SCIENCE

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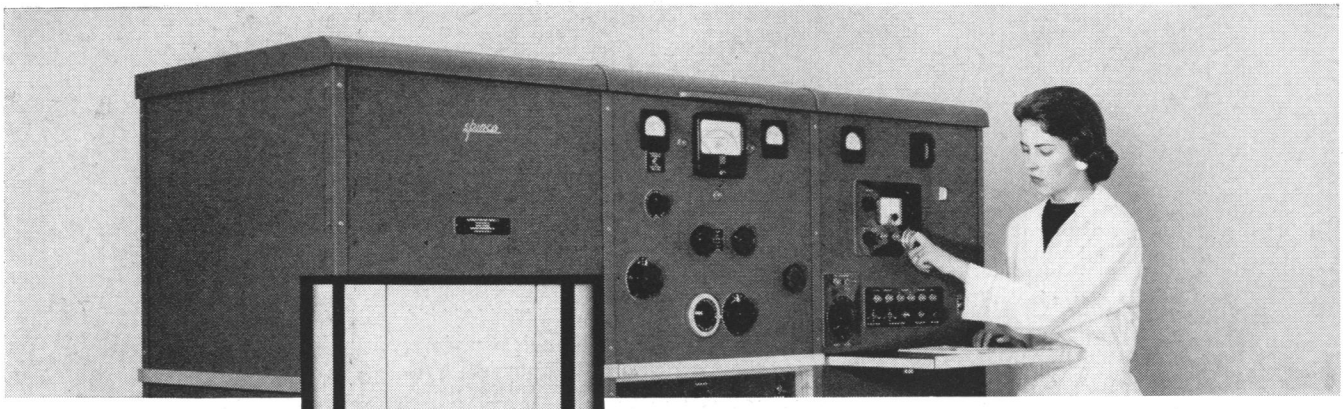
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

New Methods Extend the Usefulness of the Ultracentrifuge

Recent studies by research scientists have further increased the uses of the Analytical Ultracentrifuge for measuring molecular weights and purity of viruses, enzymes, proteins, polymers and a variety of organic and inorganic molecules. Here are four new developments as reported in the technical literature.



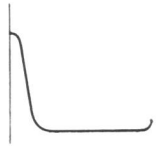
Interacting Systems

Kegeles and Rao at Clark University have measured the molecular weights of chemically reacting systems in the ultracentrifuge cell using the Archibald "approach-to-equilibrium" method. Studying the enzyme system alpha-chymotrypsin, they showed it to be present in the ultracentrifuge cell as an equilibrium mixture of monomers, dimers, and trimers. This is an extension of previous work which showed that the Archibald method applies to polydisperse non-ideal solutions, as well as to monodisperse ideal solutions.

Improved Accuracy

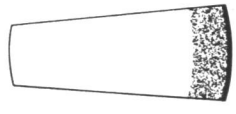
Trautman, at New York's Rockefeller Institute for Medical Research, showed that the accuracy of the Archibald method can be improved by more precisely locating the position of the meniscus on the ultracentrifuge photographic plate. He made a detailed study of the optical fine structure at the meniscus, and used a special optical aligning procedure with a mirror in the ultracentrifuge cell.

Simplified Measurements

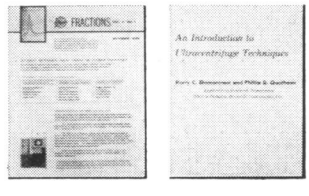


At Stockholm's Nobel Medical Institute, Ehrenberg reports a simplified approach-to-equilibrium method which makes measurements from the schlieren curve easier. He runs the ultracentrifuge fast enough for a peak to begin forming at the meniscus so that the schlieren curve is parallel with the baseline and no extrapolation is necessary. His measurements of molecular weight and diffusion constants agree closely with those by other methods.

Rapid Equilibrium



Van Holde and Baldwin at the University of Wisconsin have used short liquid columns to achieve complete sedimentation equilibrium in a fraction of the time previously required. Using liquid columns of only 3 mm, they report equilibrium with sucrose in 3½ hours, and with a 1 mm column in only 30 minutes. In addition, the authors report that measurements during approach-to-equilibrium permit calculation of a diffusion coefficient.



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Letters

Education of Science Teachers

The letter from William W. Porter II [*Science* **128**, 1156 (1958)] is an excellent illustration of how to promote resistance to the ideas one advocates. Educationists are told that their courses are completely worthless. Since they continue to offer these courses and even urge students to take them, it follows that either they are stupid or they are hypocrites. Neither of these accusations is, of course, uncommon.

Furthermore, we are asked to treat with respect arguments such as, "the world's great teachers, from Buddha, Aristotle, and Jesus Christ down to include most of our finest contemporary teachers, never had *any* courses in an education department." I cannot seem to recall exactly what university courses Buddha, Aristotle, and Jesus Christ *did* take and therefore cannot adequately evaluate the implied recommendation that public-school teachers prepare themselves in a similar fashion. However, with an ignorance of the facts which I suspect is equal to Porter's, I can assert that he is wrong about the contemporary group. I can maintain that most of our finest contemporary teachers have taken education courses and are teaching in our public schools, unrecognized and unrewarded.

It is stated that the President's science adviser is barred from teaching in the public schools. This is not strictly accurate. Most states offer provisional certification, and few, if any, school districts would turn down Killian if he would but apply. It may be noted that "mere money and salary increases" are almost certainly necessary, albeit not sufficient, conditions for an increase in the number of high-school teachers that are of this caliber.

Again, Porter seems to overlook the fact that the student receiving a general secondary teaching certificate from the University of California, to take his example, has (i) completed an undergraduate major in his subject field, (ii) been recommended by the department concerned, (iii) spent two semesters as a graduate student, and (iv) taken, as a rule, only 17 to 19 hours of education courses, which is only slightly more than one of his ten semesters of work. If his liberal arts background is deficient, perhaps the liberal arts departments need investigation.

The summer-school situation is typical of many universities and occurs for a variety of reasons. Among them may be noted: (i) the feeling among considerable numbers of teachers that they will learn more in education courses than in other courses; (ii) the relative rarity of liberal arts (especially science) courses appropriate for high-school teachers who have already completed undergraduate majors but who do not have the time, interest, or ability to undertake courses designed for prospective research workers; (iii) the suspicion among the students, not entirely unfounded, that if they take courses other than those in education, their interests and problems will be ignored and they may have to listen to sneers at themselves, their colleagues, and their profession. The frequency with which they encounter this attitude during the regular sessions is sufficient to dissuade a number of potentially able teachers from entering the profession each year.

It should be noted that the major premise of the educationists has been conceded by Porter, by the many others who have written similar letters and articles, and by those who attended the AAAS Parliament of Science. Obviously, we all agree that the problems of education need lengthy, serious, and mature consideration. It follows that teachers in training as well as those not as directly involved in public education should spend some time on this task.

Up to this point I have been, almost willy-nilly, reacting against the statements in Porter's letter. In so doing I have made statements almost as contentious and unfair as those against which I have railed. The sad thing about all this is that there is much truth in Porter's indictment. For example, almost all the educationists I know agree that certification requirements are sometimes arbitrary, rigid, and excessive. Also, the active participation of all departments of the university in teacher education has been fervently sought for years by many educationists. It appears that in several fields, notably mathematics, progress is being made. Finally, many of us agree that political action will be necessary, since, unfortunately, our influence is actually small. In short, there is enough agreement so that we *could* work together.

I would say to all who feel as Porter does (a majority of those at the Parliament of Science, it seemed to me) that we, the educationists, are glad that you are becoming seriously concerned about the public schools. Constructive, forward-looking criticism, suggestions, and, above all, participation in action are welcomed by us. You will find that most of us agree with you about the necessity for a thorough liberal arts preparation for teachers. You will disagree with us about the necessity for education courses. However, if you are willing to put in sufficient time and effort, you may well become convinced that the tremendous amount of study and research we have done in psychology and education in the past 50 years has produced a body of

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knowledge with which teachers should have some acquaintance. After due consideration, you might even concede that there are some things that teachers should know as members of an important profession, as public employees, and as part of one of the most important of all American institutions.

DONALD ROSS GREEN
Division of Teacher Education,
Emory University, Atlanta, Georgia

I find that I must disagree most thoroughly with Porter on every point that he makes concerning the education of science teachers for the secondary schools. He makes statements which are either patently false or are not applicable to the situation. However, these arguments of his (which are not new) are not my present concern.

From my experience in three institutions which train science teachers and carry on in-service programs to upgrade the quality of teachers, I find a number of factors at work which make teacher training less adequate than it should be.

The first of these factors has to do with the manner in which liberal arts and graduate science courses are taught. Demonstration and other illustrative materials are prepared out of sight of the student. The source of teaching films and other audiovisual materials is not revealed. As a result, the student, while he learns the content, does not have an opportunity to learn how to teach this same material. Some instructors, in fact, seem to regard the precise method of preparing a particularly effective demonstration as a professional secret to be kept from the students.

A second point of considerable difficulty has to do with the scheduling of content courses. While schools of education typically offer a number of courses in the late afternoon, on Saturday, and in the evening for the convenience of teachers, such courses on the level desired in the subject areas are seldom encountered. The same problem occurs for students when they are practice-teaching. The lecture-laboratory pattern of most science courses, coupled with the problems of transportation that student teachers encounter, serves to keep them from taking content courses. As to summer-session courses, I would like to suggest to Porter that it is hardly reasonable to compare the offering of the entire education department to that of only a few content areas. I must assume that history, economics, sociology, English, literature, and foreign languages, to name a few, were also taught at the University of California at Los Angeles in the summer of 1958. I am certain that science and mathematics teachers were but a minority of those enrolled in the university last summer and that the number of education courses was not, in fact, disproportionate.

In closing I would like to suggest to Porter and others who feel as he does that they observe student teachers in the schools and see for themselves what the problems and deficiencies of the beginning teachers are. They will find their educationist colleagues eager to help them visit the schools.

PETER DEAN
Wayne State University,
Detroit, Michigan

Porter's complaint, in general, is that a college graduate with a major in science cannot begin to teach at once.

Neither can a young man with a major in—let us say—chemistry begin practice as a physician or a dentist, be admitted to the bar, get a license to preach, set up an architectural or engineering office, join the musicians' union, or solicit clients as a public accountant.

Neither can a young woman with a major in—let us say—biology register as a nurse for hospital or private practice, apply for a dietician's post, or even open a beauty shop.

These young people are specialists, but they are not professionals. Professions, of which teaching is one, require certification to protect the public from amateurs and the untrained.

The reason there are so many different courses in education (as Porter counts them in a certain institution) is that there are so many different kinds of teachers. An elementary teacher (kindergarten through third grade) needs specific information and experiences which are different from those helpful to an intermediate teacher (fourth through sixth grades). Teaching at junior and at senior high-school levels involves by no means the same topics, texts, or techniques. Therefore certain fundamental courses are given first, then, in the department of education, specialization begins, just as in a medical school. Of greatest value before graduation are the many weeks of practice teaching required, analogous to the medical student's bedside courses and actual hospital experiences.

Porter's letter is another among the hundreds of published objections to the professional education of teachers which date back to 1839, when the first normal school was established, at Lexington, Mass., with 25 young women as students. The eloquence of Horace Mann outweighed the opposition before the Massachusetts legislature at that time. The professional training of teachers has its opponents, and also its defenders, today.

HANOR A. WEBB
245 Blue Hills Drive,
Nashville, Tennessee

(Continued on page 786)

Letters

(*Continued from page 746*)

The first comment by Donald Ross Green is meaningless because I did not make the statements or accusations he is refuting. My argument was directed toward getting rid of the arbitrary regulations—not the educationists themselves and their courses. Even Green concedes farther on in his letter that almost all educationists he knows "agree that certification requirements are sometimes arbitrary, rigid, and excessive." Toward the end he refers to the body of knowledge resulting from study and research in the past 50 years, but what is he concerned about? Surely sound scholarly education courses based on that research and knowledge would survive on merit without artificial support by excessive and arbitrary legal requirements.

I stated essentially that most great teachers of the past and present never had any courses in an education department. Green states that "most of our finest contemporary teachers have taken education courses." Ignoring a possible quibble over the word *most,* both statements are correct, but taken together they lead to the conclusion that education courses are not vital to the making of good science teachers; they may help and often do help, but their contribution is auxiliary and not dominant. The trouble is that an important segment of educationists won't play the auxiliary role of helping educated people to teach others. They insist on dominating the whole stage. They are appalled at the suggestion that the experts in the field of science should have an important voice in deciding who shall teach science.

My statement that capable teachers are barred from public schools by present requirements ignored provisional certification. So granted: the superior scholar and teacher is not technically barred but may teach provisionally. This only proves that under present law in most states the President's science adviser can get provisional certification—the provision being, of course, that he bone up at night and in the summer in the education department until his "deficiencies" are made up! It is still a sorry situation that merely emphasizes the importance of reducing excessive requirements. To meet the requirement in education courses is hard for the student who considers teaching late in his academic career. He is in a jam for time. The graduate student likewise is out of luck. He looks at the "provisions" of the provisional certificate and decides to do something else; he is, in effect, barred from teaching in the public schools.

These ridiculous situations could be solved through legislation recognizing science-department certification as acceptable in lieu of the standard education-department requirements. A science-department faculty is made up of capable, conscientious people who can accept responsibility. After working with a student for several years, they know his capabilities and needs. If he needs the presently required education courses, they will make him take them, but if not, they won't waste his time, and he will be a better teacher for it. Science faculty members *are* professional teachers as well as scholars.

Of course Green is right in believing that on intellectual grounds there is enough agreement so that all could work together. But, unfortunately, many educationists lack the sincere constructive attitude which is evident in Green's letter. Power-hungry, they resist any interference with their present almost complete control of secondary education. I'm afraid the answer lies in political action by a public awakened by sputnik to the existence of the problem and gradually becoming aware of the causes. Conference amounts to an intellectual Munich. From a position securely entrenched in law the educationists negotiate against the educated community armed with an umbrella.

It is all very well to know where to find props for demonstrations, how to use film libraries, and how to locate audio-visual materials, but the science faculty is a better judge of how much education-department time is necessary for picking up these incidentals than those who lobbied the present rigid and arbitrary requirements onto the statute books years ago or the present-day educationists who resist change of those old-fashioned laws.

I didn't whitewash the liberal arts departments. If there are places where rescheduling is necessary to meet the needs of the teaching profession, then by all means let's have rescheduling.

The attempt by Webb to restate my premise as merely a complaint that "a college graduate with a major in science cannot begin to teach at once" indicates inability to refute my argument for repeal of present laws under which that same graduate still cannot teach in the public schools after adding a Ph.D. and ten years of successful teaching in universities or private secondary schools. The new graduate with one more year and enough education-department courses can teach at once—he can get the certification that is denied the superior scholar and experienced professional teacher. Teaching quality is thus downgraded by applicable but obsolete regulations. Laws that create such inequities should be repealed or drastically revised.

WILLIAM W. PORTER II
244 South Gramercy Place,
Los Angeles, California

Meetings

Unusual Conditions in the Pacific

During 1957 and early 1958 it became apparent that the weather, temperatures, and biology of the Pacific were undergoing changes that were quite outside the range of conditions of the last decade or more.

At the invitation of the Scripps Institution of Oceanography, 30 scientists met at Rancho Santa Fe, near San Diego, California, 2–4 June 1958, to consider the nature and causes of the unusual conditions (*1*).

Participants were from institutions on both coasts of North America and from Hawaii, Japan, and Peru, representing research in the fields of meteorology, oceanography, marine biology, and fishery biology, and included persons actively pursuing their research in the Pacific, from the Bering Sea to Peru and westward through the Central Pacific to Japan.

Data considered were the Northern Hemispheric circulation in the atmosphere, sea temperatures, sea level and currents of the Pacific, and the distribution of marine organisms. In addition, the symposium heard a report on the unusual solar events of 1957, when, in September, sun-spot activity reached a 250-year (all-time record) high. The possible relation to the unusual meteorology was discussed.

Another major departure from conditions in immediately preceding years and from those recorded over long-term periods consisted of the unusually strong development and the southeasterly position of the Aleutian low-pressure systems, especially during the winter of 1957–58; these changes produced markedly anomalous wind fields in middle latitudes of the eastern Pacific directed northeastward, and in the northwest Pacific directed southwestward. This was accompanied by unusually high sea temperatures over much of the eastern Pacific, from the Gulf of Alaska to the coasts of Peru. On the other hand, colder sea temperatures extended southward from the Bering Sea along the coast of Japan. Hawaii, during the summer of 1957, failed to experience the usual lowering of salinity connected with the seasonal oscillations of the subtropic convergence system. Sea levels were anomalously high along the West Coast of North America, by an average of 0.5 foot, with the anomaly appearing earliest and most pronouncedly along the coast of southern California. Drift bottles released 500 miles off the coast of British Columbia at latitude 50°N fetched up on beaches rimming the northern shore of the Gulf of Alaska instead of taking their more usual course eastward toward

British Columbia, Washington, and Oregon. A strongly developed coastal countercurrent along central and northern California, Oregon, and Washington was evidenced by drift bottles released in California waters.

The diatom and dinoflagellate flora monitored at the Scripps Pier at La Jolla, California, included considerable numbers of tropical forms previously rare or absent. Southern forms also were found far north of their expected range in California waters. Certain species of salps ordinarily confined to waters off southern California extended northward in coastal waters well beyond Point Conception, as did also certain euphausiids of similar normal range. Species of these two groups, which normally occupy the oceanic mid-Pacific waters, apparently did not spread eastward towards the North American coasts, however. As for the fishes, there were a number of records from farther north of tropical and subtropical species, and two species, the barracuda and yellowtail, usually caught by sportsmen in moderate numbers off southern California, were taken in numbers larger by an order of magnitude than the usual number. Dolphin fish were taken in entirely unprecedented numbers. Sardine spawning, which in the preceding 7-year period had been largely confined to waters off Lower California, in 1957 and 1958 took place in southern California waters. There was an indication that, in 1958, the pelagic phyllosome larvae of the spiny lobster were being better retained in the waters of southern California than in previous years.

The long-term records of such meteorological and oceanographic data as have been recorded systematically suggested that the conditions of 1957 and the winter of 1957–58 represented a marked reversal of conditions which had persisted during the previous decade and resembled roughly the conditions usual during the decade of the 1930's. The year 1958 appeared, at the time of this writing, to resemble the unusual years of 1926, 1931, and 1941.

Extensive consideration of theoretical models and empirical oceanographic observations led to the conclusion that the phenomena observed during 1957, which reached their peak in the winter of 1957–58, were undoubtedly the evidence of large-scale advection of water masses, but that the theory and the data so far analyzed are inadequate to distinguish the processes by which this advection took place. Particularly in question was the relative influence of transport from the offshore direction as compared with the transport alongshore from the south. The coastal countercurrent (sometimes called the Davidson Current) was more highly developed than in the immediately preceding years, but the mechanisms involved, and the role the coastal countercurrent played in the changed temperature field, remained obscure. Likewise, speculation on a possible displacement of the zonal North Pacific current system failed to produce an entirely satisfactory explanation.

In view of the obviously inadequate state of oceanographic observations and theory, it was felt that the conditions of 1957 and of the winter of 1957–58 should furnish strong motivation for determined efforts to evolve theories in conjunction with direct measurements of water movements and continued dynamic measurements on a much wider scale.

The symposium emphasized the point that local changes of conditions cannot be studied provincially but are part of Pacific-wide or possibly world-wide changes.

The proceedings of the symposium are to be published, and are to be dedicated to Bell Shimada and Townsend Cromwell, whose tragic and untimely deaths in an aircraft accident in Mexico occurred during the symposium.

JOHN D. ISAACS
Scripps Institution of Oceanography, La Jolla, California

OSCAR E. SETTE
Fish and Wildlife Service, U.S. Department of the Interior, Stanford, California

Note

1. This report is a contribution from the Scripps Institution of Oceanography. It is based on a report to the American Society of Limnology and Oceanography, Logan, Utah, of 18 June 1958.

Forthcoming Events

May

18–22. American Soc. of Tool Engineers, 27th annual, Milwaukee, Wis. (ASTE, 10700 Puritan, Detroit 38, Mich.)

19–23. Oil and Gas Power Conf. (American Soc. of Mechanical Engineers), Houston, Tex. (O. B. Schier, ASME, 29 W. 39 St., New York 18.)

19–24. American Pharmaceutical Assoc., annual conv., Cincinnati, Ohio. (R. P. Fischelis, APA, 2215 Constitution Ave., Washington 7.)

20–21. Analog and Digital Instrumentation, 3rd natl. conf. (American Inst. of Electrical Engineers), Philadelphia, Pa. (N. S. Hibshman, AIEE, 33 West 39 St., New York 18.)

20–22. American Oil Chemists' Soc., spring, 50th anniversary, New Orleans, La. (Mrs. L. R. Hawkins, 35 E. Wacker Dr., Chicago 1, Ill.)

20–22. Boundary Problems in Differential Equations, symp., Madison, Wis. (R. E. Langer, Mathematics Research Center, U.S. Army, 1118 W. Johnson St., Madison 6.)

20–23. American Urological Assoc., Atlantic City, N.J. (S. L. Raines, 188 S. Bellevue Blvd., Memphis, Tenn.)

20–23. International Anesthesia Research Soc., 33rd cong., Miami Beach, Fla. (A. W. Friend, IARS, E. 107 and Park Lane, Cleveland 6, Ohio.)

20–24. American College of Physicians, Chicago, Ill. (E. R. Loveland, 4200 Pine St. Philadelphia 4, Pa.)

20–26. International Acad. of Pathology, annual, Boston, Mass. (F. K. Mostofi, Armed Forces Inst. of Pathology, Washington 25.)

21–22. Electronic Data Processing, conf., Cincinnati, Ohio. (C. H. Osterbrock, IRE, Univ. of Cincinnati, Cincinnati, Ohio.)

21–23. American Assoc. for Thoracic Surgery, Los Angeles, Calif. (H. T. Langston, 7730 Carondelet Ave., St. Louis 5, Mo.)

21–23. German Starch Conv., Detmold, West Germany. (Assoc. of Cereal Research, Detmold, Am Schutzenberg 9, West Germany.)

21–25. Psychosomatic Research, 4th European cong., Hamburg, Germany. (H. Freyberger, II. Med. Univ.–Klinik und Poliklinik, Hamburg-Eppendorf, Germany.)

23–24. Molecular Genetics and Human Disease, symp., Syracuse, N.Y. (L. I. Gardner, Dept. of Pediatrics, State Univ. of New York, College of Medicine, Syracuse 10.)

23–25. American Assoc. of Pathologists and Bacteriologists, Boston, Mass. (R. L. Holman, 1542 Tulane Ave., New Orleans 12, La.)

23–25. Hawaii Medical Assoc., Hilo. (L. McCaslin, 510 S. Beretania St., Honolulu 13.)

23–25. Nuclear Reactor Theory; Finite Groups, 2 symps. by Amer. Mathematical Soc., New York, N.Y. (E. G. Begle, Leet Oliver Hall, Yale Univ., New Haven, Conn).

24. Illinois State Acad. of Science, 52nd annual, Chicago. (J. S. Ayars, Department of Registration and Education, State Natural History Survey Division, Urbana, Ill.)

24–25. American Assoc. of University Professors, Pittsburgh, Pa. (R. F. Fuchs, AAUP, 1785 Massachusetts Ave., NW, Washington 6.)

24–25. Georgia Acad. of Sciences, Macon. (R. J. Martin, Dept. of Geology, Emory Univ., Atlanta 22, Ga.)

24–25. Louisiana Acad. of Sciences, Ruston. (G. H. Ware, Northwestern State College, Natchitoches, La.)

24–25. South Dakota Acad. of Science, Yankton. (J. M. Winter, Botany Dept. State Univ. of South Dakota, Vermillion, S.D.)

25. West Virginia Acad. of Sciences, Huntington. (J. D. Draper, Bethany College, Bethany, W.Va.)

25–26. Population Assoc. of America, Providence, R.I. (D. O. Price, Box 630, Chapel Hill, N.C.)

25–30. Scientific Apparatus Makers Assoc., 41st annual, White Sulphur Springs, W. Va. (J. Irving, Director of Public Information, SAMA, 20 N. Wacker Drive, Chicago 6, Ill.)

25–1. Industrial Health Conf., Chicago, Ill. (Industrial Health Conf., Room 1313, 28 E. Jackson Blvd., Chicago 4.)

26–29. Industrial Medical Assoc., Chi-

cago, Ill. (L. Arling, 3101 University Ave., SE, Minneapolis 14, Minn.)

27–28. Society of Exploration Geophysicists, 12th annual midwestern exploration, El Paso, Tex. (D. Dawson, Dawson Geophysical Co., Midland, Tex.)

27–28. Society of Neurological Surgeons, New York, N.Y. (B. S. Ray, 525 E. 68 St., New York 21.)

27–29. Aero Medical Assoc., Los Angeles, Calif. (T. H. Sutherland, P.O. Box 26, Marion, Ohio.)

27–30. Physical Chemistry of Extractive Metallurgy, intern. symp., Pittsburgh, Pa. (AIME, 29 W. 39 St., New York 18, N.Y.)

27–30. Physical Chemistry of Process Metallurgy, intern. symp., Pittsburgh, Pa. (J. F. Elliott, Room 8-109, Massachusetts Inst. of Technology, Cambridge 39.)

27–1. American Psychiatric Assoc., Philadelphia, Pa. (C. H. Hardin Branch, 156 Westminister Ave., Salt Lake City, Utah.)

29–1. American Inst. of Electrical Engineers, Syracuse, N.Y. (N. S. Hibshman, AIEE, 33 W. 39th St., New York 18.)

30–1. Eastern States Health Education Conf., New York, N.Y. (I. Galdston, New York Acad. of Medicine, 2 E. 103 St., New York 29.)

30–1. Youth Conference on the Atom, 1st natl., Atlantic City, N.J. (W. Adams, Bozell & Jacobs, Inc., 2 W. 45 St., New York 36.)

30–2. American Assoc. for Cleft Palate Rehabilitation, Philadelphia, Pa. (D. C. Spriestersbach, University Hospitals, Iowa City, Iowa.)

30–2. American Goiter Assoc., Chicago, Ill. (J. C. McClintock, 149½ Washington Ave., Albany, N.Y.)

30–2. American Physical Soc., Washington, D.C. (K. K. Darrow, Columbia Univ., New York 27, N.Y.)

30–2. Eastern College Science Conf., 13th annual, Boston, Mass. (A. F. Lett, ECSC, Suffolk Univ., Boston 14.)

30–2. Kansas Acad. of Sciences, Lawrence. (J. O. Harris, Kansas State College, Manhattan.)

30–3. Student American Medical Assoc., Chicago, Ill. (R. F. Staudacher, 430 N. Michigan, Chicago 11.)

30–4. American Assoc. for the Study of Neoplastic Diseases, Gatlinburg, Tenn. (B. H. Sisler, Box 268, Gatlinburg.)

May

1–3. Prevention of Bacterial Resistance to Antibiotics, intern. symp., Perugia, Italy. (Segreteria del Simposio, Clinica Ostetrica e Ginecologica, Policlinico, Perugia.)

2. Idaho Acad. of Science, Moscow. (E. J. Larrison, Sec.-Treas., Dept. of Biological Sciences, Univ. of Idaho, Moscow.)

2–3. American Psychosomatic Soc., 16th annual, Atlantic City, N.J. (M. Rosenbaum, APS, 265 Nassau Rd., Roosevelt, N.Y.)

2–7. Experimental Biology, intern. symp. (celebration of Lazzaro Spallanzani), Reggio and Pavia, Italy. (C. Jucci, Director, Istituti di Zoologia L. Spallanzani, Universita-Pavia, Palazzo Botta, Pavia, Italy.)

2–9. International Union for Health Education of the Public, 4th conf., Dussel-

dorf, Germany. (M. L. Viborel, 92, rue St. Denis, Paris 1e, France.)

3. American Federation for Clinical Research, annual, Atlantic City, N.J. (G. E. Schreiner, Georgetown Univ. Medical Center, Washington 7.)

3. Periapical Lesions-Pacific Coast Oral Pathology Workshop, 1st annual, Los Angeles, Calif. (W. Bullock, Dept. of Pathology, Univ. of Southern California School of Medicine, 1200 N. State St., Los Angeles.)

3–7. American Assoc. of Cereal Chemists, 44th annual, Washington, D.C. (J. W. Pence, AACC, Western Utilization Research Laboratories, Albany, Calif.)

3–7. Electrochemical Soc., Philadelphia, Pa. (Electrochemical Soc., Inc., 216 W. 102 St., New York 25.)

3–7. Electrode Processes, symp., Philadelphia, Pa. (Headquarters, Air Force Office of Scientific Research, Washington 25.)

3–7. Mechanical Properties of Intermetallic Compounds, Philadelphia, Pa. (J. H. Westbrook, General Electric Research Laboratory, P.O. Box 1088, Schenectady, N.Y.)

4. American Soc. for Clinical Investigation, annual, Atlantic City, N.J. (W. W. Stead, J. Hillis Miller Health Center, Gainesville, Fla.)

4–5. Microcirculatory Conf., 7th annual meeting, NIH, Bethesda, Md. (B. W. Zweifach, 550 First Ave., New York 16.)

4–7. American Geophysical Union, annual, Washington, D.C. (W. E. Smith, AGU, 1515 Massachusetts Ave., NW, Washington 5.)

4–7. National Instrumentation Flight Test Symp., 5th, Seattle, Wash. (H. T. Noble, Boeing Airplane Co., Flight Test Station, Wichita 1, Kan.)

4–8. American Soc. of Civil Engineers, Cleveland, Ohio. (W. H. Wisely, 33 West 39th St., New York 18.)

5–6. Association of American Physicians, annual, Atlantic City, N.J. (W. W. Stead, vice president, AFCR, J. Hillis Miller Health Center, Gainesville, Fla.)

5–6. Self-Organizing Systems, conf., Chicago, Ill. (S. Cameron, ICSOS Conference Secretary, Armour Research Foundation, 10 W. 35 St., Chicago 16.)

5–7. International Scientific Radio Union, spring meeting, Washington, D.C. (J. P. Hagen, National Acad. of Sciences, 2101 Constitution Ave., NW, Washington 25.)

5–9. Southwestern and Rocky Mountain Div., AAAS, Laramie, Wyo. (M. G. Anderson, New Mexico College of Agriculture and Mining, State College.)

5–12. Electronic Distance Measuring Equipment, Intern. Assoc. of Geodesy symp., Washington, D.C. (C. A. Whitten, Coast & Geodetic Survey, Washington 25.)

6–8. American Inst. of Chemists, Atlantic City, N.J. (L. Van Doren, American Inst. of Chemists, Inc., 60 E. 42 St., New York 17.)

6–8. American Pediatric Soc., Buck Hill Falls, Pa. (A. C. McGuinness, 2800 Quebec St., Washington 8.)

6–9. National Science Fair, 10th, Hartford Conn. (Science Clubs of America, 1719 N St., NW, Washington 6.)

6–10. Infectious Pathology, intern. cong., Milan, Italy. (A. Janussi, Secretary General, via Boccaccio 25, Milan.)

7–9. Midwestern Psychological Assoc., Chicago, Ill. (I. E. Farber, Dept. of Psychology, Univ. of Michigan, Ann Arbor.)

7–9. World Cong. on Agricultural Research, International Confederation of Agricultural Engineers and Technicians, Rome, Italy. (CITA, Regional Secretariat, 86, via Barberini, Rome.)

8–10. Uranium, 4th annual symp., Moab, Utah. (AIME, 29 W. 39 St., New York 18.)

9–11. International Soc. of Acupuncture, 10th cong., Paris, France. (SIA, 8 avenue Franklin Roosevelt, Paris 8e.)

10–15. Society of American Bacteriologists, St. Louis, Mo. (E. M. Foster, Univ. of Wisconsin, Madison 6.)

10–14. American Soc. of Maxillofacial Surgeons, Chicago, Ill. (O. H. Stuteville, 700 N. Michigan, Chicago 11.)

11–12. Practical Problems of Coordinating and Integrating All Services Related to the Treatment, Training and Management of the Mentally Retarded, conf., Vineland, N.J. (J. D. Eadline, Training School, Vineland, N.J.)

11–13. Instrumentation and Computation in Process Development and Plant Design, symp., London, England. (Institute of Chemical Engineers, 16, Belgrave Sq., London, S.W.1.)

11–13. Microwave Theory and Techniques, natl. symp., Boston, Mass. (H. Pratt, Inst. of Radio Engineers, 1 E. 79 St., New York 21.)

11–13. Power Instrumentation, natl. symp., Kansas City, Mo. (H. H. Johnson, Consolidated Edison Co. of New York,