

light, although with low probability. There are a number of direct and sensitized mechanisms that can conceivably permit light absorption by pesticides in the environment. On the surfaces of soil particles, for example, charge-transfer processes may be very important. Electronic energy transfer is likely to be the least important process for pesticides in the environment. Mechanisms involving ground-state complex formation and excited complex formation, electron transfer, and "chemical" sensitization are much more likely to occur, and their operation will depend on the nature of the microenvironment.

C. S. Foote (University of California, Los Angeles) outlined mechanisms of photochemical oxidation reactions occurring in the presence of oxygen. Oxygen may function as an energy acceptor in a reaction with the photoexcited triplet state of an organic molecule to give singlet oxygen, a metastable excited species. The reaction pathways of singlet oxygen with olefins, dienes, heteroatoms, and phenol were outlined. Another significant oxidation reaction is the reaction of free radicals with oxygen to give a peroxy radical which often initiates a chain autoxidation process.

O. L. Chapman (Iowa State University) outlined the relationship of organic photochemistry to pesticide chemistry. Predictably, pesticide molecules might be expected to undergo a number of types of photochemical reactions. These include rearrangement of heterocyclic or aromatic systems, photo-Fries reactions, elimination processes, and rearrangements of aromatic or olefinic nitro compounds to nitrites. Photooxidation, photoreduction, photodimerization, halogen bond cleavage, and the enhancement of phenol acidity by light are among the types of photochemical reactions that may be significant in the natural environment.

Research in photodynamic action was summarized by J. D. Spikes (University of Utah). Photodynamic damage to biological macromolecules results by selectively sensitized photooxidation of component residues such as the guanine residues in DNA and several amino acid residues in proteins. The formation of a triplet-excited state of a dye is the first stage of photodynamic action, and, subsequently, singlet oxygen may be produced by the reaction of triplet dye-stuff with molecular (triplet) oxygen. In a second pathway, the triplet dye may abstract a hydrogen atom from a substrate molecule to give a free radical

that undergoes oxidation. Finally, other metastable states of the dye may be formed and react with substrate. Several examples of the practical importance of photodynamic reactions were cited. The possible role of photodynamic reactions in the photodegradation of pesticides in the environment was also discussed.

W. Klein (Radiation Biology Laboratories, Smithsonian Institution) discussed efforts to quantify the intensity and quality of the visible and ultraviolet radiation which reaches the earth and which would be available for photochemical reactions. He presented results which indicated that this radiation exposure is highly variable depending on season and cloud cover, as well as smog and haze.

A general discussion of the practical significance of pesticide photoalteration followed, with D. G. Crosby (University of California, Davis) as chairman. Several panels considered various aspects of the problem, and their conclusions and recommendations may be briefly summarized as follows:

The use of pesticides, especially synthetic pesticides, undoubtedly will continue for many years, but an accounting of the distribution of pesticides is very incomplete. A fundamental problem is the location and fate of residual pesticides. Present information indicates that most pesticides are altered by sunlight, but there is very little indication of the magnitude of photoalteration processes that affect pesticides. The principal concern is with the identity and the potential hazard of photoalteration products. Development of reliable information on the toxicology of the photoproducts is impeded by several considerations: (i) ignorance of the chemical nature of the photoproducts produced; (ii) a lack of standardized procedures for the investigation of photochemical reactions; and (iii) a lack of knowledge of the nature of the macro- and microenvironments to which pesticides are exposed in the field, including the intensity and spectral distribution of solar energy at the earth's surface, the effects of adsorption on soil or foliar surfaces, and the effects of sensitizers in the solid phase or in water.

The most likely sites in which photoalteration can occur appear to be the atmosphere, either in the vapor phase or on particulates, and organic films on the surface of water, soils, and plants. A case was made for the study of the distribution of pesticides and their photoalteration products throughout

all components of the environment.

Regulation of pesticides will require protocols for standardized estimation and prediction of photoalteration. Before such protocols are closely defined, gaps in current knowledge must be filled. Furthermore, many of the potential alternative methods of pest control such as the use of microbial agents, insect juvenile hormones, pheromones, and chemosterilants are not exempt from photoalteration reactions.

There is a lack of communication between researchers in basic photochemistry and those concerned with pesticide use and development. There is enough common ground between these two groups to ensure fruitful exchanges of information, and this needs encouragement. It is also possible to be critical of industry and government because of their reluctance to make public research information that has been developed to ensure the registration of proprietary compounds. Some clearinghouse of photochemical information generated, regardless of source, would be extremely beneficial for more rapid progress on these problems.

Despite the proportions of the problem delineated, a somewhat unanticipated piece of information which emerged from the meeting was that research support for the general area appeared to be decreasing. A more extensive summary of the proceedings is in preparation and will shortly be available on request from J. R. Plimmer.

ROBERT RABSON

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JACK R. PLIMMER

*Pesticide Degradation Laboratory,
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Quality Institute,
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Beltsville, Maryland 20705*

Forthcoming Events

July

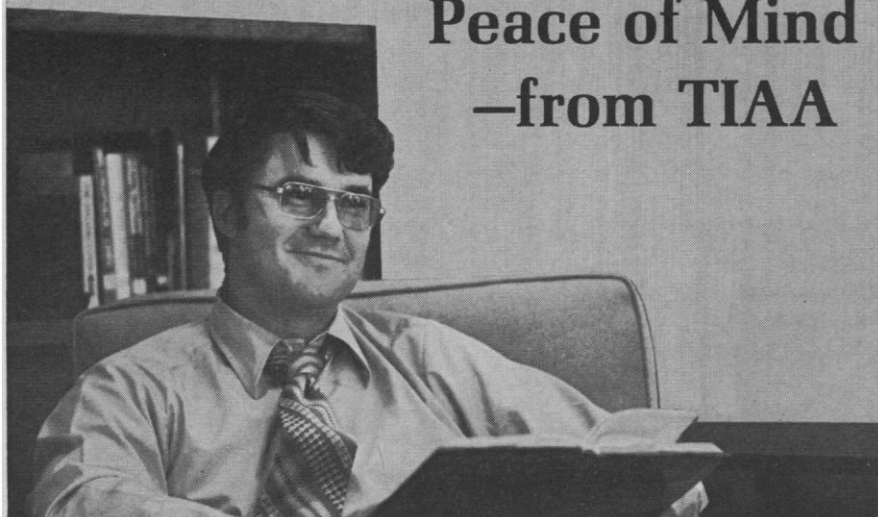
15-19. American Medical Assoc., 106th annual mtg., New York, N.Y. (E. B. Howard, 535 N. Dearborn St., Chicago, Ill. 60610)

15-19. American Veterinary Medical Assoc., Philadelphia, Pa. (M. R. Clarkson, AVMA, 635 S. Michigan Ave., Chicago, Ill. 60605)

15-20. American Assoc. of Clinical Chemists, New York, N.Y. (J. S. King, Jr., AACC, P.O. Box 15053, Winston-Salem, N.C. 27103)

15-20. World Federation of Culture

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15-20. International **Diabetes** Federation, 8th congr., Brussels, Belgium. (J. Pirart, Belgian Diabetes Assoc., 234B Ave. Churchill, 1180 Brussels)

15-20. Institute of **Electrical and Electronics Engineers**, summer power mtg., Vancouver, B.C., Canada. (Technical Activities Board, 345 E. 47 St., New York 10017)

15-20. Conference on **Energy Research—Alternatives for Policy and Management to Meet Regional and National Needs**, Engineering Foundation, Henniker N.H. (W. C. Ackerman, Illinois State Water Survey, Urbana 61801)

15-20. American Soc. of **Pharmacognosy**, joint with Pharmacognosy and Natural Products Section, Acad. of Pharmaceutical Sciences, Jekyll Island, Ga. (J. M. Cassady, School of Pharmacy and Pharmacal Sciences, Purdue Univ., West Lafayette, Ind. 47907)

15-20. Conference on **Use of Shotcrete for Underground Structural Support**, Engineering Foundation, South Berwick, Maine. (J. R. Graham, Bureau of Reclamation, Denver, Colo.)

17-19. Summer **Computer Simulation** Conf. Montreal, Canada. (L. Sashkin, SCSC, Aerospace Corp., P.O. Box 92957, Los Angeles, Calif. 90009)

17-19. **Oceans and National Economic Development** Conf., Natl. Oceanic and Atmospheric Administration, Seattle, Wash. (Seattle-King County Economic Development Council, Suite 1900, 1218 Third Ave., Seattle 98101)

18-20. International Symp. on **Acoustical Holography and Imaging**, 5th, jointly by the Sonics and Ultrasonics Group, Inst. of Electrical and Electronics Engineers, Acoustical Soc. of America, and Stanford Research Inst., Palo Alto, Calif. (P. S. Green, Room K1088, Bldg. 30, Stanford Research Inst., Menlo Park, Calif. 94025)

18-20. **Electronic Crime Countermeasures** Conf., Institute of Electrical and Electronics Engineers and Aerospace and Electronic Systems Soc., Edinburgh, Scotland. (J. S. Jackson, Office of Continuing Education, College of Engineering, Univ. of Kentucky, Lexington 40506)

20-23. Pan American Cancer Cytology Soc. and the World Assoc. for Gynecological Cancer Prevention, joint European assembly on **Cytology and Cancer Prevention**, Salzburg, Austria. (J. E. Ayre, PACCS, 150 Broad Hollow Rd., Melville, N.Y. 11746)

21. American Soc. of **Hospital Pharmacists**, Boston, Mass. (J. A. Oddis, 4630 Montgomery Ave., Bethesda, Md. 20014)

21-27. American **Pharmaceutical** Assoc., Boston, Mass. (W. S. Apple, APA, 2215 Constitution Ave., NW, Washington, D.C. 20037)

22-27. Research Conf. on **Instrumentation Science**, 32nd, Scientific Instrumentation and Research Div., Instrument Soc. of America, Geneva, N.Y. (M. W. Cochran, ISA, 400 Stanwix St., Pittsburgh, Pa. 15222)

22-27. Symposium on **Man-Machine Communication for Scientific Data Handling**, CODATA Task Group on Com-

puter Use, intern. and interdisciplinary mtg., Bresigau, Germany. (Secretary, CODATA Task Group on Computer Use, c/o M. K. Ward, Intern. Conf. Office, National Research Council of Canada, Ottawa K1A 0R6, Canada)

22-27. Conference on **Performance of Full-Scale Structures**, Engineering Foundation, Henniker, N.H. (J. Janney, Wiss, Janney, Elstner & Associates, Northbrook, Ill. 60062)

23-26. Postgraduate Symp. on **Current Concepts in Medical Mycology**, Stanford, Calif. (P. H. Jacobs, Dept. of Dermatology, Stanford Univ. Medical Center, Stanford 94305)

23-26. **Nuclear and Space Radiation Effects**, Inst. of Electrical and Electronics Engineers, Logan, Utah. (J. S. Nichols, AFWL/ELT, Kirtland Air Force Base, N.M. 87117)

23-26. **Rural Sociological Soc.**, College Park, Md. (J. E. Bunkelberger, 306A Comer Hall, Auburn Univ., Auburn, Ala. 36830)

23-27. **Hydrology of Lakes**, intern. symp., Intern. Assoc. of Hydrological Science of the Intern. Union of Geodesy and Geophysics, Helsinki, Finland. (A. P. Pinsak, Lake Survey Center, National Oceanic and Atmospheric Administration, 630 Federal Bldg., Detroit, Mich. 48226)

23-28. **Global Impacts of Applied Microbiology**, 4th intern. conf., American Soc. for Microbiology, São Paulo, Brazil.

(A. F. Langlykke, ASM, 1913 I St., NW, Washington, D.C. 20006)

24-28. **National Environmental Health Assoc.**, 37th annual, Atlanta, Ga. (N. Pohlit, NEHA, 1600 Pennsylvania, Denver, Colo. 80203)

27-29. **Electronic Materials**, 15th conf., American Inst. of Mining, Metallurgical and Petroleum Engineers, Las Vegas, Nev. (A. J. Strauss, Lincoln Lab., Massachusetts Inst. of Technology, Lexington 02173)

27-31. **Nuclear Techniques in Comparative Studies of Food and Environmental Contamination Conf.**, Intern. Atomic Energy Agency, Food and Agriculture Organization of the U.N., and World Health Organization, Otaniemi (near Helsinki), Finland. (J. H. Kane, Office of Information Services, U.S. Atomic Energy Commission, Washington, D.C. 20545)

30-2. **American Soc. of Animal Science**, Lincoln, Neb. (G. P. Lofgreen, Imperial Valley Field Station, 1004 East Holton Rd., El Centro, Calif. 92243)

30-2. **American Assoc. of Physicists in Medicine**, San Diego, Calif. (J. Hilbert, Dept. of Radiology, University Hospital, 220 Dickenson St., San Diego 92103)

30-4. **Observation and Measurement of Atmospheric Pollution**, World Meteorological Organization and World Health Organization, Helsinki, Finland. (V. D. Rockney, Code W13, U.S. National Weather Service, 8060 13th St., Silver Spring, Md. 20910)

August

4-11. **Systematic and Evolutionary Biology**, intern. Congr., Boulder, Colo. (J. L. Reveal, Dept. of Botany, Univ. of Maryland, College Park 20742)

4-12. **American Soc. of Plant Taxonomists**, Boulder, Colo. (D. M. Porter, Dept. of Botany, Natl. Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560)

4-12. **Society of Systematic Zoology**, Boulder, Colo. (T. L. Erwin, Dept. of Entomology, Natl. Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560)

5-10. **Engineering Foundation Conf.**, Henniker, N.H. (L. B. Wingard, Jr., EF, 345 E. 47 St., New York 10017)

6-10. **Poultry Science Assoc.**, Brookings, S. D. (C. B. Ryan, Texas A & M Univ., College Station 77843)

7-10. **Phi Beta Kappa**, Nashville, Tenn. (C. Billman, PBK, 1811 Q St., NW, Washington, D.C. 20009)

8-10. **Cryogenic Engineering**, Atlanta, Ga. (J. E. Jensen, Brookhaven Natl. Lab., 1 E. Fourth, Upton, N.Y. 11973)

9-11. **Salinity: A Critical Review of Causes and Control**, 15th western resources conf., Boulder, Colo. (Bureau of Conferences and Institutes, Div. of Continuing Education, Univ. of Colorado, Boulder 80302)

12-15. **American Soc. for Horticultural**

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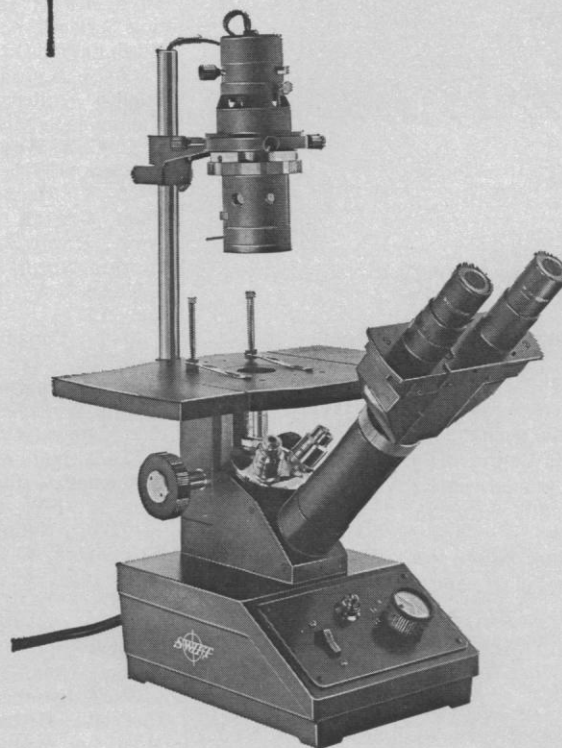
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Science, Raleigh, N.C. (C. Blackwell, ASHS, P.O. Box 109, 914 Main St., St. Joseph, Mich. 49085)

12-17. Conference on Making Service Industries More Productive through Computers and Automation, Engineering Foundation, Henniker, N.H. (A. McAdams, Chairman, Cornell Univ., Ithaca, N.Y. 14850)

12-17. Organometallic Chemistry, 6th intern. conf., Amherst, Mass. (M. D. Rausch, Univ. of Massachusetts, Amherst 01002)

12-17. International Ornithological Congr., 16th, Canberra, Australia. (Secretary-General, IOC, P.O. Box 84, Lynham, A.C.T., Australia 2602)

12-18. Mechanical, Electrical, and Allied Engineering Branches, 5th Pan American Congr., Bogotá, Colombia. (E. T. B. Gross, Rensselaer Polytechnic Inst., Troy, N.Y. 12181)

13-16. Potato Assoc. of America, Guelph, Ont., Canada. (H. J. Murphy, 114 Deering Hall, Univ. of Maine, Orono 04473)

13-16. Society for the Study of Reproduction, 6th annual, Athens, Ga. (C. Cruse, 113 N. Neil St., Champaign, Ill. 61820)

13-17. Australian and New Zealand Assoc. for the Advancement of Science, 45th congr., Perth, Western Australia. (E. Underwood, 45th ANZAAS Congr., Univ. of Western Australia, Nedlands 6009)

13-17. International Workshop Conf. on Laser Interaction and Related Plasma Phenomena, Troy, N.Y. (M. Clark, Office of Continuing Studies, Rensselaer Polytechnic Inst., Troy 12181)

13-17. Physics and Chemistry of Fission, 3rd, Intern. Atomic Energy Agency, Rochester, N.Y. (J. H. Kane, Office of Information Services, Atomic Energy Commission, Washington, D.C. 20545)

13-17. National Council of Teachers of English (college section summer conf.), Kalamazoo, Mich. (J. Malmstrom, Dept. of English, Western Michigan Univ., Kalamazoo 49001)

13-18. Mechanisms of Regulation of Plant Growth, intern. plant physiology symp., Royal Soc. of New Zealand, Palmerston North. (G. W. Markham, RSNZ, 6 Halswell St., P.O. Box 12249, Wellington, N.Z.)

15-17. Canadian High Polymer Forum, 17th, St. Jean, P.Q., Canada. (E. G. Lovering, Pharmaceutical Chemistry Div., Health Protection Branch, Tunney's Pasture, Ottawa, Ont., K1A 0L2, Canada)

15-18. National Council of Teachers of Mathematics, Fargo, N.D. (NCTM, 1201 16th St., NW, Washington, D.C. 20036)

16-18. National Wildlife Federation, Washington, D.C. (T. L. Kimball, NWF, 1412 16th St., NW, Washington, D.C. 20036)

16-30. Cosmic Ray Conf., 13th intern., Denver, Colo. (R. L. Chasson, Dept. of Physics, Univ. of Denver, Denver 80210)

19-21. Symmetry, Similarity and Group-Theoretic Methods in Mechanics, conf., American Acad. of Mechanics, Calgary, Alberta, Canada. (P. G. Glockner, Dept. of Civil Engineering, Univ. of Calgary, Calgary T2N 1N4)

19-22. American Soc. for Horticultural Science, Raleigh, N.C. (C. Blackwell, ASHS, P.O. Box 109, St. Joseph, Mich. 49085)

19-23. American Soc. for Pharmacology and Experimental Therapeutics, East Lansing, Mich. (E. B. Cook, ASPET, 9650 Rockville Pike, Bethesda, Md. 20014)

19-24. Career Guidance for Women Entering Engineering, Conf., Engineering Foundation, Henniker, N.H. (N. Fitzroy, General Electric Co., Schenectady, N.Y.)

19-24. Conference on Energy Conservation at Point of Use, Engineering Foundation, Henniker, N.H. (J. Denton, Univ. of Pennsylvania, Philadelphia, Pa. 19104)

19-24. Society for Industrial Microbiology, Evanston, Ill. (W. M. Stark, Lilly Research Labs., Eli Lilly & Co., Indianapolis, Ind. 46206)

19-24. International Symp. on Microchemical Techniques, sponsored by American Microchemical Soc., Intern. Union of Pure and Applied Chemistry, Commission on Microchemical Techniques, and Div. of Analytical Chemistry, University Park, Pa. (H. J. Francis, Jr., Pennwalt Corp., 900 First Ave., King of Prussia, Pa. 19406)

19-29. International Assoc. of Agricultural Economists, 15th intern. congr., São Paulo, Brazil. (V. J. Pellegrini, Rua Xavier Silveria H 57, Apr 102, Copacabana, Rio de Janeiro, Brazil)

20-21. Spectroscopy, 15th, Soc. for Applied Spectroscopy, Denver, Colo. (R. H. Heidel, U.S. Geological Survey, Bldg. 25, Denver Federal Center, Denver 80225)

20-24. Texturization Theory, Determination and Control of Physical Properties of Food Materials, Amherst, Mass. (C. Rha, Agricultural Engineering Bldg., Univ. of Massachusetts, Amherst 01002)

20-25. American Physiological Soc., Rochester, N.Y. (Mrs. G. Hamilton, APS, 9650 Rockville Pike, Bethesda, Md. 20014)

20-26. Leprosy Congr., 10th intern., Bergen, Norway. (S. G. Browne, 16 Bridgefield Rd., Sutton, Surrey, England)

20-29. Genetics, 13th intern. congr., Berkeley, Calif. (S. W. Brown, Dept. of Genetics, 345 Mulford Hall, Univ. of California, Berkeley 94720)

21-22. Society of Logistics Engineers, Hunt Valley, Md. (R. R. Harvey, SOLE, P.O. Box 164, Hunt Valley)

21-24. International Chemistry Teachers Conf., Chemical Education Divs. of the Chemical Inst. of Canada and the American Chemical Soc., Waterloo, Ont. (L. H. Sibley, St. Catharines Collegiate Inst. and Vocational School, 34 Catherine St., St. Catharines, Ontario, Canada)

21-24. Symposium on Zirconium in Nuclear Applications, American Soc. for Testing and Materials and American Inst. of Mining, Metallurgical and Petroleum Engineers, Portland, Ore. (Meetings Officer, ASTM, 1916 Race St., Philadelphia, Pa. 19103)

22-24. Applications of X-ray Analysis, 22nd annual conf., Denver, Colo. (C. O. Rudd, Metallurgy and Materials Science Div., Denver Research Inst., Univ. of Denver, Denver 80210)

22-25. National Council of Teachers of Mathematics, Fort Worth, Texas. (NCTM, 1201 16th St., NW, Washington, D.C. 20036)

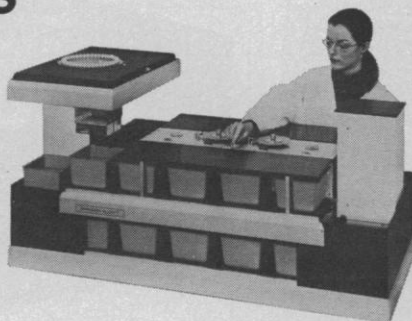
25-26. Mathematical Psychologists, 6th annual, Montreal, Canada. (A. A. J. Marley, Dept. of Psychology, P.O. Box 6070, Montreal 101, P.Q.)

25-28. American Astronomical Soc.,

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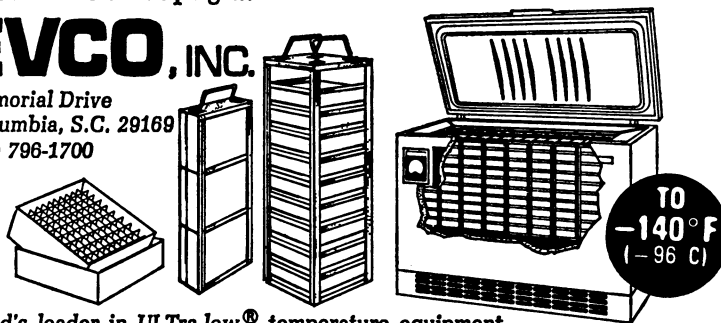
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Columbus, Ohio. (H. M. Gurin, AAS, 211 FitzRandolph Rd., Princeton, N.J. 08540)

26-31. International Soc. of Neurochemistry, 4th intern., Tokyo, Japan. (Y. Tsukada, Dept. of Psychology, School of Medicine, Keio Univ., Shinjuku, Tokyo)

27-29. Comparative Virology, 2nd intern. conf., Mont Gabriel, P.Q., Canada. (E. Kurstak, Univ. of Montreal, P.O. Box 6128, Montreal 101, P.Q., Canada)

27-30. American Sociological Assoc., New York, N.Y. (N. J. Demerath, ASA, 1001 Connecticut Ave., NW, Washington, D.C. 20036)

27-31. NATO Conf. on Cybernetic Modeling of Adaptive Organizations, Porto, Portugal. (D. Howland, College of Administrative Science, Ohio State Univ., 1775 S. College Rd., Columbus 43210)

27-1. Leucocyte Culture Conf., 8th, Uppsala, Sweden. (K. Lindahl-Kiessling, Inst. for Medical Genetics, Univ. of Uppsala, V. Agatan 24, S-752-20 Uppsala)

28-30. Association for Computing Machinery, Atlanta, Ga. (G. Smith, ACM, 1133 Ave. of the Americas, New York 10036)

28-31. International Assoc. of Human Biologists and Soc. for the Study of Human Biology, Detroit, Mich. (E. B. Watts, Dept. of Anthropology, Tulane Univ., New Orleans, La. 70018)

29-31. Conference and Workshop on Primate Karyology, Wayne State Univ., Detroit, Mich. (A. L. Koen, Mott Center, 275 E. Hancock, Detroit 48201)

September

1-7. Electroencephalography and Clinical Neurophysiology, 8th intern. congr., Marseille, France. (G.-C. Lairy, Laboratoire d'EEG, Hôpital Henri Rousselle, 1, rue Cabanis, Paris 14° France)

2-6. Victimology, intern. symp., World Psychiatric Assoc., Jerusalem, Israel. (I. Drapkin, Organizing Committee of Criminology, Faculty of Law, Hebrew Univ. of Jerusalem, P.O. Box 4051, Jerusalem)

2-7. Bacteriology, intern. congr., American Soc. for Microbiology, Jerusalem, Israel. (A. F. Langlykke, ASM, 1913 I St., NW, Washington, D.C. 20006)

2-7. International Congr. on Mercury, sponsored by the Inst. Tecnológico Metalurgico Emilio Jimeno-Univ. of Barcelona, and the Consejo de Administracion de las Minas de Almaden y Arrayanes, Barcelona, Spain. [Secretaria del Congreso, Facultad de Ciencias (Pedralbes), Univ. of Barcelona, Barcelona-14]

2-8. Birth Defects, 4th intern. conf., National Foundation-March of Dimes, Vienna, Austria. (Intern. Medical Congr., Ltd., c/o National Foundation, 1275 Mamaroneck Ave., White Plains, N.Y. 10605)

2-10. Society of Protozoologists, Clermont-Ferrand, France. (D. M. Hammond, Dept. of Zoology, Utah State Univ., Logan 84321)

2-14. Tropical Medicine and Malaria, 9th intern. congr., Athens, Greece. (E. M. H. Mofidi, School of Public Health, Univ. of Tehran, Tehran, Iran)

3-6. Chemical Thermodynamics, 3rd intern. conf., Intern. Union of Pure and Applied Chemistry, Baden, Vienna, Austria. (F. Kohler, Inst. of Physical Chemistry,

SCIENCE, VOL. 180

Univ. of Vienna, Währingerstr. 42, A-1090 Vienna)

3-6. **Stress Analysis Group**, annual conf., Inst. of Physics, Bath, England. (Meetings Officer, IP, 47 Belgrave Sq., London, SW1X 8QX, England)

3-7. **Symposium on Isotopes and Radiation Techniques in Studies of Soil Physics, Irrigation and Drainage in Relation to Crop Production**, Intern. Atomic Energy Agency, Nicosia, Cyprus. (J. H. Kane, Office of Information Services, U.S. Atomic Energy Commission, Washington, D.C. 20545)

3-7. **Molecular Sieves**, 3rd intern. conf., Eidgenössische Technische Hochschule and the Swiss Chemical Soc., Zurich, Switzerland. (W. M. Meier, Inst. für Kristallographie der ETH, Sonneggstr. 5, 8006 Zurich)

3-7. **Pharmaceutical Sciences**, 33rd intern. congr., Stockholm, Sweden. (FIP-Congr. 1973, Box 1142, S-111 81 Stockholm)

3-7. **International Union of Pure and Applied Chemistry**, 24th intern. congr., Hamburg, Germany. (Secretariat, 7 Via Cornelio Celso, 00161 Rome, Italy)

3-9. **Symposium on Photoelastic Effects and Its Applications**, Intern. Union of Theoretical and Applied Mechanics, Brussels, Belgium. (J. Kestens, Laboratoire d'Analyse des Contraintes, Université Libre de Bruxelles 87, Avenue Ad. Buyl, Brussels 5)

4-8. **American Political Science Assoc.**, New Orleans, La. (E. M. Kirkpatrick, APSA, 1527 New Hampshire Ave., NW, Washington, D.C. 20036)

4-12. **International Assoc. for the Scientific Study of Mental Deficiency**, 3rd congr., The Hague, Netherlands. (M. I. I. Goldberg, Box 83, Teachers College, Columbia Univ., New York 10027)

4-14. **International Radiation Protection Assoc.**, 3rd intern. congr., Washington, D.C. (R. J. Catlin, U.S. Atomic Energy Commission, Washington, D.C. 20545)

5-7. **Marine Technology Soc.**, Washington, D.C. (R. W. Niblock, MTS, 1730 M St., NW, Washington, D.C. 20036)

5-7. **Nuclear Structure: Heavy Ions Conf.**, Inst. of Physics, Manchester, England. (Meetings Officer, IP, 47 Belgrave Sq., London, SW1X 8QX, England)

5-8. **Society of General Physiologists**, Woods Hole, Mass. (C. Edwards, Dept. of Biological Sciences, State Univ. of New York, Albany 12222)

5-8. **International Conf. on Magnetic Structures in Superconductors**, American Physical Soc., Argonne Natl. Lab., Intern. Inst. of Refrigeration, Intern. Union of Pure and Applied Physics, and Natl. Science Foundation, Argonne, Ill. (R. P. Huebener, Solid State Science Div., Argonne Natl. Lab., Argonne 60439)

5-12. **American Phytopathological Soc.**, 65th mtg., Minneapolis, Minn. (R. J. Green, Jr., Dept. of Botany and Plant Pathology, Purdue Univ., Lafayette, Ind. 47907)

5-12. **Plant Pathology**, 2nd intern. congr., Intern. Soc. for Plant Pathology, Minneapolis, Minn. (J. E. Mitchell, Dept. of Plant Pathology, Univ. of Wisconsin, Madison 53706)

6-8. **Parapsychological Assoc.**, 16th mtg., Charlottesville, Va. (R. L. Morris, Psychical Research Foundation, Duke Station, Durham, N.C. 27706)

6-10. **Plasma Chemistry Symp.**, Intern. Union of Pure and Applied Chemistry, Kiel, Germany. (J. R. Hollahan, NASA-Ames Research Center, M/S 239-4 Moffett Field, Calif. 94035)

7-9. **More Learning: Less Teaching Conf.**, Inst. of Physics, Guildford, England. (Meetings Officer, IP, 47 Belgrave Sq., London, SW1X 8QX, England)

8-11. **American Fisheries Soc.**, Orlando, Fla. (R. A. Wade, AFS, 1319 18th St., NW, Washington, D.C. 20036)

8-15. **Chemotherapy**, 8th intern. congr., Athens, Greece. (P. Kontomichalou, P.O. Box 1554, Athens)

8-15. **Neurology**, 10th intern. congr., Barcelona, Spain. (J. M. Espadaler, Consejo de Ciento, 318, Barcelona-7)

9-12. **American Ceramic Soc.** (Electronics Div.), Atlanta, Ga. (F. P. Reid, ACS, 4055 North High St., Columbus, Ohio 43214)

9-13. **Marine Plankton and Sediments**, 3rd planktonic conf., Intern. Council of Scientific Unions, Scientific Committee on Oceanic Research, Working Group 37, Kiel, Germany. (E. Seibold, Geologisches Institut der Universität, Olshausenstr. 40/60, 23 Kiel)

9-13. **International Assoc. on Water Pollution Research**, 7th, Paris, France. (B. B. Berger, Room 211, Graduate Research Center, Water Resources Research Center, Univ. of Massachusetts, Amherst 01002)

9-14. **American Chemical Soc.**, 166th natl. mtg., Chicago, Ill. (Meetings Manager, ACS, 1155 16th St., NW, Washington, D.C. 20036)

9-14. **International Radiation Protection Assoc.**, 3rd congr., Washington, D.C. (R. J. Vatlin, U.S. Atomic Energy Commission, Washington, D.C. 20545)

9-21. **International Assoc. of Geomagnetism and Aeronomy**, Kyoto, Japan. (Prof. Rikitake, Earthquake Research Inst., Univ. of Tokyo, 2-11-16, Yayoi, Bunkyo-ku, Tokyo, Japan)

10-11. **Turbulence in Liquids**, 3rd symp., Univ. of Missouri-Rolla, Rolla. (J. L. Zakin, Dept. of Chemical Engineering, Univ. of Missouri-Rolla, Rolla 65401)

10-12. **Exploration of the Planetary System**, Copernicus conf., Intern. Astronomical Union, Torun, Poland. (P. Swings, Inst. of Astrophysics, Univ. of Liège, Leon Souguenet Ave., 23, B-4050, Esneux, Belgium)

10-12. **Irradiation Experimentation in Fast Reactors**, American Nuclear Soc., Jackson Hole, Wyo. (J. G. Crocker, 2309 Arctic Ave., Idaho Falls, Idaho 83401)

10-12. **Marine Technology Soc.**, 9th annual conf., Washington, D.C. (R. A. Frosch, MTS, 1730 M St., NW, Washington, D.C. 20036)

10-13. **European Conf. on Pediatric Nephrology**, Strbske Pleso, Czechoslovakia. (F. Demant, Clinic of Pediatrics of the Faculty Hospital, Kosice, Czechoslovakia)

10-14. **International Symp. on Macromolecules**, Intern. Union of Pure and Applied Chemistry, Aberdeen, England. (J. R. Keene, Chemical Soc., Burlington House, Piccadilly, London, England)

10-14. **Mass Spectrometry Conf.**, 6th intern. conf., Intern. Union of Pure and Applied Chemistry, Edinburgh, Scotland. (C. H. Maynard, Inst. of Petroleum, 61 New Cavendish St., London, W1M 8AR, England)

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10-14. Symposium on **Radioimmunoassay and Related Procedures in Clinical Medicine and Research**, Intern. Atomic Energy Agency, Istanbul, Turkey. (E. J. Garcia, IAEA, Karntner Ring 11-13, A-1010 Vienna, Austria)

10-15. International Assoc. for **Cybernetics**, 7th, Namur, Belgium. (J. Lemaire, Place Andre Ryckmans, Palais des Expositions, B-5000, Namur)

12-14. American **Ceramic Soc.** (Electronics Div.), Atlanta, Ga. (F. P. Reid, ACS, 4055 North High St., Columbus, Ohio 43214)

12-14. **Physics of Semimetals and Nar-**

row-Gap Semiconductors, Univ. of Wales and Inst. of Science and Technology, Cardiff, Wales. (J. E. Aubrey, Dept. of Applied Physics, UW and IST, King Edward VII Ave., Cardiff CF1 3NU)

12-17. American **Medical Writers Assoc.**, Bethesda, Md. (E. Stahl, Ayerst Labs., Montreal, P.Q., Canada)

13-14. Society for **Management Information Systems**, 5th annual conf., Chicago, Ill. (A. Suter, SMIS, 221 North La Salle St., Chicago 60601)

13-15. International Congr. on the **Knee Joint**, 75th, Dutch Orthopaedic Assoc., Rotterdam, Netherlands. (Secre-

tariat, Holland Organizing Centre, 16 Lange Voorhout, The Hague, Netherlands)

16-20. American **Oil Chemists Soc.**, Chicago, Ill. (J. Lyon, AOCS, 508 S. Sixth St., Champaign, Ill. 61820)

16-20. American Acad. of **Ophthalmology and Otolaryngology**, Dallas, Texas. (C. M. Kos, 15 Second St., SW, Rochester, Minn. 55901)

24-28. **Noble Gases Symp.**, jointly by U.S. Environmental Protection Agency, Natl. Environmental Research Center, and Univ. of Nevada, Las Vegas. (D. S. Barth, NERC, P.O. Box 15027, Las Vegas 89114)

October

1-3. Hanford **Biology Symp.**, 13th, sponsored by U.S. Atomic Energy Commission and Battelle Memorial Inst., Richland, Wash. (J. A. Harrison, Biology Dept., Battelle Pacific Northwest Labs., Richland 99352)

1-3. International Conf. on **Land for Waste Management**, Canadian Soc. of Soil Science, Ottawa, Ont. (M. K. Ward, Natl. Research Council, Ottawa, Ont. K1A 0R6)

1-4. American Acad. of **Family Physicians**, Denver, Colo. (R. Tusken, AAFP, Volker Blvd. at Brookside, Kansas City, Mo. 64112)

1-4. American Soc. for **Metals**, Chicago, Ill. (A. R. Putnam, ASM, Metals Park, Ohio 44073)

1-5. American Assoc. for **Laboratory Animal Science**, 24th annual, Miami Beach, Fla. (Joseph J. Garvey, AALAS, 2317 W. Jefferson St., Joliet, Ill. 60435)

1-5. Symposium on **Remote Sensing in Oceanography**, American Soc. of Photogrammetry, Orlando (Disney World), Fla. (J. S. Beazley, 330 Ponce St., Tallahassee 32303)

1-6. International Congr. of **Rheumatology**, 13th, Kyoto, Japan. (S. Sasaki, Japan Rheumatism Assoc., Shimbunkaikan 63, 3-8-4 Ginza, Chuo-ku, Tokyo, Japan)

3-5. **Clinical Orthopedic Soc.**, Cleveland, Ohio. (M. L. Clayton, COS, 2045 Franklin St., Denver 80205)

4-6. Refractories Div., American **Ceramic Soc.**, Bedford, Pa. (F. P. Reid, ACS, 4055 N. High St., Columbus, Ohio 43214)

4-10. **Chemistry of Sea/Air Particulate Exchange Processes**, intern. symp., Intern. Assoc. for the Physical Sciences of the Ocean, Intern. Union of Geodesy and Geophysics, Nice, France. (R. A. Duce, Dept. of Oceanography, Univ. of Rhode Island, Kingston 02881)

5-6. **Psychopharmacology Symp.**, World Psychiatric Assoc., Wroclaw, Poland. (A. Bukowczyk, Kraszewskiego 25, Wroclaw)

5-9. **Sigma XI**, Fontana, Wis. (T. T. Holme, SX, 345 Whitney Ave., New Haven, Conn. 06510)

6-12. American **Concrete Inst.**, Ottawa, Ont., Canada. (ACI, Box 4754, Redford Stat., 22400 W. Seven Mile Rd., Detroit, Mich. 48219)

6-13. World Federation for **Mental Health**, 25th congr., Sydney, Australia. (A. Stoller, Mental Health Authority, 300 Queen St., Melbourne C1, Australia)

7-11. **Clay Minerals Soc.** (10th mtg.) and Clay Minerals Conf. (22nd), Banff, Alta., Canada. (J. E. Gillott, Dept. of



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Civil Engineering, Univ. of Calgary, Calgary 44, Alberta)

7-11. International **Iron and Steel Inst.**, 7th annual conf., Johannesburg, South Africa. (IISI, 5 Place du Champ de Mars, 1050 Brussels, Belgium)

7-11. **Life Assurance Medicine**, 11th intern. congr., Mexico City, Mexico. (J. Rendon, Edificio Bancomer, Aptdo Postal M-7817, Mexico, D.F.)

7-12. **Electrochemical Soc.**, 144th natl., Boston, Mass. (E. G. Enck, ES, P.O. Box 2071, Princeton, N.J. 08540)

7-13. **Neurological Surgery**, 8th intern. congr., Tokyo, Japan. (S. Ishii, Dept. of Neurosurgery, Juntendo Univ. Hospital, Hongo, Bunkyo-ku, Tokyo)

7-20. **Institute on Terrestrial and Extraterrestrial Volcanology**, Italian Natl. Research, Regional Sicilian Government, and the Italian Ministry of Public Education, Erice, Trapani, Sicily. (F. Cuttitta, U.S. Geological Survey, Geologic Div., Washington, D.C. 20244), or (M. Carapezza, Istituto di Mineralogia, Via Archirafi 36, 90123 Palermo, Italy)

8-10. **National Electronics Conf. and Exhibition**, 29th, Chicago, Ill. (NEC, Inc., Oakbrook Executive Pl. No. 2, 1211 W. 22 St., Oak Brook, Ill. 60521)

8-10. **Society for Industrial and Applied Mathematics**, Iowa City, Iowa. (J. K. Cullum, IBM-T. J. Watson Research Center, Yorktown Heights, N.Y. 10598)

8-12. **International Drivers' Behaviour Research Assoc.**, Zurich, Switzerland. (T. E. A. Benjamin, Room 9C27, 10, quai Paul Doumer, F-92 Courbevoie, France)

8-12. **Symposium on Experience from Operating and Fueling of Nuclear Power Plants**, Intern. Atomic Energy Agency, Vienna, Austria. (J. H. Kane, Office of Information Services, U.S. Atomic Energy Commission, Washington, D.C. 20545)

9-12. **Association of Official Analytical Chemists**, 87th, Washington, D.C. (L. G. Ensminger, AOAC, Box 540, Benjamin Franklin Sta., Washington, D.C. 20044)

9-12. **Optical Soc. of America**, 58th annual, Rochester, N.Y. (J. W. Quinn, OSA, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

9-12. **American Vacuum Soc.**, 20th natl. symp., New York, N.Y. (R. B. Marcus, Bell Telephone Labs., Murray Hill, N.J. 07974)

10-12. **Glass Div., American Ceramic Soc.**, Bedford, Pa. (F. P. Reid, ACS, 4055 N. High St., Columbus, Ohio 43214)

10-16. **American Speech and Hearing Assoc.**, Detroit, Mich. (K. O. Johnson, 9030 Old Georgetown Rd., Washington, D.C. 20014)

11-12. **Chemical and Physical Processes in Combustion**, 7th technical mtg., Eastern Section, Combustion Inst., Montreal, P.Q., Canada. (F. J. Wright, Corporate Research Labs., Esso Research and Engineering Co., P.O. Box 45, Linden, N.J. 07036)

11-13. **American Soc. for Colposcopy and Colpomicroscopy**, 6th clinical, Key Biscayne, Fla. (A. C. Corzo, Symposia Intern., P.O. Box 580, Tujunga, Calif. 91042)

11-13. **American Assoc. for the Surgery of Trauma**, Chicago, Ill. (J. A. Boswick, AAST, 4200 E. Ninth Ave., Denver, Colo. 80220)

12-14. **National Assoc. of Biology Teachers**, St. Louis, Mo. (J. P. Lightner, NABT, 1420 N St., NW, Washington, D.C. 20005)

12-20. **American Soc. of Clinical Pathologists**, Chicago, Ill. (M. Damron, ASCP, 710 S. Wolcott Ave., Chicago 60612)

14-17. **American Chemical Soc.**, 5th Northeast regional, Rochester, N.Y. (P. Tingue, Bldg. 81, Room 254, Research Labs., Eastman Kodak Co., Rochester 14650)

14-17. **Association of Life Insurance Medical Directors**, New York, N.Y. (A. E. Brown, ALIMD, 501 Boylston St., Boston, Mass. 02117)

14-18. **American Inst. of Ultrasound in Medicine**, Ann Arbor, Mich. (M. A. Wainstock, Dept. of Ophthalmology, Univ. of Michigan Medical Center, Ann Arbor)

14-19. **Society of Motion Picture and Television Engineers**, New York, N.Y. (D. A. Courtney, SMPTE, 9 E. 41 St., New York 10017)

14-20. **Allergology**, 8th intern. congr., Tokyo, Japan. (Japanese Soc. of Allergology, c/o Dept. of Microbiology and Immunology, Nippon Medical School, 1-1 Sendagi, Bunkyo-ku, Tokyo)

14-20. **World Medical Assoc.**, Munich, Germany. (A. Z. Romualdez, WMA,

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10 Columbus Circle, New York 10019)

14-21. International Congr. on **Tropical Medicine and Malaria**, 9th, Hellenic Ministry of Social Services and Hellenic Ministry of Culture and Sciences, Athens, Greece. (J. Papavassiliou, ICTMM, P.O. Box 1373, Athens)

15-16. **Environmental Geologic Mapping - Colloquium**, Austin, Tex. (E. G. Wermund, Bureau of Economic Geology, Univ. of Texas, Box X, University Station, Austin 78712)

15-17. National **Electronics Conf.**, Inst. of Electrical and Electronics Engineers, Chicago, Ill. (IEEE, 345 E. 47 St., New York 10017)

15-17. **Energy Resources Symp.**, Royal Soc. of Canada, Ottawa, Ont. (Executive Secretary, RSC, 395 Wellington, Ottawa, K1A0 N4)

15-17. National **Noise Control Engineering Conf.**, Washington, D.C. (R. Cohen, Ray W. Herrick Labs., School of Mechanical Engineering, Purdue Univ., Lafayette, Ind. 47907)

15-17. **Soil Microcommunities Conf.**, 3rd, Syracuse, N.Y. (D. L. Dindal, Dept. of Zoology, College of Environmental Sciences and Forestry, State Univ. of New York, Syracuse 13210)

15-18. **Estuarine Research Federation**, 2nd intern. conf., cosponsored by American Soc. of Limnology and Oceanography, Myrtle Beach, S.C. (A. B. Williams, Systematics Lab., Natl. Marine Fisheries Service, U.S. Natl. Museum, 10th and Constitution Ave., NW, Washington, D.C. 20560)

15-18. **Instrument Soc. of America** 28th mtg., Houston, Tex. (H. S. Kindler, ISA, 400 Stanwix St., Pittsburgh, Pa. 15222)

15-18. **Lubrication Conf.**, American Soc. of Mechanical Engineers and American Soc. of Lubrication Engineers, Atlanta, Ga. (ASME, United Engineering Center, 345 E. 47 St., New York 10017)

15-18. American Inst. of **Ultrasound in Medicine**, 18th annual, Detroit, Mich. (M. Wainstock, Dept. of Ophthalmology, Univ. of Michigan Medical School, Ann Arbor)

15-19. American College of **Surgeons**, 59th annual clinical congr., Chicago, Ill. (E. W. Gerrish, ACS, 55 E. Erie St., Chicago 60611)

15-19. **Youth in a World of Change**, World Psychiatric Assoc. and Australian and New Zealand College of Psychiatrists, Sydney, Australia. (Congress Secretary, Box 475, G.P.O., Sydney, New South Wales 2001)

15-20. International Soc. of **Radiology** Congr., 13th, Madrid, Spain. (J. Bonmati, ISRC, Lagasca 27, Madrid 1)

16-18. Society of **Automotive Engineers**, aerospace engineering and manufacturing mtg., Los Angeles, Calif. (A. J. Favata, SAE, 2 Pennsylvania Plaza, New York 10001)

16-19. American **Chemical Soc.**, rubber chemistry mtg., Denver, Colo. (F. M. O'Connor, Harwick Standard Chemical Co., 60 S. Seiberling St., Akron, Ohio 44305)

16-19. **Human Factors Soc.**, Washington, D.C. (M. G. Knowles, HFS, P.O. Box 1369, Santa Monica, Calif. 90406)

RESEARCH NEWS

(Continued from page 1162)

produced a variant with increased resistance to the antibodies. This new variant was isolated and grown in the presence of antibodies specific for it.

After several such cycles of growth and mutation, Hannoun isolated a variant that no longer mutated under the experimental conditions. This variant, he postulates, represents the end point of evolution within the A₃ subtype, and is thus a virus that would be expected to appear in the late 1970's. Support for this postulate was provided by the discovery that the London influenza variant first isolated in 1972 was antigenically quite like the first mutant Hannoun had produced in his laboratory a year earlier.

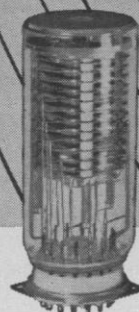
As a result of an only partially understood aspect of the mutation process, the Pasteur group believes, antibodies specific for any one influenza mutant also provide protection against all antecedent mutants within that subtype. Vaccines produced from Hannoun's final variant should thus provide protection against all A₃ variants that might appear within this decade—although the emergence of the next major variant will necessitate beginning all over again. Limited studies have already shown that a killed virus vaccine produced from the Pasteur variant is effective against current strains of influenza, and the French government has licensed it for use as soon as possible. It is unlikely that the vaccine will be licensed for use in the United States for at least another year, however, because of the need for more data on its efficacy.

Because the Pasteur vaccine is made with inactivated viruses, it is expected to be no more effective than current killed virus vaccines. If Hannoun's methodology is proved correct, then, the best approach might involve a combination of techniques. That is, the final variant isolated by Hannoun could be used to produce attenuated virus vaccines by the method of Chanock, Davenport, or Kilbourne. In that fashion, almost complete protection could be provided from shortly after the appearance of a major new subtype until the appearance of the next subtype. Given adequate funding for the development and application of these techniques, some investigators argue, there need never be another influenza pandemic.

—THOMAS H. MAUGH II

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