

two relatively distinct signals—a broad signal having a *g*-factor somewhat more than 2, associated with sulfur atoms, and a doublet having a *g*-factor equal to that of the free electron. In several special cases, including crystals of various amino acids and in silk fibers, this doublet has been identified as a radical on the alpha carbon atom located in the polypeptide backbone and bonded to a single hydrogen atom. This might suggest that the glycines were being preferentially attacked.

The connection between radiation-induced ESR signals and biological activity, as shown in studies on trypsin irradiated in the dry state, was discussed by Peter Alexander (London). He suggested that a major inactivating event in the case of proteins could be the removal of an amino acid residue from the polypeptide chain. This concept is certainly in good agreement with the doublet signals described by Henriksen. It was, however, pointed out that the postulated breakage of the bond between the alpha and beta carbons is unexpected.

Tolbert (Colorado) summarized information on the radiation chemistry and radiation biochemistry of proteins irradiated in the dry state. From the chemical data, Tolbert concluded that there is only a difference of a factor of 2 or 3 in radiosensitivity for destruction of various amino acids in irradiated proteins, and that there was no selective breakage of sulfur-sulfur bonds. There also does not seem to be any real evidence for breakage of the main polypeptide chain in most proteins. Warren Garrison (Berkeley) briefly reviewed his mechanism for chain breakage following the production of a free radical on the alpha carbon in the polypeptide backbone and gave evidence for this process in irradiated gelatin. No suggestion was advanced as to why this breakage apparently does not occur in other proteins, except that the free ends may sometimes recombine with each other.

Comprehensive studies on irradiated dry spores of *Bacillus megaterium* were presented by E. L. Powers (Argonne). These studies show excellent correlations between spore viability and a free-radical mechanism within the spore, as deduced from the effects of such reagents as oxygen, nitric oxide, or hydrogen sulfide, all of which have well known reactions with free radicals. Powers preferred to define free radicals on the basis of their chemical reactivity with such reagents. Other

participants thought that definition of a free radical in terms of an unpaired electron was more satisfactory. The variations in spore survival could also be correlated with ESR measurements, although Powers was careful to point out that a large number of free radicals are created in a spore before it loses its ability to multiply, and that the free radicals responsible for spore inactivation probably constitute only a very minute fraction of those which can be measured by the ESR technique.

In the final session, Peter Alexander suggested that electron-spin-resonance was rather unlikely to give much of a clue as to what events were significant in causing the loss of biological activity of irradiated cells. On the other hand, he felt that the ESR technique had great potential for the understanding of details of events taking place once the key materials involved in the biological inactivation process had been identified. Alan Conger (Temple) echoed a rather similar idea when he said that he did not really care about the detailed interpretation of ESR signals. What concerned him was the location in which the ESR signals were found.

In summing up, E. C. Pollard (Pennsylvania State), chairman of the Subcommittee on Radiobiology, felt that it was clear that evidence of physical damage by radiation was plentiful, but that relating it to biological effects still seemed difficult.

The conference was sponsored by the subcommittee on radiobiology of the National Research Council. The complete proceedings, including the extensive discussion after each paper, will appear soon as an NRC publication.

FRANKLIN HUTCHINSON

*Yale University,
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Forthcoming Events

November

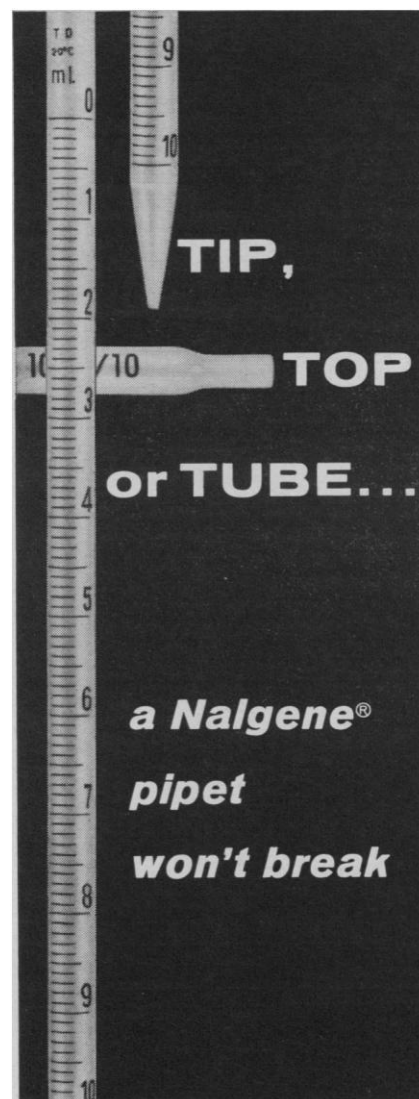
7. American College of Dentists, Las Vegas, Nev. (O. W. Brandhorst, 4236 Lindell Blvd., St. Louis, Mo.)

7-9. American Science Film Assoc., annual, Washington, D.C. (ASFA, 1319 F St., NW, Washington 20004)

7-11. American Soc. of Mechanical Engineers, winter annual mtg., Chicago, Ill. (ASME, 345 East 47 St., New York)

7-12. Anatomical Pathology, 5th Latin American congr., Lima, Peru. (J. J. Andujar, P.O. Box 118, Fort Worth, Tex.)

7-13. Paediatrics, 11th intern. congr.,



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Tokyo, Japan. (K. Nakamura, Dept. of Pediatrics, Univ. of Tokyo, P.O. Box 18, Hongo, Tokyo)

7-14. **Vienna Univ. of Technology**, 150th anniversary celebration, Vienna, Austria. (Technische Hochschule, Guss-hausstr. 23, Vienna 4)

8-9. **Engineering in the Practice of Medicine**, Philadelphia, Pa. (S. Rosen, Dept. of Medicine, Hahnemann Medical College, 230 N. Broad St., Philadelphia 19102)

8-11. **American Dental Assoc.**, Las Vegas, Nev. (H. Hillenbrand, 222 E. Superior St., Chicago, Ill. 60611)

8-11. **Insecticide and Fungicide**, 3rd British conf., Brighton, England. (Secretary, 140 Bensham Lane, Thornton Heath, Surrey, England)

8-11. **Nutrition**, Western Hemisphere Congr., Chicago, Ill. (Dept. of Foods and Nutrition, American Medical Assoc., 535 North Dearborn, Chicago 60610)

8-11. **Quality Control**, intern. Congr., Tokyo, Japan. (Union of Japanese Scientists and Engineers, c/o Sakata Bldg., 3 Muromachi 4-chome, Nihombashi, Chuo-ku, Tokyo)

8-13. **Austrian Medical Congr.**, 19th annual, Vienna. (M. Schnardt, Österreichische Ärztekammer, Referat für Ärztliche Fortbildung, Weihburggasse 10-12, Vienna 1)

9-12. **Seismic Models**, symp., Prague, Czechoslovakia. (V. Karnik and J. Vanek, Inst. of Geophysics, Czechoslovak Acad. of Sciences, Bocni II, Prague 13-Sporilov)

9-13. **Asociación Médica de Puerto Rico**, Santurce. (J. A. Ramirez, 13-5 Fernandez Juncos Ave., Santurce)

10-11. **Power Applications of Controllable Semiconductor Devices**, conf., London, England. (Secretary, Inst. of Electrical Engineers, Savoy Pl., London, W.C.2)

10-12. **American Soc. for Cell Biology**, 5th, Philadelphia, Pa. (M. J. Moses, Box 2982, Duke Univ. Medical Center, Durham, N.C. 27706)

10-12. **Engineering in Medicine and Biology**, 18th annual conf., Philadelphia, Pa. (H. P. Schwan, Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia 19104)

10-12. **Isotope Techniques in the Hydrologic Cycle**, symp., Univ. of Illinois, Urbana. (G. E. Stout, Meteorology Section, Illinois State Water Survey, Univ. of Illinois, Urbana)

10-13. **Respiratory Therapy**, 2nd New England conf., Boston, Mass. (D. Crocker, Children's Hospital Medical Center, 300 Longwood Ave., Boston 15)

10-20. **Development of Petroleum Resources of Asia and the Far East**, 3rd symp., Tokyo, Japan. (S. Santitham, Rajadarn Ave., Bangkok, Thailand)

11-12. **Kentucky Acad. of Science**, Univ. of Kentucky, Lexington. (D. M. Lindsay, Georgetown College, Georgetown, Ky.)

11-13. **Gerontological Soc.**, 18th annual, Los Angeles, Calif. (W. D. Obrist, Dept. of Psychiatry, Duke Univ. Medical Center, Durham, N.C. 27706)

11-13. **Bases for Nuclear Spin-Parity Assignments**, conf., Gatlinburg, Tenn. (F. K. McGowan, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn. 37831)

12-13. **Clinical Pathology of Infancy**, Assoc. of Clinical Scientists, Washington,

D.C. (F. W. Sunderman, 1833 DeLancey Pl., Philadelphia, Pa. 19103)

12-13. Society for **Industrial and Applied Mathematics**, western regional, Seattle, Wash. (B. H. Colvin, Boeing Scientific Research Laboratories, P.O. Box 3981, Seattle)

12-14. Association of **Clinical Scientists**, Washington, D.C. (R. MacFate, 300 N. State St., No. 5322, Chicago, Ill. 60610)

12-15. **Neutrality of Medicine**, 2nd intern. congr., Paris, France. (R. Ellenboger, Ministère des Anciens Combattants et Victimes de Guerre, 37, rue de Bellechasse, Paris 7^e)

14-15. National Medical Foundation for **Eye Care**, Chicago, Ill. (L. A. Zupan, Room 6, 1100 17th St., NW, Washington, D.C.)

14-16. Hedrologicum Conlegium, Intern. Soc. for the Study of **Diseases of the Colon and Rectum**, 2nd congr., Tokyo, Japan. (J. F. Montague, 104 E. 40 St., New York 10016)

14-17. Southern **Medical Assoc.**, Washington, D.C. (R. F. Butts, 2601 Highland Ave., Birmingham 5, Ala.)

14-18. Mexican **Dental Assoc.**, 1st intern. congr., Mexico City. (R. Espinosa de la Sierra, Asociación Dental Mexicana, Sinaloa no. 9, Mexico 7, D.F.)

14-18. **Dental**, Pacific intern. conf., Honolulu, Hawaii. (W. A. Wakai, 291 Alexander Young Bldg., Honolulu 96813)

14-18. Society of **Exploration Geophysicists**, 35th annual intern., Dallas, Tex. (Dallas Geophysical Soc., Dallas)

14-19. American Acad. of **Ophthalmology and Otolaryngology**, Chicago, Ill. (W. L. Benedict, 15 Second St., SW, Rochester, Minn.)

14-21. **Air Pollution**, 1st world congr., Buenos Aires, Argentina. (D. D. Torti, Asociación Argentina Contra la Contaminación del Aire, Sarmiento 680, Buenos Aires)

15-16. **Hypervelocity Techniques**, 4th symp., Tullahoma, Tenn. (J. Lukasiewicz, vonKarman Gas Dynamics Facility, ARO, Inc., Arnold Air Force Station, Tenn. 37706)

15-16. **Science** conf., 4th annual, Belfer Graduate School of Science, Yeshiva Univ., New York, N.Y. (A. Gelbart, Belfer Graduate School of Science, Amsterdam Ave. and 186th St., New York 10033)

15-17. Association of **Military Surgeons** of the U.S., Washington, D.C. (F. E. Wilson, 1500 Massachusetts Ave., NW, Washington, D.C.)

15-18. **Aircraft Design and Technology**, Los Angeles, Calif. (American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

15-18. **Information Problems in the Drug Industry**, conf., Philadelphia, Pa. (C. P. Butcher, Graduate School of Library Science, Drexel Inst. of Technology, 32nd and Chestnut Sts., Philadelphia 19104)

15-18. American **Nuclear Soc./Atomic Industrial Forum**, winter meeting, Washington, D.C. (O. J. DuTemple, American Nuclear Soc., 244 E. Ogden Ave., Hinsdale, Ill. 60521)

15-19. **Animal Care Panel**, 16th annual, Philadelphia, Pa. (H. P. Schneider, Hahnemann Medical College, 230 N. Broad St., Philadelphia 19102)

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