system must be "loose-leaf" and maintained through a continual process of growth and refinement. The PHYSBE (PHYsiological Simulation Benchmark Experiment) simulations will be designed to embody eventually the best of current knowledge concerning both the simuland, the system being simulated, and the techniques of simulation. Documented and debugged, these proven simulations would give the investigator an advanced staging area from which to proceed with further experiments, thus helping to avoid "reinventing the wheel" and other overlapping effort.

These standardized simulations also offer a means of comparatively evaluating simulation equipment and techniques, thus making it possible to make selections more objectively. Other applications include driving the model by selected independent variables, which are easy-to-measure functions, in order to compute difficult-to-measure variables that can be recorded from the model. This method is similar to the one used in the application described by Kadish for the determination of insulin requirements. To date, it seems that most biological simulations have required in the order of 50 to 100 operational amplifiers, and that while many of these systems are interconnected (for example, respiratory, cardiovascular, renal, and nervous systems), specialists have been most interested in one organ system at a time. The PHYSBE concept allows simulation of such systems more realistically by "closing the loop" around them. Thus the more important feedback and cross-coupling effects can be provided.

Baker Mitchell demonstrated the use of the PHYSBE concept at The University of Texas M. D. Anderson Hospital and Tumor Institute. He added inertial and gravitational terms, atrial pumping, arterial wall viscosity, and variable heart rate to the basic simulation, and implemented a detailed description of the left atrium, left heart, and a three-section aorta for study on the analog portion of the hybrid simulation. He emphasized the necessity for deriving the details of such a model from physiologic considerations.

Robert Linebarger (NASA Ames Research Center) implemented PHYSBE using the DSL/90 digital simulation language and a remote terminal connected to a computation center over a standard telephone line. The program used the time-shared computer conversationally. George Burgin (Decision Science) discussed a straightforward FORTRAN implementation of PHYSBE, and the suitability of high-level, digital computer simulation languages for simulation of physiological systems.

Mary Evans and Jim Sweeney (Tulane University) described an approach to the recognition of chromosomes from photomicrographic image processing. The centromere is used as a reference point for measurement of branch lengths and widths for preliminary sorting in accordance with the Denver classifications of chromosomes.

Louis Lauler and Dale Fuller (Lockheed Missiles and Space Company) presented a clinically oriented hospital information system with many terminals. The system is used to retrieve and select message elements from a structured information hierarchy displayed on screens and called or manipulated with light pens. The system starts with identifying the physician to the machine, which gives a list of his current patients. Using the video matrix terminal he adds or deletes information about any of these patients. A specific application is the selection and modification of medications. There are about 10,000 choices of different medical order entries covering drug orders, general care, diet, laboratory, x-ray, and other choices. A final descriptor can be reached quickly within three or four inquiries.

Tate Minckler and Caroline Horton (University of Texas M. D. Anderson Hospital and Tumor Institute) discussed user control of a Medical Information Management System (MIMS). Current developments were demonstrated at The University of Texas Graduate School of Biomedical Sciences with an IBM 1050 terminal typewriting system and an SDS-930 computer. The system is used for the management of research files as a prototype for hospital information management. The concepts lead to the need for centralized files with many access terminals in which patient information retrieval is based on a *Who, What, When* approach under the user's control for definition, collection, transcription, and editing of data which is of variable field lengths, and used in a generalized hierarchical filing system which is independent of the user's format and therefore allows additional freedom for the user to structure his files as he wishes.

Robert Schwarzbach (University of Pittsburgh Medical Center) reported on conversational computer language for use on a time-sharing system. Simplicity of language and conversational mode of operation of the system offer advantages to medical research personnel in allowing rapid analysis of data soon after experiments are completed. Analyses which formerly required several hours are now done within minutes.

New precision techniques for multicompartment analysis of biochemical systems provide estimates and weights for solving nonlinear tracer problems of carbohydrate and lipid metabolism, according to Abraham Silvers (Stanford University School of Medicine). The investigator can use sums of exponentials to get initial estimates and weights which previously required prior knowledge of these quantities.

Donald Wright described a patient-monitoring program for patients undergoing cardiac surgery at the University of Virginia Medical Center. He used a hybrid computer for processing the electrocardiogram, multiple arterial pressures, venous pressures, air-wave pressures and flows, and multiple temperatures. The Center is developing new techniques for continuous measurement of multiple biochemical parameters consisting of arterial *p*H, arterial PO_2, arterial PCO_2, and serum electrolytes. Current research is aimed at providing precision processing and increasing ability to reject erroneous data.

LEE D. CADY, JR.
University of Texas M. D. Anderson Hospital and Tumor Institute, Houston, Texas 77025

Calendar of Events

National Meetings

June

15–16. American **Rheumatism** Assoc., New York, N.Y. (Miss M. Walsh, The Association, 1212 Avenue of the Americas, New York)

15–16. **Soil, Water and Suburbia**, Dept. of Agriculture and Dept. of Housing and Urban Development, Washington, D.C. (S. Kasper, Room 1201, Dept. of Housing and Urban Development, 1430 K St., NW, Washington, D.C.)

15–17. American Assoc. of **Physics Teachers**, summer mtg., Canton, N.Y. (A. B. Arons, Physics Dept., Amherst College, Amherst, Mass.)

15–17. Symposium on **High Energy Radiation Therapy Dosimetry**, American Assoc. of Physicists in Medicine, New York, N.Y. (L. H. Lanzl, Dept. of Radi-

ology, Univ. of Chicago, 950 E. 59 St., Chicago, Ill. 60637)

15–18. American **Therapeutic** Soc., mtg., Atlantic City, N.J. (A. F. Kreglow, 1801 Eye St., NW, Washington, D.C.)

15–19. American College of **Chest Physicians**, Atlantic City, N.J. (M. Kornfeld, 112 E. Chestnut St., Chicago, Ill. 60611)

16–17. American **Geriatrics** Soc., Atlantic City, N.J. (E. Henderson, Executive Director, The Society, 10 Columbus Circle, Room 1495, New York 10019)

17. Academy of **Tuberculosis Physicians**, Atlantic City, N.J. (G. P. Bailey, 1295 Clermont, Denver, Colo.)

17–18. Academy of **Psychosomatic Medicine**, 4th symp. on anxiety and depression, Atlantic City, N.J. (E. Dunlop, 150 Emory St., Attleboro, Mass. 02703)

17–18. American **Diabetes** Assoc., Atlantic City, N.J. (J. R. Connelly, The Associaton, 18 E. 48 St., New York 10017)

17–18. Society for **Surgery of the Alimentary Tract**, Atlantic City, N.J. (J. Van Prohaska, The Society, 950 E. 59 St., Chicago, Ill. 60637)

17–19. **Reliability and Maintainability**, 6th annual conf., Cocoa Beach, Fla. (Meetings Dept., American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

18–21. **Botanical** Soc. of America, Northeastern Section, summer field mtg., Tuxedo, N.Y. (R. K. Zuck, Dept. of Botany, Drew Univ., Madsion, N.J.)

18–22. American **Medical** Assoc., 116th annual conv., Atlantic City, N.J. (The Association, 535 N. Dearborn St., Chicago, Ill. 60610)

18–22. **Health Physics** Soc., 12th annual mtg., Washington, D.C. (J. C. Villforth, Radiological Health Lab., 1901 Chapman Blvd., Rockville, Md.)

18–22. Society for **Investigative Dermatology**, Atlantic City, N.J. (G. W. Hambrick, Jr., The Society, Johns Hopkins Hospital, 601 N. Broadway, Baltimore, Md. 21205)

18–23. American Soc. of **Ichthyologists and Herpetologists**, annual mtg., San Francisco, Calif. (W. I. Follett, California Acad. of Sciences, Golden Gate Park, San Francisco 94118)

18–30. **Electron Microscopy**, workshop, Northeastern Univ., Boston, Mass. (C. Youse, Continuing Education, Northeastern Univ., 360 Huntington Ave., Boston)

19. **Scombroid Phylogeny**: Ideas and Approaches, symp. of American Soc. of Ichthyologists and Herpetologists, San Francisco, Calif. (B. J. Rothschild, Tuna Ecology Program, Bureau of Commercial Fisheries, P.O. Box 3830, Honolulu, Hawaii 96812)

19–21. Automatic **Data Processing Systems in Local Government**, 3rd annual conf., New York, N.Y. (H. Sellin, School of Continuing Education, New York Univ., New York 10003)

19–21. **Colloid**, 41st natl. symp., Buffalo, N.Y. (P. Becher, Chemical Research Dept., Atlas Chemical Industries, Wilmington, Del. 19899)

19–21. **Heat Transfer** and **Fluid Mechanics** Inst., La Jolla, Calif. (D. B. Olfe, Dept. of Aerospace and Mechanical Engineering Sciences, Univ. of California at San Diego, La Jolla)

19–21. **Microelectronics,** symp., St. Louis, Mo. (R. Pellin, Inorganic Chemicals Div., Monsanto Co., 800 N. Lindbergh Blvd., St. Louis 63166)

19–22. American Soc. for **Engineering Education,** 75th annual mtg., East Lansing, Mich. (L. Winner, 152 W. 42 St., New York 10036)

19–22. Western Soc. of **Soil Science,** annual mtg., Los Angeles, Calif. (J. L. Young, 100 Agricultural Hall, Oregon State Univ., Corvallis)

19–23. **Automating State and Local Records Making and Records Keeping,** American Univ., Washington, D.C. (P. W. Howerton, Director, Center for Technology and Administration Inst., 2000 G St., NW, Washington 20010)

21–23. **Modern Titrimetry,** 20th annual summer symp. on analytical chemistry, Claremont, Calif. (A. L. Beilby, Dept. of Chemistry, Pomona College, Claremont 91713)

21–25. Society of **Women Engineers,** 17th annual conv., Washington, D.C. (Mrs. J. R. Fisher, 12501 Connecticut Ave., Silver Spring, Md. 20906)

21–30. **Combustion-Generated Air Pollution,** mtg., Berkeley, Calif. (Engineering Extension, 2223 Fulton St., Berkeley 94720)

22–23. **Animal Reproduction,** 8th symp., Urbana, Ill. (Short Courses and Conferences, 116 Illini Hall, Champaign, Ill. 61820)

22–24. American Soc. of **Enologists,** annual mtg., Santa Barbara, Calif. (The Society, Box 411, Davis, Calif.)

22–25. American Assoc. of **Bioanalysts,** mtg., Detroit, Mich. (D. Birenbaum, The Association, 805 Ambassador Bldg., St. Louis, Mo. 63101)

25–27. **Mountain Meteorology,** symp., Fort Collins, Colo. (J. L. Rasmussen, Dept. of Atmospheric Science, Colorado State Univ., Fort Collins 80521)

25–28. American Soc. of **Agricultural Engineers,** annual mtg., Saskatoon, Sask., Canada. (O. L. Symes, Dept. of Agricultural Engineering, Univ. of Saskatchewan, Saskatoon)

25–28. American **Dairy Science** Assoc., Ithaca, N.Y. (C. Cruse, The Association, 903 Fairview Ave., Urbana, Ill. 61801)

25–28. American **Leather Chemists** Assoc., Lake Placid, N.Y. (W. T. Roddy, Executive Secretary, The Association, Univ. of Cincinnati, Cincinnati, Ohio 45221)

25–30. American Soc. for **Testing and Materials,** 70th annual mtg., Boston, Mass. (H. H. Hamilton, Public Relations, The Society, 1916 Race St., Philadelphia, Pa.)

26–27. American Soc. of **Pharmacognosy,** annual mtg., Ann Arbor, Mich. (A. G. Paul, College of Pharmacy, Univ. of Michigan, Ann Arbor)

26–28. **Computer Workshop,** Columbia Univ., New York, N.Y. (Workshop Director, College of Pharmaceutical Sciences, Columbia Univ., 115 W. 68 St., New York 10023)

26–30. American **Schools for the Deaf,** conf. West Hartford, Conn. (E. W. Tillinghast, Arizona State School of Deaf and Blind, P.O. Box 5545, Tucson 85703)

26–30. **Computers in Chemistry,** conf., Univ. of California, San Diego. (P. James, Chancellor Office, Univ. of California at San Diego, La Jolla)

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