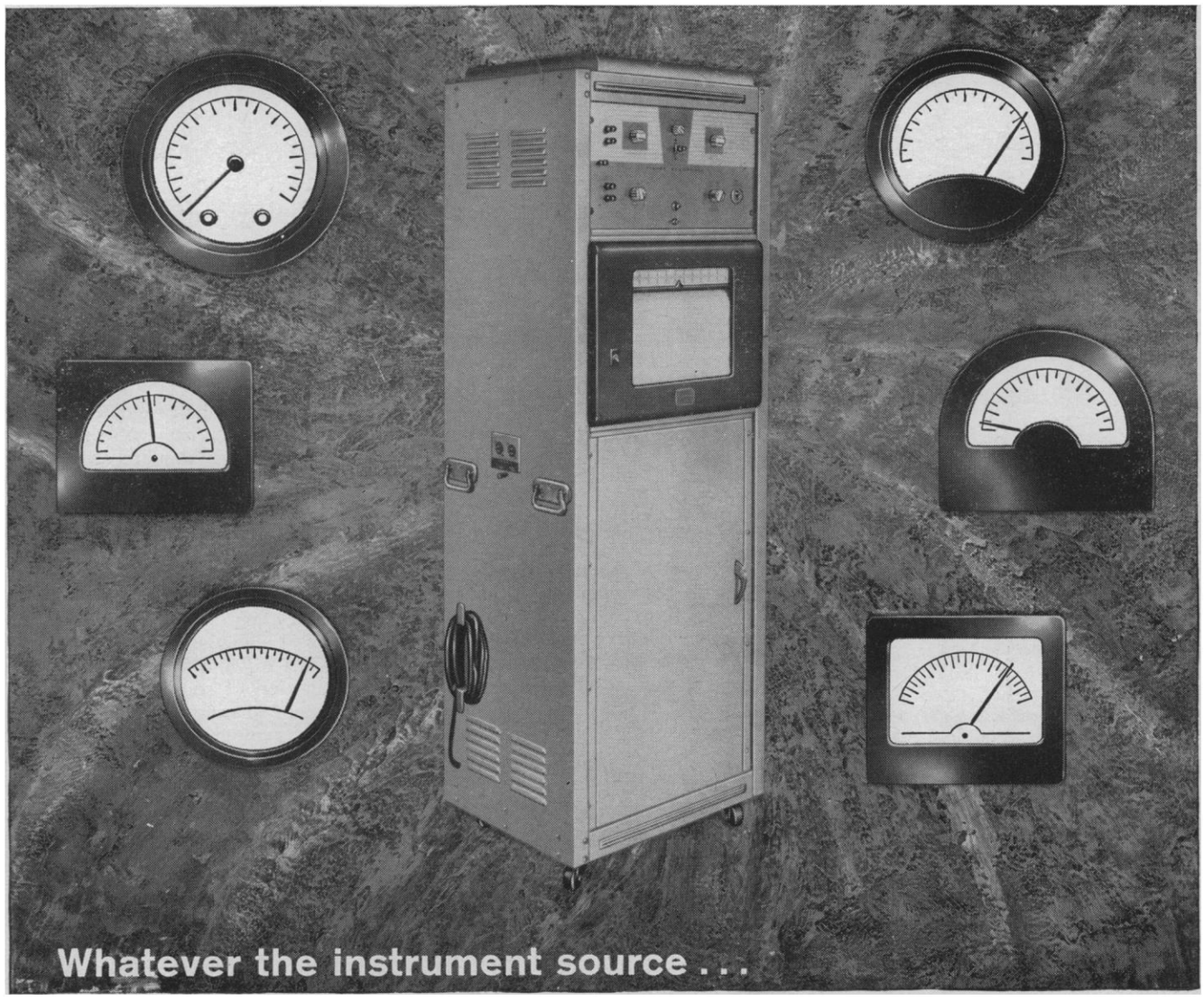
It is well known that scientific thought and technical skill have an important bearing on our efforts to help less developed countries achieve higher standards of living. The uses of research in such fields as agriculture, nutrition, and epidemiology are familiar. In plant breeding, for example, a new hybrid rice may be produced by combining the higher response to fertilizer of one variety with the adaptability to tropical conditions of another. Also familiar are some of the spectacular developments that physics is expected to produce in the next few decades, like breeder reactors, which generate more fissionable material than they consume.

But there is still much known technology that is not being used, even though relevant to the problems of backward countries, and there is plenty of room for the development of new devices of more immediate applicability than nuclear reactors. Some indication of the range of possibilities was given at the sessions last August of the International Conference on Science in the Advancement of New States, held in Rehovoth, Israel. On the question of sources of power, for example, ideas included the development of special, low-maintenance electric generators to provide light for remote villages, while in the matter of increasing the water supply, there was an account of recent work in controlling evaporation from lakes by spreading a substance on the surface that forms an extremely thin, blanketing layer.

In education, also, the Rehovoth conference brought out the possibility of adapting developments in other lands to the special needs of less developed countries. Education is central to effective technical assistance, and education now means not just literacy but scientific literacy. Mention was made of the work of the Physical Sciences Study Committee in the United States in creating a new high school course in physics. What was distinctive about this project was not just the incorporation of a modern viewpoint, but the massive effort that was mounted to carry out the work. There was not only the cooperation of university professors, high school teachers, writers, and others in the preparation of text and apparatus, but also the special training at summer institutes of the teachers who were to give the courses. Science courses designed for less developed countries might prove different in scope, but the same approach might be used in their preparation.

Also discussed at the conference was the possibility of doing more research in the social sciences. Success in technical assistance has something to do with our knowledge of the attitudes and beliefs of the people we hope to assist. In fact, as the conference made clear, to speak only of introducing new techniques is to understate the problem. Technical assistance involves at bottom introducing a new world outlook, and the problem is that rapid cultural change can be an extremely disruptive social force.

The feeling is growing in this country that we should increase the assistance that we are now offering less developed countries. But there must also be growth in appreciation of the role that science can play in making the assistance effective. Just as surely as there are many research projects now underway that could profitably be expanded, so there must be many ideas, as yet unborn, that greater support and interest would quickly produce. What is needed is a rather special technology, one suited to the requirements of growing states but perhaps of no more direct use to American citizens, if nonetheless necessary, than a Polaris-launching submarine.—J.T.



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Letters

(Continued from page 1732)

pedagogy that the teacher's knowledge of subject matter content might turn out to be far less than desirable. As I see it, the problem is one of proper balance. Some knowledge of the technique of teaching would, in my opinion, be highly desirable for the majority of college teachers.

I believe it is a vast oversimplification to state, as Helwig does, "that the two essential characteristics of a good teacher are (i) enthusiasm and (ii) thorough knowledge of and interest in his subject." I believe that most people concentrate on "teaching" and forget that the important process is really its complement "learning." This takes place within and *only* within the mind of the student. If our educators would exhibit more concern for learning, then teaching, as such, would take care of itself. I submit that the key factor in the education process is the motivation of the learner; I would venture further that the role of the teacher is primarily that of a motivator and only secondarily that of an imparter of knowledge. Actually the student may acquire knowledge from books, audio visual aids, direct experience, or other means. College teaching, as contrasted with secondary school teaching, is concerned with the development within the student of the power to think, reason, appreciate, and discriminate; but the exercise of intellect necessary to become learned requires self-discipline on the part of the student, not enthusiasm and interest of the teacher, or only insofar as it makes the student want to learn.

There appears to me only a tenuous relationship between learning on the part of the student and either enthusiasm or thorough knowledge of and interest in the subject matter on the part of the teacher. If these two attributes of the teacher serve to motivate the student, so much the better, but one should not rule out other techniques of motivation. Unfortunately one can think of a number of teachers who possess these two qualifications and yet who are not considered by either their peers or their students to be very good teachers.

We must recognize also that college teaching embraces a wide range from the instruction of beginning freshmen to the occasional contact with the mature graduate student pursuing studies in either purely academic or professional fields. It is my personal opinion that teaching the elementary college level courses makes the greater demands on the motivation skill of the teacher; whereas, in graduate work, motivation may be more readily derived from the teacher who is both enthusiastic and possessed of great knowledge, because both of these qualities provide high motivation to the advanced student.

It is in this latter situation particularly that I fear that any state licensure might only serve to eliminate many of our greatest and most widely influential teachers.

MERRITT A. WILLIAMSON
College of Engineering and Architecture, Pennsylvania State University, University Park

Left-handed Subjects

I am engaged in research requiring left-handed subjects of all mating patterns. We particularly need sinistral individuals at least 16 years of age with both parents left-handed.

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SIDNEY WEINSTEIN
Albert Einstein College of Medicine, Yeshiva University, New York

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It was just as well that no gypsy fortuneteller told the Baron that 72 years after his death work would begin in earnest on unraveling *just* how grape sugar breaks down into pyruvic acid and that this work would take 40 years until the phenomenon was at last understood as the first stage in the process by which chemists and other living creatures obtain from their food the energy with which to engage in all affairs, including ratiocination about biochemistry.

Anyway, the Baron was an excellent chemist. He prepared several salts of pyruvic acid, including the lithium. Now we wish to report that we, too, can prepare *Pyruvic Acid Lithium Salt* and, in fact, offer it as Eastman 8130, a standard for use in pyruvic acid determinations. *Pyruvic Acid* is Eastman 498, vintage unspecified.

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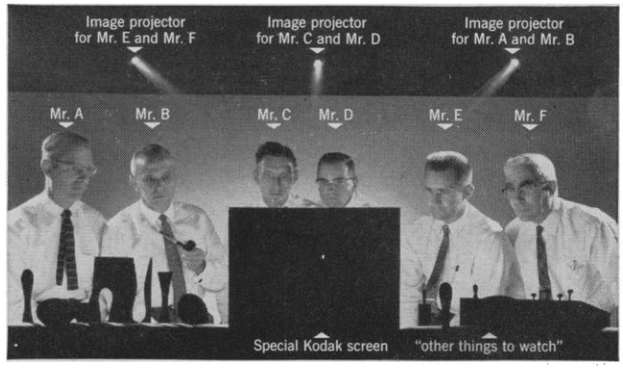

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Meetings

Migration of Marine Organisms

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It was the fifth of the series of meetings on marine sciences which the office has held since its foundation in 1949. The previous meetings, like the Guayaquil meeting, had the double character of symposium and working-party session. They were held at Concepción, Chile, in 1954; São Paulo, Brazil, in 1955; Montemar, Chile, in 1956; and Montevideo, Uruguay, in 1957.

Enrique Rioja (Mexico) was elected chairman of the Guayaquil symposium, and Hugo Ferrando (Uruguay) acted as secretary. Thirteen marine scientists, from the following countries, participated: Argentina, Brazil, Chile, Cuba, Ecuador, Mexico, Peru, and Uruguay. The UNESCO Science Cooperation Office for Latin America was represented by Angel Establier.

The program of the meeting included sessions on the following subjects: (i) migration of marine organisms (fish; invertebrates; cephalopods; birds; other vertebrates); (ii) environmental factors (oceanographic and biological) that cause migration; (iii) standardization of methods for studying migratory phenomena, with a view to comparing results; (iv) establishment of regional programs for work on migration of aquatic populations; and (v) other problems related to migration of marine organisms.

At the conclusion of the symposium, the following recommendations were unanimously approved by the participants.

1) The symposium, considering that the study of the migration of marine organisms by its very nature requires a joint effort on the part of the countries concerned, recommends regional action. The following delimitation of problems common to a number of countries is made with a view to their being undertaken regionally. Argentina, Brazil, and Uruguay: Thunnidae, Scombridae, Clupeidae (*Sardinella* sp.), Galeorhinidae (*Galeorhinus vitaminicus*), and Mugilidae (*Mugil* sp.). Chile and Argentina: Merluccidae (*Merluccius* sp.), Decapoda (Macrura: "langostinos" shrimps, and "langosta" de Juan Fernández). Peru and Chile: Thunnidae (*Neothunnus macropterus*), Engraulidae (*Engraulis* sp.), Scombroidae (*Sarda* sp.), and Decapoda (*Munida* sp.). Peru, Ecuador, and Colombia: Thunnidae (*Katsuwonus* sp.; *Neothunnus macropterus*), Decapoda (Macrura: "langostinos"). Mexico, Caribbean, and coast of Venezuela: Thunnidae (*Katsuwonus* sp.; *Thunnus* sp.), Centropomidae (*Centropomus* sp.), Decapoda (Macrura: *Panulirus* sp.; Penaeidae: *Penaeus* sp.).

2) It is recommended that information be exchanged between Argentina and Chile covering research results and methods used in work on the principal species of *Merluccius*.

3) Marking trials should be held in conjunction with studies on the biological cycle of the species (growth, reproduction, alimentation, and so on), with a view to relating migration and the different phases of life of individuals. Similarly, the importance of the study of environmental conditions emphasized at the meeting of the UNESCO Marine Sciences Working Party, held at Montevideo 22 to 24 May 1957, is underlined.

4) In view of the importance of movement and mixture of different bodies of water, it is expressly recommended that Argentina, Brazil, and Uruguay should study the northern and southern limits and fluctuations, respectively, of subantarctic and subtropical waters and also the origin of the water of the coastal region. It is hoped that similar work may be undertaken for the southeast Pacific area in the fairly near future.

5) UNESCO is asked to interest the governments of Latin America in supporting this type of scientific work, which is an indispensable basis for a proper knowledge of the renewable resources of the sea.

6) It is recommended that the next marine sciences meeting to be organized by the UNESCO Science Cooperation Office for Latin America should be divided into two sections: "Abiotic oceanography" and "Marine biology."

J. SWARBRICK
Centro de Cooperacion Cientifica Para America Latina, Montevideo, Uruguay

Forthcoming Events

December

26–31. American Assoc. for the Advancement of Science, annual, New York, N.Y. (R. L. Taylor, AAAS, 1515 Massachusetts Ave., NW, Washington 5)

The following 52 meetings are being held in conjunction with the AAAS annual meeting.

AAAS Committee on Science and the Promotion of Human Welfare (B. Commoner, Shaw School of Botany, Washington Univ., St. Louis 5, Mo.). 26, 28, 29 Dec.

AAAS Cooperative Committee on the Teaching of Science and Mathematics (J. R. Mayor, Director of Education, AAAS, Washington, D.C.). 28, 29 Dec.

Academy Conference (J. G. Arnold, Jr., Loyola Univ., New Orleans, La.). 26–27 Dec.

Alpha Epsilon Delta (M. L. Moore, 7 Brookside Circle, Bronxville, N.Y.). 29 Dec.

American Assoc. of Clinical Chemists (H. Goldenberg, Dept. of Biochemistry, Hillside Hospital, P.O. Box 38, Glen Oaks, N.Y.). 26–27 Dec.

American Assoc. of Scientific Workers (Miss M. Yevick, 214 Western Way, Princeton, N.J.). 27 Dec.

American Astronautical Soc. (R. Fleisig, 58 Kilburn Rd., Garden City, N.Y.). 27 Dec.

American Astronomical Soc. (J. A. Hynek, Dearborn Observatory, Northwestern Univ., Evanston, Ill.). 28–31 Dec.

American Council on Women in Science (Miss E. B. Thurmann, Div. of Research Grants, National Insts. of Health, Bethesda 14, Md.). 27 Dec.

American Economic Assoc. (K. E. Boulding, Dept. of Economics, Univ. of Michigan, Ann Arbor). 26 Dec.

American Geophysical Union (R. Jastrow, NASA Theoretical Div., 8719 Colesville Rd., Silver Spring, Md.). 26 Dec.

American Nature Study Soc. (R. E. Hopson, 4138 S.W. Fourth Ave., Portland 1, Ore.). 27–30 Dec.

American Psychiatric Assoc. (P. H. Knapp, Boston Univ. School of Medicine, Boston, Mass.). 29, 30 Dec.

American Soc. of Criminology (D. E. J. MacNamara, New York Inst. of Criminology, 115–117 W. 42 St., New York 36). 26, 27 Dec.

American Soc. of Naturalists (R. C. Rollins, Gray Herbarium, Harvard Univ., 22 Divinity Ave., Cambridge 38, Mass.). 27 Dec.

American Soc. of Zoologists (R. L. Watterson, Dept. of Zoology, Northwestern Univ., Evanston, Ill.). 28–30 Dec.

American Sociological Assoc. (V. H. Whitney, Dept. of Sociology, Wharton School of Finance, Univ. of Pennsylvania, Philadelphia, Pa.). 28, 29 Dec.

American Statistical Assoc. (R. E. Lewis, New York Area Chapter, 55 Wall St., New York 15). 29 Dec.

Association of American Geographers (C. Morrison, Jr., American Geographical Soc., Broadway at 156 St., New York 32). 27–30 Dec.

Association for Computing Machinery (W. F. Cahill, NASA, 8719 Colesville Rd., Silver Spring, Md.). 29 Dec.

Astronomical League (Miss A. A. Pindar, Amateur Astronomers Assoc., Inc., 223 W. 79 St., New York 24). 28 Dec.

Beta Beta Beta Biological Soc. (Mrs. F. G. Brooks, P.O. Box 515, Ansonia Station, New York 23). 27 Dec.

Biomedical Information Processing Organization (R. S. Ledley, Natl. Biomedical Research Foundation, Silver Spring, Md.). 30 Dec.

Committee on Cosmetics, American Medical Assoc. (J. B. Jerome, 535 N. Dearborn St., Chicago 10, Ill.). 29 Dec.

Conference on Scientific Communication Problems (G. L. Seielstad, Technical Reports Group, Applied Physics Laboratory, Johns Hopkins Univ., Silver Spring, Md.). 26, 27 Dec.

Conference on Scientific Manpower (T. J. Mills, Natl. Science Foundation, 1951

Constitution Ave., NW, Washington 25). 27 Dec.

Conference on Scientific Manuscripts (N. Reingold, Dept. of History of Science and Medicine, Yale Univ., New Haven, Conn.). 29 Dec.

Ecological Soc. of America (R. S. Miller, Dept. of Biology, Univ. of Saskatchewan, Saskatoon, Saskatchewan, Canada). 26–31 Dec.

History of Science Soc. (D. J. de Solla Price, Dept. of History of Science and Medicine, Yale Univ., New Haven, Conn.). 27–29 Dec.

Institute of Management Sciences (M. M. Flood, Mental Health Research Inst., 205 N. Forest Ave., Ann Arbor, Mich.). 30 Dec.

Metric Assoc. (J. T. Johnson, 694 W. 11 St., Claremont, Calif.). 27 Dec.

Mountain Lake Biological Station (H. H. Hobbs, Jr., Univ. of Virginia, Charlottesville, Va.). 29 Dec.

National Acad. of Economics and Political Science (A. E. Taylor, Parkton, Md.). 27 Dec.

National Assoc. of Biology Teachers (P. Webster, Bryan City Schools, Bryan, Ohio). 27–30 Dec.

National Assoc. for Research in Science Teaching (G. Mallinson, School of Graduate Studies, Western Michigan Univ., Kalamazoo). 27 Dec.

National Assoc. of Science Writers (E. Ubell, Herald Tribune, New York, N.Y.). 27 Dec.

National Geographic Soc. (W. R. Gray, NGS, 16th and M Sts., NW, Washington 6). 30 Dec.

National Speleological Soc. (Brother Nicholas, FSC, Dept. of Biology, Univ. of Notre Dame, Notre Dame, Ind.). 27 Dec.

Nature Conservancy (J. W. Brainerd, Springfield College, Springfield, Mass.). 27 Dec.

New York Acad. of Sciences (D. Purpura, College of Physicians and Surgeons, Columbia Univ., New York, N.Y.). 30 Dec.

Science Clubs of America (Miss L. V. Watkins, Science Service, 1719 N Street, NW, Washington 6). 30 Dec.

Scientific Research Soc. of America (D. B. Prentice, 56 Hillhouse Ave., New Haven 11, Conn.). 29 Dec.

Sigma Delta Epsilon (Mrs. E. Cortelyou, Aeroprojects Inc., W. Chester, Pa.). 27–29 Dec.

Society for General Systems Research (C. A. McClelland, Dept. of History, San Francisco State College, 1600 Holloway Ave., San Francisco, Calif.). 29 Dec.

Society for the History of Technology (C. W. Condit, Department of English, Northwestern Univ., Evanston, Ill.). 27–29 Dec.

Society for Industrial and Applied Mathematics (J. Griesmer, IBM Research Center, Box 218, Yorktown Heights, N.Y.). 28 Dec.

Society for Industrial Microbiology (J. A. Ramp, 11 Van Dyke Rd., Waldwick, N.J.).

Society of the Sigma Xi (T. T. Holme, 56 Hillhouse Ave., New Haven 11, Conn.). 29 Dec.

Society for the Study of Evolution (H. H. Ross, State Natural History Survey, Urbana, Ill.). 27–29 Dec.

Society of Systematic Zoology (C. F. Lytle, Dept. of Zoology, Tulane Univ., New Orleans 18, La.). 27–29 Dec.

Tau Beta Pi Assoc. (R. H. Nagel, Tau Beta Pi Assoc., Univ. of Tennessee, Knoxville). 29 Dec.

Torrey Botanical Club (Miss A. Hervey, New York Botanical Garden, Bronx Park 56, N.Y.). 27 Dec.

27–28. Council for the Improvement of Scientific Communication—Cong. on Educology and Role Growth Theory of Communication and Learning, New York, N.Y. (R. L. Switzen, 840 Grand Concourse, New York 51.)

27–29. Conference on Strong Interactions, Berkeley, Calif. (A. C. Helmholz, Dept. of Physics, Univ. of California, Berkeley.)

27–29. Northwest Scientific Assoc. and Idaho Acad. of Science, joint meeting, Moscow. (E. J. Larrison, Dept. of Biological Sciences, Univ. of Idaho, Moscow.)

27–14. Bahamas Surgical Conf., Nassau. (B. L. Frank, P.O. Box 4037, Fort Lauderdale, Fla.)

28. Association for Education in International Business, St. Louis, Mo. (J. N. Behrman, Univ. of Delaware, Newark, Delaware)

28–30. American Economic Assoc., St. Louis, Mo. (J. W. Bell, Northwestern Univ., Evanston, Ill.)

(See issue of 18 November for comprehensive list)