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Serum Bilirubin determinations in infants suffering from erythroblastosis fetalis have proved an important criteria for the use of exchange transfusions. The accuracy of this measurement has always been open to question because of uncertainty about the purity of bilirubin (1).

Our specifications for Bilirubin are:

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The problem of finding an accurate method for bilirubin determination has occupied clinical chemists for 50 years. For determinations of new-born plasma, the most useful procedure is the Lathe and Rutheven (2) modification of the Malloy-Evelyn method (3). Stoner and Weisberg have recently reported an excellent micromethod for bilirubin (4).

For accurate determinations of low values of bilirubin, methods of choice are those of Bruckner (5) and Jendrassik and Grof (6). The methods of Meites and Hogg (7), and Powell (8) have the advantage of rapidity and involve few manipulative steps for the laboratory that does not have access to specialized equipment.

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<th>Quantity</th>
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<tr>
<td>5 gram bottle</td>
<td>$14.90</td>
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<td>1 gram bottle</td>
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<td>500 mg bottle</td>
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### REFERENCES:


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<tr>
<td>100 grams</td>
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complacency in behavioral science of which Bixenstine speaks. In the special field of the experimental analysis of behavior I do see a new kind of confidence. It springs not from “a release from preoccupation with theory” but from success. Important problems are being attacked and solved. Methods are available which are effective with respect to behavior as a subject matter, but this does not mean that they should be emulated in every other field of science.

B. F. SKINNER
Psychological Laboratories, Harvard University, Cambridge, Massachusetts

Melman Controversy

The tone of D. S. Greenberg's article on Seymour Melman (News and Comment, 17 Apr., p. 27), as well as that of his reply to Melman's letter (Letters, 17 July, p. 233), seems out of place in your pages. What Greenberg says, what he leaves unsaid, and the phrases he employs all seem to suggest a political argument rather than a presentation of factual material. Contributions of this sort do not seem well designed to add luster to your excellent journal.

ALBERT KAPLAN
4385 Maryland, St. Louis 8, Missouri

Italy: Science and Politics

The article on research in Italy by V. K. McElheny (14 Aug., p. 690) was of more than casual interest to me, as I spent the period from October 1960 to June 1961 at the Instituto Superiore di Sanità under a Fulbright grant. I worked with G. Gualandi in E. B. Chain's group. Even at that time distinct political interference could be noted in the workings of that research institution. Members of political parties of extreme left and right (especially those affiliated with the Movimento Sociale Italiano) continually alluded to "foreign" elements in the Instituto which should be eliminated. I am sorry that McElheny did not delve further into these political involvements, as I think that the recent unfortunate happenings in Italy are only the legalistic culmination of a long series of parliamentary proceedings, both official and otherwise. Even 3 years ago many persons warned of what would follow if the situation continued to deteriorate.

I believe that the obvious lesson to be learned—if, indeed, it is not already clear to all—is that partisan politics can only have an insidious influence on the administration of any research organization, large or small. Of the wealth of scientific ability and achievement in Italy both in the past and future I have no doubt; one can only hope that members of the Italian Parliament share this view and will cease the harassment and interference which has resulted in the unhappy and unnecessary events described.

HAROLD B. REisman
108 Huntington Avenue, Danville, Pennsylvania

“Science” ≠ Sciences

I should like to comment on the recent discussion of the science training in a liberal arts curriculum (Letters, 21 Aug., p. 767).

While the average science major of my acquaintance is knowledgeable in humanistic and sociological fields, few non-science majors are capable of contributing to a conversation in scientific areas. These students generally attempt to fulfill their science requirements by taking the easiest possible courses, "easiest" usually meaning a minimum of lab or problem work and a maximum of studying "science," instead of biology, physics, or chemistry. If these courses do succeed in teaching "science," it is a subject which I believe few scientists would recognize. The quality of teaching of the subjects themselves generally suffers from shared emphasis with the more general topic. In contrast, basic courses which aim primarily at exposing the student to the basic facts, methods, problems, and ideas of a particular scientific discipline give him both currency in that field and experience in "science." To imagine that this experience can be supplanted by formal teaching of the philosophical view is to credit philosophy with a scheme sufficiently well-developed and defined to enable the student to "appreciate" science. I personally doubt the existence of such a scheme and question the advisability of teaching any subject by teaching about the study of that subject.

STEPHEN MARK SCHWARTZ
Boston University School of Medicine, Boston, Massachusetts

25 SEPTEMBER 1964
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plants, it will serve to indicate problems and to provide a convenient approach to the widely scattered literature on the subject. Students of physiologically active compounds in plants will find in it much valuable information.

Hawaiian plants are included "as far as practical"—which does not appear to be very much. Otherwise, as far as determinable for the geographic area covered, all plants except bacteria known to have poisoned livestock or humans are treated. Some such plants, which occur on this continent but are not known to have caused poisoning here, are included on the basis of their known toxicity elsewhere. Many cases of plants reputed to be toxic but whose toxicity is undocumented by clear circumstantial or experimental evidence are not discussed.

Since this book is a survey drawn from the literature, doubtlessly many potentially harmful plants were omitted. A useful consequence of its publication may be to encourage the reporting of any well-documented cases unknown to the author or any that may come to light in future.

In the first chapter, which is provided with a separate bibliography, knowledge of poisonous plants in the United States and Canada is reviewed, and original sources of information are identified. Poisonous principles are discussed in the second chapter. The bulk of the book is devoted to individual or related groups of poisonous plants, the discussions of which generally are organized as follows: scientific name; common name(s), if any; description; distribution and habitat; poisonous principle(s); toxicity; symptoms and lesions; and conditions of poisoning. "Descriptions have been written with the intention of enabling a person to decide with certainty whether a suspected plant in hand is or is not the one described," a tall order and one that is not a little presumptuous. In many instances illustrations help in this regard, but not nearly all plants are illustrated. Discussions relating to given plants are uneven in terms of content. The unevenness generally reflects the relative state of knowledge in the particular case, not simply a matter of the author's choice.

The text is generously supplied with significant references, which are listed in a bibliography of 1715 titles. Some of the latter are review papers, the bibliographies of which have not been repeated but which are thus made more accessible to the interested reader or potential researcher.

This publication should be of great value to those for whom it was primarily intended. Many others of us who are tagged as "botanist" not infrequently have calls, often made in great haste, for information on poisonous plants such as those dealt with here. We shall be very grateful to be able to have the volume close at hand.

R. K. GODFREY
Department of Biological Science, Florida State University, Tallahassee

Biochemistry Textbook


We live in an era of comparative biochemistry, in which the basic metabolic pathways common to all organisms are stressed. We remind our students that glycolysis is pretty much the same in muscle, yeast cell, and leaf, and that the modern orthodoxy regarding DNA, RNA, and proteins pertains to all of God's creatures.

Why, then, a special book on plant biochemistry? Obviously, one might suppose, because there are, after all, unique plant processes such as photosynthesis and symbiotic nitrogen fixation, unique plant components such as cellulose, rubber, and alkaloids, and unique problems in chemical physiology posed by such plant structures as stomata, phloem, and endodermis. The unwary reader approaching this book from that point of view is doomed to disappointment. What he will find is a conventional textbook of biochemistry, in which topics like proteins and enzymes, bioenergetics, oxidative phosphorylation, and the metabolism of carbohydrates, organic acids, amino acids, nucleic acids, and lipids are given routine coverage. Most of the information in these chapters is based on data derived from microorganisms and animals, and when plants are dragged into the act, it all seems a little contrived and after-the-fact. The only chapters with a plant flavor are those on photosynthesis, isopentanes, and alkaloids, and I did not find them particularly interesting. I also regret the fact that the authors omitted from consideration such interesting and current topics as ferredoxin, phytochrome, and kinetin, such interesting older stories as the metabolism of selenium and fluorine, and such fascinating problems in chemical physiology as the control of stomatal opening.

What the authors have chosen to do, they have done accurately and well. My major complaint is that they haven't improved significantly on such older books as Fruton and Simmonds for general biochemistry or James Bonner or Trevor Robinson for plant biochemistry.

As one who teaches advanced plant physiology to graduate students, I will certainly recommend that they become familiar with the contents of this book. As an adviser, however, I would recommend that they learn basic biochemistry from a general course. I would hope that the specialized study of plant biochemistry would build on such a general course, and that each plant topic could be explored in greater depth than permitted by this volume. In such a context, this book will find only limited use as a textbook.

ARTHUR W. GALSTON
Department of Biology, Yale University

New Books

General


(Continued on page 1490)
with consequent formation of triplet states in high yield. Much of the variation in behavior is understandable on the basis of the variation in the electronic structures of the lowest-lying triplet states of different molecules. The general picture was extended by George Porter (Sheffield) who added consideration of low-lying “charge transfer” states to the usual \( \pi^* \) and \( \pi, \pi^* \) states. Although it appears to the reviewer that charge-transfer states are \( \pi, \pi^* \) states having large dipole moments, the generalization will be of great value because compounds having such low-lying states are exceptionally unreactive and easily characterized by spectroscopy. However, the developing harmony of thought was jolted in the last lecture by N. C. Yang (Chicago) who presented strong evidence that 9-anthraldehyde (and perhaps other compounds) reacts by way of a triplet state that is not the lowest available to the molecule. Evidently solution photochemists will have to recognize the possibility, well known from vapor-phase studies, that decay to the lowest excited state of a given multiplicity will not always be fast compared with bimolecular reactions.

Howard Zimmerman (Wisconsin), Oskar Jeger (Zurich E. T. H.), and Gerhard Quinkert (Braunschweig) also discussed rearrangement and fragmentation of ketones. No absolute mechanistic-type reaction has yet emerged. For example, reactions in which carbonyl groups are lost as carbon monoxide obviously involve free radicals in some instances, but in other cases show stereoselectivity which indicates that the lifetimes of any such intermediates must be vanishingly short. The well-known Zimmerman hypotheses concerning the rearrangements of unsaturated ketones were presented, discussed, expanded, and contracted. The writer is left with the feeling that he understands the various mechanisms but does not yet quite understand the compounds.

Discussions of photoaddition reactions by Richard Cookson (Southampton) and de Mayo served to remind participants that study of the mechanisms of photoreactions can often be blended with development of extraordinary new synthetic methods. One of the attractions of photochemistry is use of the reactions for synthesis of exotic compounds. Those who study reaction mechanisms seem to feel that they will shortly provide a systematic understanding to guide synthetic work. However, synthetic chemists feel such urg-
ency that they forge ahead and develop spectacular synthetic procedures without waiting for the final word from chemical dynamics. Fortunately, the two approaches enjoy a symbiotic relationship, frequently within a single laboratory.

Various aspects of the chemistry of conjugated dienes and polyenes were expounded by Madame Mousseron (Montpellier), William Dauben (Berkeley), and Klaus Gollnick (Müllheim). These versatile molecules undergo ring-closure, ring-opening, rearrangement by hydrogen transfer, cyclodimerization, and internal cycloadition to give fantastically distorted molecules and enter into a large number of reactions with other reactants—all under the influence of light. With this group of substrates there is often good evidence that triplet and singlet paths do not cross in many cases. Consequently, reactions effected by direct irradiation and by sensitization frequently give entirely different products.

Refreshing novelty was provided by Orville Chapman (Iowa State) and Mendel Cohen (Weizmann Institute). Chapman presented an entirely new group of photorearrangements of aromatic nitro compounds. Cohen discussed phototropism and photodimerization in crystals. The work complements studies of crystal structures by x-ray diffraction. At least within the two series of materials studied, it is possible to make unequivocal predictions concerning photochemical reactivity on the basis of intermolecular relationships within the crystals.

The symposium was sponsored by the Organic Division of the International Union of Pure and Applied Chemistry and the principal lectures will be published in a special issue of Pure and Applied Chemistry. The symposium and the accompanying course were supported by a grant from NATO. Financial aid from the latter organization was largely responsible for the presence of many young investigators.

GEORGE S. HAMMOND
California Institute of Technology,
Pasadena

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Surface Physics

Investigations of chemical and physical interactions occurring at solid surfaces were reported at the second annual Surface Physics Symposium held at Washington State University, Pull-
man, 8–9 May 1964. Most of the reported work was done under ultrahigh vacuum conditions so that a variety of spurious effects could be eliminated.

The surface ionization that takes place when a solid is evaporated from a heated metal surface has been widely used for some time in sources of charged particles and in molecular beam detectors; the efficiency of this process is predicted by the Saha-Langmuir equation. This equation, which agrees with experimental results for alkali metal evaporation, predicts that the ratio of ions to neutrals is greatest when a material with low ionization potential is evaporated from a high work function surface.

J. F. Truhlar (Washington State University) described an experiment in which heated filament-grade tungsten was found to be a source of ions of most of the alkaline metals, alkaline earths, and other substances. Previous work has shown that the ion current is a good indicator of the rate at which the surface of a filament is etched or chemically sputtered in reactive gases.

In a report on work recently completed at the Ames Laboratory of the Atomic Energy Commission, Miles J. Dresser (Washington State University) found that the Saha-Langmuir equation is grossly inadequate to predict the surface ionization efficiency for the electronically complicated rare earth atoms. The predicted ionization efficiency is incorrect both in its absolute value and in its temperature dependence. Apparently part of the problem results from the difficulty of assigning the proper statistical weights to complex atoms.

G. A. Antypas (Washington State University) is using the positive ion currents from a high purity Fe filament to study metal defects. Even with low impurity levels, easily measured ion currents are obtained and it is found that phase transformation and plastic deformation increase the positive ion current. It appears that these positive ion currents are a much more sensitive indicator of metal structure than is electron emission and that they will yield valuable information about metal defects and impurity diffusion.

E. W. Mueller (Pennsylvania State University) outlined recent advances in field ion microscopy and described a photoelectronic image intensifier that has reduced photographic exposure time by four orders of magnitude. The improved intensity permits the ultimate flickering of the atomic images to be

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25 SEPTEMBER 1964
observed. This flickering appears to be caused by the statistical variation in the ion current which originates at a single atomic point (about 10⁻⁴⁺ amperes).

E. V. Kornelsen (National Research Council of Canada) has found that when high energy, rare gas ions impinge upon tungsten monocrystals with velocities along certain preferred directions, their penetration is much greater than when a polycrystalline tungsten target is used. One can explain this by the fact that certain directions in the crystals are more open than others or that elastic vibrations can be more easily excited by particles traveling in a preferred direction. In addition to this, a fraction of a percent of the ions exhibit unusually long paths in monocrystals. These ions do not seem to be governed by normal stopping power laws; the mechanism of penetration is unknown.

Several conjectures were made to explain this unexpected result. One possibility is that the ions create phonon waves which then carry the ions for great distances with no energy loss. Another suggestion is that the projectile ions are channeled so that they tend not to lose energy to the lattice but interact only with free electrons. When the energy of the ion has been decreased to less than 15 ev, the ion may be neutralized and energetically cannot again become charged. When the energy of the atom has further decreased to several ev, the neutral atom may then exhibit a Ramsauer interaction in which it appears almost transparent to the free electrons of the metal and travels a great distance with no further energy loss.

Investigation of the adsorption of activated gases is beginning to yield information on the activated states responsible for adsorption or pumping. Some studies have already been completed on the adsorption of gases activated by bombardment with low energy electrons. Whenever a heated filament is used as a source of bombarding electrons, an additional thermally activated absorption process, called chemical pumping, must also occur.

C. M. Bliven (General Telephone Company) has used the omegatron partial pressure analyzer to study the chemical pumping of nitrogen. Both the sticking probability and the number of molecules adsorbed depend upon the pressure. Disagreement on the measured values of these variables, which have previously been attributed to crys-
tallographic orientation, impurities, and surface preparation, may also be ascribed in part to pressure differences.

S. B. Nornes (Washington State University) was concerned with the mechanism of chemical pumping in N₂. On the basis of the measured pressure dependence, it is possible that N₂ which strikes the filament is dissociated and that the atomic nitrogen leaving the filament is adsorbed on the glass walls. Atomic nitrogen has already been found to be the important activated species when N₂ is bombarded by low energy electrons. If the precision and sensitivity of such adsorption studies can be increased, these measurements may be capable of producing fundamental data on activated states not otherwise observed.

In a public lecture Mueller described his work developing the field ionization microscope and presented a film showing electronically intensified field ion images in which the atoms of a number of metals could be seen to evaporate under the influence of high electric fields.

E. E. DONALDSON
Department of Physics,
Washington State University, Pullman

Forthcoming Events

September

29–2. American Roentgen Ray Soc., 65th annual, Minneapolis, Minn. (C. A. Good, Mayo Clinic, Rochester, Minn.)


October


2–3. Council for International Organi-

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Fluorescence .5 ppb as quinine base max.

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zations of Medical Societies, 6th general assembly, Brussels, Belgium. (P. A. Messerli, 6 rue Franklin, Paris 16°, France)

2-3. Psychotherapy of the Family, symp., Milwaukee, Wis. (B. C. Burris, Milwaukee Psychiatric Hospital, Milwaukee 53213)

2-9. Radiology, 8th inter-American congr., Caracas, Venezuela. (R. Merenfeld, Apartado Postal 9362 Candelaria, Caracas)


3-4. Medical Radiobiology, 7th natl. congr., Pisa, Italy. (Segreteria, Inst. di Radiologia dell’Università, Spedali Riuniti di “S. Chiara,” Pisa)


4-9. American College of Surgeons, clinical congr., Chicago, Ill. (American College of Surgeons, 55 East Erie St., Chicago 60611)

5-6. Enzyme Regulation, 3rd intern. symp., Indianapolis, Ind. (G. Weber, Indiana Univ. School of Medicine, Indianapolis)

5-7. Association of Medical Illustrators, annual, Los Angeles, Calif. (C. Bridgman, Dept. of Anatomy, UCLA Center for Health Sciences, Los Angeles)

5-7. Radiation Effects on Electronics, natl. meeting, American Nuclear Soc., Syracuse, N.Y. (ANS, 244 East Ogden Ave., Hinsdale, Ill.)

5-8. Clay Mineral Soc., Univ. of Wisconsin, Madison. (M. L. Jackson, Univ. of Wisconsin College of Agriculture, Madison 6)


5-8. Research Methods and Instrumentation, 14th symp., Bethesda, Md. (J. B. Davis, Natl. Insts. of Health, Bethesda, Md. 20014)

5-9. Aeronautics and Space Engineering, Soc. of Automotive Engineers, Los Angeles, Calif. (E. V. Albert, 399 N. Sepulveda Blvd., El Segundo, Calif. 90245)


5-10. German Physical Soc., Düsseldorf. (GPS, Gänshiedestr. 15a, Stuttgart, Germany)

6-8. Analytical Chemistry in Nuclear Technology, 8th conf., Gatlinburg, Tenn. (C. D. Susano, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn.)


6-9. Space Electronics, symp., Las Vegas, Nev. (C. H. Doersam, Jr., Box 177, Port Washington, N.Y.)

6-10. Clinical and Experimental Hypnosis, 16th annual, Pittsburgh, Pa. (Soc. for Clinical and Experimental Hypnosis, 353 W. 57 St., New York, N.Y. 10019)

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7. California Acad. of Sciences, San Francisco. (G. E. Lindsay, California Academy of Sciences, Golden Gate Park, San Francisco)


7-9. Electronic Information Handling, natl. conf., Pittsburgh, Pa. (A. Kent, Univ. of Pittsburgh, Pittsburgh)

7-9. Institute of Management Sciences (TIMS)/Operations Research Soc. of America (ORSA), joint natl. meeting, Minneapolis, Minn. (G. B. Davis, School of Business Administration, Univ. of Minnesota, Minneapolis)

8-10. Agricultural Meteorology, 6th conf., Lincoln, Nebr. (American Meteorological Soc., 45 Beacon St., Boston 8, Mass.)

9-10. Undergraduate Courses and Curriculum, midwestern regional conf., Univ. of Kansas, Lawrence. (R. E. McNair, Assoc. of Midwest College Biology Teachers, Univ. of Kansas, Lawrence)


11-15. Diseases of the Chest, 8th intern. cong., Mexico City, D.F. (M. Kornfeld, American College of Chest Physicians, 112 E. Chestnut St., Chicago 11, Ill.)


11-16. American Assoc. of Medical Record Librarians, annual, Miami Beach, Fla. (M. J. Waterstraat, RRL, 840 North Lake Shore Dr., Chicago, Ill. 60611)


12-14. Aviation Pathology, 5th scientific session, Washington, D.C. (Secretary, Joint Committee on Aviation Pathology, Armed Forces Inst. of Pathology, Washington, D.C. 20305)


12-14. Protection Against Radiations in Space, 2nd symp., Gatlinburg, Tenn. (F. C. Mainschein, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn.)

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18–23. American Acad. of Ophthalmology and Otolaryngology, Chicago, Ill. (W. L. Benedict 15 Second St., SW, Rochester, Minn. 55901)


21–23. Aerospace and Navigational Electronics, 11th East Coast conf., Balti- more, Md. (M. Hastings, Mail No. 1281 A, Baltimore Space and Defense Center, Westinghouse Electric Corp., P.O. Box 1693, Baltimore 21203)


21–23. Spectroscopy, Instrumentation and Chemistry, 3rd Pacific meeting, San Francisco, Calif. (J. G. Conway, Lawrence Radiation Laboratory, Univ. of California, Berkeley 4)

21–24. Acoustical Soc. of America,
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<td>Total Load</td>
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<td>120 gr.</td>
<td>220 gr.</td>
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<td>Sensitivity</td>
<td>0.1 mg.</td>
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<td>Readability by estimation</td>
<td>0.05 mg.</td>
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<td>Reproducibility</td>
<td>±0.03 mg.</td>
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<td>Dimensions</td>
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1-7. Plant Scientists of Latin America, 6th meeting, Lima, Peru. (M. Paulette, Universidade Agraria, Apartado 456, Lima)

2-4. Society of Engineering Science, 2nd technical meeting, Michigan State Univ., East Lansing. (A. C. Eringen, School of Aeronautical and Engineering Sciences, Purdue Univ., West Lafayette, Ind. 47907)


3-5. Liquidation in Mine Chambers, conf., Ostrava, Czechoslovakia. (Mrs. E. Vergeinerova, Czechoslovak Scientific and Technical Soc., Siroka 5, Prague 1)

4-6. Diffraction, 22nd Pittsburgh conf., Pittsburgh, Pa. (W. M. Biagas, Pittsburgh Diffraction Co., Crucible Steel Co., P.O. Box 7257, Pittsburgh 15213)

4-6. Design of Experiments, 10th conf., (by invitation only), Washington, D.C. (F. G. Dressel, Army Research Office-Durham, Box CM, Duke Station, Durham, N.C.)

4-6. Northeast Electronics Research and Engineering meeting (NEREM), Boston, Mass. (J. E. Storer, Boston Section, Inst. of Electrical and Electronics Engineers, 313 Washington St., Newton 58, Mass.)


5-6. U.S. Army Materiel Command, Inst. of Environmental Sciences, joint meeting, Aberdeen Proving Ground, Md. (A. Armstrong, 104 Bliss Lane, Glen Burnie, Md.)


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5. Ibid, 33, 1902, (1961)

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