Policy for Announcements in the FJ Calendar

We will consider for advertising in the FJ Calendar any open meeting of a biological topic occurring in any location worldwide. Please send your announcement to the Executive Editor, The FASEB Journal, FASEB, 9650 Rockville Pike, Bethesda, MD 20814, USA. Your announcement should be restricted to: date (include year), title and location of meeting, contact address (with name if appropriate). We will advertise only meetings taking place more than 5 months after the date of receipt of the announcement. Meetings, symposia, and workshops will be included up to 2 years in advance; international congresses will be included up to 3 years in advance.

FJ Indicates new entry.

APRIL 1988

4-10 Molecular Biology of RNA, Keystone, Colorado, USA. UCLA Symposia, Molecular Biology Inst., Univ. of California, Los Angeles, CA 90024, USA.

4-10 DNA-Protein Interactions in Transcription, Keystone, Colorado, USA. UCLA Symposia, Molecular Biology Inst., Univ. of California, Los Angeles, CA 90024, USA.

5-8 First International Conference on the Release of Genetically Engineered Microorganisms, St. David's Hall, Cardiff, Wales, UK. Mr. Colin Griffiths, Conference Secretary, P.O. Box 50, Cardiff, Wales CF1 5XW, UK.

6-8 Modeling and Control in Biomedical Systems, Venice, Italy. Secretariat IFAC-BME-88 Symposium, Dept. of Electrical Engineering, Univ. of Padova, Via Gradenigo, 6/A, I-35131 Padova, Italy.

7-8 Workshop on Electrofusion in Hybridoma Technology, Oslo, Norway. Electrofusion Workshop Secretariat, c/o Senter for Industriehormning, P.O. Box 124, Blindern, 0314 Oslo, Norway.

10-15 Advanced Methods in Pharmacokinetics and Pharmacodynamics, San Francisco, California, USA. Univ. of California, Extended Programs in Medical Education, Rm. U-569, San Francisco, CA 94143, USA.

10-16 Stress-Induced Proteins, Keystone, Colorado, USA. UCLA Symposia, Molecular Biology Inst., Univ. of California, Los Angeles, CA 90024, USA.

10-16 Metal Ion Transport and Storage: Molecular Biology and Chemistry, Frisco, Colorado, USA. UCLA Symposia, Molecular Biology Inst., Univ. of California, Los Angeles, CA 90024, USA.

10-17 Molecular Biology of Stress, Keystone, Colorado, USA. UCLA Symposia, Molecular Biology Inst., Univ. of California, Los Angeles, CA 90024, USA.

11-13 Sickle Cell Disease—The State of the Art, Hyatt Regency Hotel, Bethesda, Maryland, USA. Conference Dept., The New York Academy of Sciences, 2 E. 63rd St., New York, NY 10021, USA.

11-13 BIOTECH RIA ’88, Molecular Probes: Technology and Medical Applications, Congress Palace, Florence, Italy. Organizing Secretariat, Fondazione Giovanni Lorenzini, Via Monte Napoleone, 23 — 20121 Milan, Italy.

11-15 Molecular Biology, London, UK. Histochemistry Unit, Royal Postgraduate Medical Sch., Hammemsmith Hospital, Du Cane Rd., London W12 0HS, UK.

13-16 Structure and Functions of the Cytoskeleton, Lyon, France. Cosponsored by IUB. Dr. Bernard Rousset, Inst. National de la Santé, INSERM U. 197, Faculté de Medecine Alexis Carrel, 69372 Lyon Cedex 08, France.

14-16 Arachidonic Acid Metabolism in the Nervous System: Physiological and Pathological Significance, Hyatt Regency Hotel, Bethesda, Maryland, USA. Conference Dept., The New York Academy of Sciences, 2 E. 63rd St., New York, NY 10021, USA.

17-23 Molecular and Cellular Mechanisms of Human Hypersensitivity and Autoimmunity, Keystone, Colorado, USA. UCLA Symposia, Molecular Biology Inst., Univ. of California, Los Angeles, CA 90024, USA.

17-23 Cell Activation and Signal Initiation: Receptor and Phospholipase Control of Inositol Phosphate, PAF and Eicosinoid Production, Keystone, Colorado, USA. UCLA Symposia, Molecular Biology Inst., Univ. of California, Los Angeles, CA 90024, USA.


18-19 Neural Network Models and the Vestibular System, NASA, Ames Research Center, Moffett Field, California, USA. Dr. Muriel D. Ross, Space Biology Branch, National Aeronautics and Space Administration, Ames Research Center, Moffett Field, CA 94035, USA.

18-22 Hybridization Histochemistry, London, UK. Histochemistry Unit, Dept. of Histopathology, Royal Postgraduate Medical Sch., Hammemsmith Hospital, Du Cane Rd., London W12 0HS, UK.

19-22 Analytical 88, 11th International Exhibition, Munich, FRG. Münchener Messeund Ausstellungsgesellschaft mbH, ANALYTICAL 88, Postfach 121009, D-8000 Munich 12, FRG.
20-21 Mineral Homeostasis in the Elderly: A Conference to Identify Research Priorities, Duke University, Durham, North Carolina, USA. Dr. Connie Bales, Center for Aging, Box 3003, Duke Univ. Medical Center, Durham, NC 27710, USA.

22-23 Comprehensive Care of the AIDS Patient: A Workshop, San Francisco, California, USA. Extended Programs in Medical Education, Room U-569, Univ. of California, San Francisco, CA 94143, USA.

22-24 Taipei Conference on Prostaglandin and Leukotriene Research, Taipei, Taiwan, R.O.C. Organizing Secretariat, Taipei Conference on PG and LT Research, Inst. of Biomedical Science, Academia Sinica, P.O. Box 1-12, Nankang, Taipei, Taiwan, R.O.C.

23-30 Human Tumor Antigens and Specific Tumor Therapy, Keystone, Colorado, USA. UCLA Symposia, Molecular Biology Inst., Univ. of California, Los Angeles, CA 90024, USA.

23-30 Mechanisms of Action and Therapeutic Applications of Biologics in Cancer and Immune Deficiency Disorders, Keystone, Colorado, USA. UCLA Symposia, Molecular Biology Inst., Univ. of California, Los Angeles, CA 90024, USA.

26-28 Infant Formula Conference II, The Radisson Francis Marion Hotel, Charleston, South Carolina, USA. Ms. Margaret Ridgell, AOAC, 1111 N. 19th St., Suite 210, Arlington, VA 22209, USA.


30 Apr. International Symposium on -1 May D. B. Dill's Milestones in Environmental Physiology, University of Nevada, Las Vegas, Nevada, USA. Dr. M. K. Yousef, Dept. of Biology, Univ. of Nevada, Las Vegas, NV 89154, USA.

APRIL 1988

MAY 1988

1-6 72nd Annual Meeting of the Federation of American Societies for Experimental Biology, Las Vegas, Nevada, USA. FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814, USA.


5-13 Course on Tissue Culture in Neurobiology, University of Saskatchewan, Saskatoon, Saskatchewan, Canada. S. Fedoroff, Dept. of Anatomy, Univ. of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 0W0.

8-12 79th American Oil Chemists' Society Annual Meeting, Phoenix Civic Plaza, Phoenix, Arizona, USA. Meetings Manager, American Oil Chemists' Society, PO. Box 3489, Champaign, IL 61821, USA.

9-13 Endocrine Pathology, London, UK. Histochemistry Unit, Dept. of Histopathology, Royal Postgraduate Medical Sch., Hamme-smith Hospital, Du Cane Rd., London W12 OHS, UK.

9-13 VIIIth International Washington Spring Symposium: Biomedical Advances in Aging '88: Molecular and Immunological Mechanisms, Intervention and Clinical Approaches to Treatment, Washington, DC, USA. Dr. Allan L. Goldstein, Dept. of Biochemistry, The George Washington Univ. Sch. of Medicine and Health Sciences, 2300 Eye St., NW, Washington, DC 20037, USA.

10-13 Galveston Chapter of the Society for Neuroscience Symposium: Neuroendocrine Modulation of Central Nervous System Function, Galveston, Texas, USA. Dr. J. M. Lakoski, Dept. of Pharmacology J-31, Univ. of Texas Medical Sch., Galveston, TX 77550, USA.

11-13 Annual Meeting of the Association of Systematics Collections, Field Museum, Chicago, Illinois, USA. Dr. K. E. Hoagland, Association of Systematics Collections, 730 11th St., NW, 2nd Fl., Washington, DC 20001, USA.

12-13 Royal Australian Chemical Institute, Polymer Division, Symposium on Controlled Release: Science and Technology 1988, Victorian College of Pharmacy, Melbourne, Australia. Dr. R. C. Oppenheim, Victorian Coll. of Pharmacy Ltd., 381 Royal Parade, Parkville, Victoria 3052, Australia.

12-14 Cholesterol Metabolism, New York University Medical Center, New York City, USA. Dr. Norman B. Javitt, NYU Medical Center Postgraduate Medical Sch., 550 First Ave., New York, NY 10016, USA.

12-14 Cholesterol Metabolism, an international Symposium in memory of the 90th birthday of Rudolph Schoenheimer, New York University Medical Center, New York City, USA. Registration Office, NYU Post-Graduate Medical Sch., 550 First Ave., New York, NY 10016, USA.
15-18 Artificial Intelligence: Expert Systems and Other Applications, Ann Arbor, Michigan, USA.

Stephen E. Morrison, American Society for Information Science, 1424 16th St., NW, Suite 404, Washington, DC 20036, USA.

16-20 In Vitro Autoradiographic Techniques, London, UK. Histochemistry Unit, Dept. of Histopathology, Royal Postgraduate Medical Sch., Hammersmith Hospital, Du Cane Rd., London W12 0HS, UK.

19-20 The Role of Folate and Vitamin B-12 in Neurotransmitter Metabolism and Degenerative Neurologic Changes Associated with Age, FASEB Conference Center, Bethesda, Maryland, USA. Sue Ann Anderson, Senior Staff Scientist, Life Sciences Research Office, FASEB, 9650 Rockville Pike, Bethesda, MD 20814, USA.

19-23 Advances in the Biology and Chemistry of N-Nitroso and Related Compounds, Omaha, Nebraska, USA. Ms. Terri Eastman, Epley Inst. for Research in Cancer, Univ. of Nebraska Medical Center, Omaha, NE 68105, USA.

20-22 1st International Congress on Mucopolysaccharidosis and Related Diseases, Radisson University Hotel, Minneapolis, Minnesota, USA. Continuing Medical Education, Univ. of Minnesota, Box 202 UMHC, 420 Delaware St. SE, Minneapolis, MN 55455, USA.

22-26 26th Annual Meeting of the Association for Gnotobiotics, Pallas Suite Hotel, New Orleans, Louisiana, USA. Dr. James B. Henehan, LSU-Surgery, 1442 Tulane Ave., New Orleans, LA 70112, USA.

22-26 International Conference on Diet, Lipids and Cancer, Yulara Resort (via Ayern Rock), Northern Territory, Australia. Co-sponsored by IUB. Dr. John R. Sabine, Univ. of Adelaide, Waite Agricultural Research Inst., Glen Osmond, South Australia 5064, Australia.

23-25 7th Stony Brook Symposium on Recent Advances in Intercellular Communication, Stony Brook, New York, USA. Biochemistry Dept., State Univ. of New York, Stony Brook, NY 11794, USA.

25-28 Seventy-Ninth Annual Meeting of the American Association for Cancer Research, New Orleans Convention Center, New Orleans, Louisiana, USA. Margaret Foti, Executive Director, AACR, Temple Univ. School of Medicine, West Bldg., Rm. 301, Broad and Tioga Sts., Philadelphia, PA 19140, USA.


26-27 Current Issues in Anatomic Pathology, San Francisco, California, USA. Office of Extended Programs in Medical Education, Rm. U-569, Univ. of California, San Francisco, CA 94143, USA.


26-29 Continuous Cell Lines as Substrates for Biologicals, National Clarion Hotel, Arlington, Virginia, USA. Cell Substrates Conference Registrar, Talley Management Group, Inc., 22 Euclid St., Woodbury, NJ 08096, USA.

26-31 Annual Meeting of American Association for the Advancement of Science, Boston, Massachusetts, USA. AAAS Meeting Officer, 1101 Vermont Ave., 10th Fl., Washington, DC 20005, USA.

5-11 American Chemical Society, Toronto, Ontario, Canada. ACS Meetings Dept., 1155 16th St. NW, Washington, DC 20036, USA.

6-10 1988 Annual Scientific Meeting of Undersea and Hyperbaric Medical Society, Fairmont Hotel, New Orleans, Louisiana, USA. Ms. Jane Dunne, Undersea and Hyperbaric Medical Society, 9650 Rockville Pike, Bethesda, MD 20814, USA.


8-10 70th Annual Meeting of The Endocrine Society, New Orleans, Louisiana, USA. The Endocrine Society, 9650 Rockville Pike, Bethesda, MD 20814, USA.

9-11 International Symposium on Immunotoxins, Sheraton University Center, Durham, North Carolina, USA. Ms. Rosemary Bornes, c/o Dr. Arthur Frankel, Duke Univ. Medical Center, Box 3898, Durham, NC 27710, USA.

12-15 International Symposium on Alzheimer's Disease, Kuopio, Finland. Prof. Paavo Reikkinen, Dept. of Neurology, Univ. of Kuopio, SF-70211 Kuopio, Finland.

12-16 Immunology and Immunopathology of the Alimentary Canal, 11th International Convocation on Immunology, Hyatt Regency Hotel, Buffalo, New York, USA. Dr. James F. Mohn, Director, The Ernest Witebsky Center for Immunology, 233 Sherman Hall, State Univ. of New York at Buffalo, Buffalo, NY 14214, USA.


12-16 Hormones, Thermogenesis and Obesity, University of Wisconsin, Madison, Wisconsin, USA. Stenbock Symposium, Inst. for Enzyme Research, Univ. of Wisconsin, Madison, WI 53706, USA.

FJ CALENDAR 2291
12-17 Yeast RNA: Transcription, Splicing, Translation, Replication and Transposition, FASEB Summer Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

13-16 Biological Membranes in Cancer Cells, Le Tre Vaselle Hotel, Torregiano, Perugia, Italy. New York Academy of Science Conference, Dr. A. Scarpa, Case Western Reserve Univ., Dept. of Physiology and Biophysics, Cleveland, OH 33106, USA.

15-18 Canadian Federation of Biological Societies (and Pharmacological Society of Canada, Canadian Society for Nutritional Sciences, and Society of Toxicology of Canada), Laval, Quebec, Canada. Robin Vander Klaute, 575 King Edward Ave., Ottawa, Ontario, Canada K1N 7N5.

15-19 8th Annual Symposium of the American Society for the Immunology of Reproduction, Portland, Maine, USA. Dr. Neal Rote, Foundation for Blood Research, Box 190, Route 1, Scarborough, ME 04074, USA.

18-29 NATO Advanced Study Institute on Vascular Endothelium: Receptors and Transduction Mechanisms, Porto Carras, Halkidiki, Greece. Dr. John D. Catravas, Dept. of Pharmacology and Toxicology, Medical Coll. of Georgia, Augusta, GA 30912, USA.

19-22 International Symposium: Basic and Clinical Approaches to Virus Chemotherapy, University of Helsinki, Helsinki, Finland. Secretariat, Antivirals-88, c/o Duodecim, Kalevankatu 11 A SF-00100 Helsinki, Finland.

19-23 Molecular and Cellular Mechanisms of Antiarrhythmic Agents, Nashville, Tennessee, USA. Dr. Luc Hondeghem, Vanderbilt Univ., Cardiovascular Research Program, Rm. CC-2209 Medical Center N., Nashville, TN 37232, USA.

19-23 Bioelectromagnetics Society Annual Scientific Meeting, Westin Hotel, Stamford, Connecticut, USA. Dr. W. G. Wisecup, Executive Director, 120 W. Church St., Suite 4, Frederick, MD 21701, USA.

19-24 Retinoids, FASEB Summer Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

19-24 Canadian Society of Microbiologists, Windsor, Ontario, Canada. Dr. H. Fackrell, Dept. of Biology, Univ. of Windsor, Windsor, Ontario, Canada N9B 3P4.

20-22 Northeast Regional Section Meeting of the Association of Official Analytical Chemists, Lowell University, Lowell, Massachusetts, USA. Edmond Baretta or Jim Fitzgerald, FDA Winchester Engineering and Analytical Center, 109 Holton St., Winchester, MA 01890, USA.

20-22 Midwest Regional Section Meeting of the Association of Official Analytical Chemists, Holiday Inn West, Columbia, Missouri, USA. George Rottinghaus, Univ. of Missouri, Columbia, Veterinary Medicine Diagnostic Laboratory, Columbia, MO 65211, USA.

23-24 Pacific Northwest Regional Section Meeting of the Association of Official Analytical Chemists, Evergreen College, Olympia, Washington, USA. Mike Wehr, Oregon Dept. of Agriculture, 635 Capitol St., NE, Salem, OR 97310, USA.

26 Jun. Smooth Muscle, FASEB Summer -1 Jul. Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

26 Jun. Neuroimmunomodulation, FASEB -1 Jul. Summer Research Conferences, Copper Mountain, Colorado, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

26 Jun. Fourth Congress of the International Society for Biomedical Research on Alcoholism, Kyoto, Japan. Dr. Kinya Kuriyama, Chairperson, Dept. of Pharmacology, Kyoto Prefectural Univ. of Medicine, Kawaramachi-Hirokoji, Kamikyo-ku, Kyoto 602, Japan.


28-30 50th Annual Scientific Meeting of the Committee on Problems of Drug Dependence, Sea Crest Resort and Conference Center, North Falmouth, Massachusetts, USA. Dr. Martin W. Adler, Executive Secretary, CPDD, Dept. of Pharmacology, Temple Univ. Sch. of Medicine, 3420 N. Broad St., Philadelphia, PA 19140, USA.

JULY 1988

3-6 The Molecular Aspects of Autoimmunity, Hotel L'Estrel, Ville D'Estrel, Canada. Dr. Nadir R. Farid, Thyroid Research Laboratory, Health Sciences Centre, St. John's, Newfoundland, Canada A1B 3V6.

3-8 Ultradian and Infradian Modulation of the Circadian System, FASEB Summer Research Conferences, Copper Mountain, Colorado, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.
<table>
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<tr>
<th>Date</th>
<th>Event</th>
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<tr>
<td>3–8</td>
<td>Autoimmunity, FASEB Summer Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.</td>
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<td>3–8</td>
<td>Sixth International Conference on Biochemistry and Biophysics of Cytochrome P-450, Vienna, Austria. Co-sponsored by IUB. Dr. Inge Schuster, Sandoz Research Inst., Brunnerstrasse 59, A-1235 Vienna, Austria.</td>
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<td>5–9</td>
<td>Conference on Bioreactive Chromatography and Biotechnology, Mogilany, Poland. Satellite to IUB Congress in Prague. Dr. Grazyna Muszyńska, Inst. of Biochemistry and Biophysics, Polish Academy of Sciences, Warsaw, Poland.</td>
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<td>6–7</td>
<td>Immune Recognition of Protein Antigens, London, UK. The Scientific Meetings Secretary, The U.K. Royal Society, 6 Carlton House Terrace, London SW1Y 5AG, UK.</td>
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<td>6–8</td>
<td>Biotechnological Aspects of Protein Production by Cultured Cells, Prague, Czechoslovakia. Satellite symposium of 14th IUB Congress. Dr. F. Frank, Inst. of Molecular Genetics, Vidosnka 1083 CS-142 20 Praha 4, Czechoslovakia.</td>
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<td>6–9</td>
<td>Local Changes in DNA Structure and Their Biological Implications, Brno, Czechoslovakia. Satellite Meeting of the IUB. 14th International Congress of Biochemistry, 166 50 Prague 6, Czechoslovakia.</td>
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<td>10–15</td>
<td>14th International Congress of Biochemistry, Prague, Czechoslovakia. Sponsored by IUB. 14th International Congress of Biochemistry, 166 50 Prague 6, Czechoslovakia.</td>
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<td>10–15</td>
<td>Phospholipases, FASEB Summer Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.</td>
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<td>10–15</td>
<td>Regulation of Gene Expression in Higher Animals in Response to Hormones and Nutritional Substrates, FASEB Summer Research Conferences, Copper Mountain, Colorado, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.</td>
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<td>11–15</td>
<td>CRYO 88 — 25th Annual Meeting of the Society for Cryobiology, Aachen, FRG. Dr. Christoph Körber, Helmholtz-Inst. für Biomedizinische Technik, Pauwelsstr., D-50100 Aachen, FRG.</td>
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<td>11–16</td>
<td>Design and Analysis of Scientific Experiments, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA. Director of the Summer Session, Room E19–356, Massachusetts Institute of Technology, Cambridge, MA 02139, USA.</td>
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<td>17–21</td>
<td>The International Congress on Natural Products Research, Prospector Hotel, Park City, Utah, USA. Cosponsored by the American and Japanese Societies of Pharmacognosy. Prof. Chris M. Ireland, Dept. of Medicinal Chemistry, 308 Skaggs Hall, Univ. of Utah, Salt Lake City, UT 84112, USA, or Dr. Yohji Hashimoto, President, Japan Society of Pharmacognosy, Kobe Women's Coll. of Pharmacy 4-19-1, Motoyamakita-Machi, Higashinada-Ku, Kobe 658, Japan.</td>
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<td>17–22</td>
<td>Immunopharmacology, FASEB Summer Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.</td>
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<td>17–22</td>
<td>Molecular Biology and Infectious Diseases, FASEB Summer Research Conferences, Copper Mountain, Colorado, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.</td>
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<td>17–23</td>
<td>8th International Congress of Endocrinology, Kyoto, Japan. The Secretary, 8th International Congress of Endocrinology, Travel Planners-Kyoto Congress, Suite 150, GPM Bldg., San Antonio, TX 78216, USA.</td>
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<td>18–20</td>
<td>Biotechnological Aspects of Protein Production by Cultured Cells, Prague, Czechoslovakia, Satellite Meeting of the IUB. 14th International Congress of Biochemistry, 166 50 Prague 6, Czechoslovakia.</td>
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<td>18–20</td>
<td>21st Century Prospects of Biotechnology in Agriculture and Environment, Slusovice, Czechoslovakia, Satellite Meeting of the IUB. 14th International Congress of Biochemistry, 166 50 Prague 6, Czechoslovakia.</td>
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<td>18–20</td>
<td>10th Symposium on Biology, Biochemistry and Clinical Biochemistry of Lectins, Prague, Czechoslovakia, Satellite Meeting of the IUB. 14th International Congress of Biochemistry, 166 50 Prague 6, Czechoslovakia.</td>
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JULY 1988

18-20 Cellular Pathology and Pharmacology, Budapest, Hungary. Dr. Jozsef Gaal, CHINOIN Pharmaceutica and Chemical Works Ltd., Research Centre, P.O. Box 110, 1325 Budapest, Hungary.

18-20 Fourth International Symposium on Selenium in Biology and Medicine, University of Tubingen, Tubingen, FRG. Dr. Albrecht Wendel, Physiologisch-Chemisches Inst. der Univ., Hoppe-Seyler-Str. 4, D-7400 Tubingen, FRG.


20-22 Annual General Meeting, Nottingham, UK. Meetings Officer, The Biochemical Society, 7 Warwick Court, London WCIR 5DP, UK.

20-23 International Symposium on Tachykinins, University of Graz, Graz, Austria. Dr. F. Lembeck, Tachykinin Symposium, Dept. of Pharmacology, University of Graz, Universitätsplatz 4, A-8010 Graz, Austria.

24-27 The Mammalian Myocardium - Biochemical and Physiological Mechanisms Underlying the Heartbeat, Leeds, UK. Dr. C. Orchard, Dept. of Physiology, The Worsley Medical and Dental Bldg., The University, Leeds LS2 9NQ, UK.

24-28 Sixth International Symposium on Calcium-Binding Proteins In Health and Disease, Hotel Nagoya Castle, Nagoya, Japan. Satellite symposium of 8th International Congress of Endocrinology. Secretariat, Sixth International Symposium on Calcium-Binding Proteins in Health and Disease, Dept. of Pharmacology, Nagoya Univ. Sch. of Medicine, Showaku, Nagoya 466, Japan.

24-29 Structure and Function of Cell Membranes, FASEB Summer Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

24-29 Trichothecene, Blue-green Algal, and Marine Toxins: Mechanisms, Detection, and Therapy, FASEB Summer Research Conferences, Copper Mountain, Colorado, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

24-29 Universities Associated for Research and Education in Pathology Teaching and Research Conference on Molecular Biology and Pathology, Copper Mountain, Colorado, USA. UAREP Teaching and Research Conference Coordinator, 9650 Rockville Pike, Bethesda, MD 20814, USA.

25-29 1st World Congress of World Association of Veterinary Microbiologists, Immunologists and Specialists of Infectious Disease, Lyon, France. Prof. Y. Richard, WAVMI, Ecole National Veterinaire de Lyon, Route de Saan Bel, Marcy-l'Etiole, 69260 Charbonnieres-les-Bains, France.

25-30 International Symposium on Mucus and Related Topics, Society for Experimental Biology, University of Manchester, UK. Dr. E. Chantler, Dept. of Obstetrics and Gynaecology, Univ. Hospital of South Manchester, Nell Ln., West Didsbury, Manchester M20 8LR, UK.

27-31 International Symposium on Inflammatory Heart Disease: A Multidisciplinary Approach to Myocarditis and Heart Allograft Rejection, Snowmass, Colorado, USA. Ms. Marge Adey, Center for Continuing Education, Univ. of Nebraska Medical Center, 42nd and Dewey Ave., Omaha, NE 68105, USA.

31 Jul. Cellular and Molecular Genetics, -5 Aug. FASEB Summer Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

31 Jul. Folate, Vitamin B-12 and One-Carbon Metabolism, FASEB Summer Research Conferences, Copper Mountain, Colorado, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

JULY 1988

31 Jul. 8th International Congress of Histochemistry and Cytochemistry, Omni Shoreham Hotel, Washington, DC, USA. Congress Secretariat, Dr. Constance Oliver, NIH-NIDR Bldg. 10, Rm. 1A23, Bethesda, MD 20892, USA.

31 Jul. Animal, Plant and Microbial Toxins, 9th World Congress of International Society on Toxicology, Oklahoma State University, Stillwater, Oklahoma, USA. Dr. C. L. Ownby, Dept. of Physiological Sciences, Oklahoma State Univ., Stillwater, OK 74078, USA.

AUGUST 1988

6-12 1988 World Congress on Medical Physics and Biomedical Engineering, San Antonio, Texas, USA. Dr. David T. Kopp, Secretary General, Dept. of Radiology, UTHSCSA, 7705 Floyd Curl Dr., San Antonio, TX 78284, USA.

7-12 Receptors, FASEB Summer Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

7-12 Endothelium and Cardiovascular Function, FASEB Summer Research Conferences, Copper Mountain, Colorado, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

7-13 14th International Congress on Yeast Genetics and Molecular Biology, Espoo, Finland. Tarja Koistinen, Research Labs. Alko Ltd., POB 350, SF 00101, Helsinki, Finland.

8-11 XI1th Meeting of the International Society of Oxygen Transport to Tissue, Ottawa, Canada. K. Rakusan, Dept. of Physiology, Sch. of Medicine, Univ. of Ottawa, 451 Smyth Rd., Ottawa, Ontario, Canada K1H 8M5.

8-12 Fifth International Magnesium Symposium, Kyoto International Conference Hall, Kyoto, Japan. Professor Yoshinori Itokawa, Dept. of Hygiene, Faculty of Medicine, Kyoto Univ., Kyoto 606, Japan.
11-13 NATO Advanced Research Workshop on Cell and Molecular Biology of Artemia Development, Ramada Renaissance du Parc, Montreal, Quebec, Canada. Dr. A. H. Warner, Dept. of Biological Sciences, Univ. of Windsor, Windsor, Ontario, Canada N9B 3P4.

14-18 39th American Institute of Biological Sciences Annual Meeting, University of California, Davis, California, USA. Ms. Louise Salmon, AIBS Meetings Dept., 730 11th St., NW, Washington, DC 20001, USA.

14-19 International Conference on Human Lactation, Melbourne University, Melbourne, Australia. Nursing Mothers’ Association of Australia, P.O. Box 231, Nunawading, Victoria 3131, Australia.

14-19 Electrophysiological Mechanisms of Propagation and Activation of Cardiac Muscle and Smooth Muscle, FASEB Summer Research Conferences, Saxtons River, Vermont, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.

14-19 Neoplastic Transformation of Liver Cells, FASEB Summer Research Conferences, Copper Mountain, Colorado, USA. Dr. Robert W. Krauss, Executive Director, FASEB Summer Conferences, 9650 Rockville Pike, Bethesda, MD 20814, USA.


15-19 General Principles in Toxicology and Toxicologic Pathology, Parker House Hotel, Boston, Massachusetts, USA. Dept. of Continuing Medical Education, Boston Univ. Sch. of Medicine, 80 E. Concord St., Boston, MA 02118, USA.

16-19 Groupe Polyphenols International Conference, Ontario, Canada. Dr. T. Fuleki, Horticultural Research Inst. of Ontario, Vineland Station, Ontario, Canada L0R 2E0.

17-20 29th Annual Drosophila Conference, University of Toronto, Toronto, Ontario, Canada. Dr. Ellen Larsen, Dept. of Zoology, Univ. of Toronto, 25 Harbord St., Toronto, Ontario, Canada M5S 1A1.


21-24 Bioavailability 88—Chemical and Biological Aspects of Nutrient Availability, University of East Anglia, Norwich, UK. G. R. Fenwick, AFRC Inst. of Food Research, Norwich Lab., Colney Ln., Norwich, Norfolk NR4 7UA, UK.

21-25 Key Issues in Mental Retardation Research, 8th International Congress of the International Association for the Scientific Study of Mental Deficiency, Dublin, Ireland. Mr. John O’Gorman, Congress Chairperson, 8th World Congress, IASSMD, 12, Pembroke Park, Dublin 4, Ireland; or Dr. Michael Mulcahy, Stewarts Hospital, Palmerstown, Dublin 20, Ireland.

22-26 The Pharmacology of Thermoregulation, 7th International Symposium, The University of Odense, Odense, Denmark. Dr. Peter Lomax, Dept. of Pharmacology, UCLA Sch. of Medicine, Los Angeles, CA 90024, USA.


23-26 7th International Symposium on Mass Spectrometry in Life Sciences, State University of Ghent, Ghent, Belgium. Dr. A. De Leenheer, Lab. voor Medische Biochemie en voor Klinische Analyse, Harelbekestraat 72, B-9000 Gent, Belgium.


31 Aug. Symposium on Cholecytokinin, -2 Sep. CGK ’88, Robinson College, Cambridge, UK. Prof. G. J. Dockray, Physiological Laboratory, Univ. of Liverpool, Brownlow Hill, PO. Box 147, Liverpool L69 3BX, UK.

SEPTEMBER 1988

3-7 Advances in Liquid Chromatography: 8th Annual American-Eastern European Colloquium and Symposium on Liquid Chromatography, Szeged, Hungary. Dr. Huba Kalász, Dept. of Pharmacology, Semmelweis Univ. of Medicine, Budapest VIII. Nagyvázár tér 4, Hungary 1089.
SEPTEMBER 1988

4-7 The International Congress on Forensic Sciences, Beijing, China. Office of International Congress on Forensic Sciences, China Express Congress Limited, 1201-2 Energy Plaza, 92 Granville Rd., Tinshmatsu, East Kowloon, Hong Kong.

4-8 8th International Congress of Eye Research, Hyatt Regency Hotel, San Francisco, California, USA. 8th ICER Secretariat, Stanford Univ. Medical Center, Rm. S-030, Stanford, CA 94305, USA.

4-9 XVIII World's Poultry Congress and Exhibition, Nagoya, Japan. XVIII World's Poultry Congress and Exhibition, c/o International Congress Service, Kasha Bldg., 2-14-9 Nihombashi Chuo-Ku, Tokyo, Japan 103.

6-9 Protein Targeting, 8th John Innes Symposium, John Innes Institute and University of East Anglia, Norwich, Norfolk, UK. J. Fox, Symposium Secretary, John Innes Inst., Colney Ln., Norwich NR4 7UH, UK.

7-9 Prenatal Abuse of Licit and Illicit Drugs, Hyatt Regency Hotel, Bethesda, Maryland, USA. Conference Dept., The New York Academy of Sciences, 2 E. 63rd St., New York, NY 10021, USA.

11-17 Thermodynamics Applied to Biological Systems, Santa Margherita Ligure, Italy. Cosponsored by IUB. Prof. Giovanni Rialdi, Centro Studi Chimico Fisici Macromolecole CNR, Corso Europa 30, 16132 Genova, Italy.

12-13 2nd International Symposium on Lipid Metabolism in the Nonmoxic and Ischemic Heart, Maastricht, The Netherlands. Dr. G. J. van der Vusse, Dept. of Physiology, Univ. of Limburg, P.O. Box 616, 6200 MD Maastricht, The Netherlands.

13-15 International Conference on Computers in Clinical Medicine-Medical Informatics 88, Nottingham, UK. Conference Division, British Medical Informatics Society, 87 Gower St., London WC1E 6AA, UK.

13-16 Fourth International Conference of the International Organization of Psychophysiology, Prague, Czechoslovakia. Prof. Tomas Radil, Czechoslovak Academy of Sciences, Inst. of Physiology, 142 20 Praha 4-KRC Videnska 1083, Czechoslovakia.

13-17 Ninth European Immunology Meeting, Rome, Italy. Organizing Secretariat, MGA Via P. Cossa, 41 00193, Rome, Italy.

14-16 Meeting of the British Electrophoresis Society, Glasgow, Scotland. Dr. J. A. Bleeke, Oral Biology Group, Glasgow Dental Hospital and School, 378 Sauchiehall St., Glasgow, UK.

15-17 IX European Meeting of the International Society for Heart Research, Oxford, UK. Prof. David J. Hearse, Cardiovascular Research, Rayne Inst., St. Thomas' Hospital, London SE1 7EH, UK.

17-18 Nutrition in the Pathogenesis and Treatment of Organ Failure, Clarion Hotel, New Orleans, Louisiana, USA. ASCN Postgraduate Course, 9650 Rockville Pike, Bethesda, MD 20814, USA.

19-22 29th International Conference on the Biochemistry of Lipids, Tokyo, Japan. Prof. Y. Seyama, Dept. of Physiological Chemistry and Nutrition, Faculty of Medicine, Univ. of Tokyo, Bunkyo-ku, Tokyo 113, Japan.


21-23 Galway Meeting, University College, Galway, Ireland. Meetings Officer, The Biochemical Society, 7 Warwick Court, London WC1R 5DP, UK.

25-30 196th Annual Meeting of the American Chemical Society, Los Angeles, California, USA. ACS Meetings Dept., 1155 16th St. NW, Washington, DC 20036, USA.

26-29 11th International CODATA Conference, Karlsruhe Congress and Exhibition Centre, Karlsruhe, FRG. DECHEMA, Attn. CODATA Conference, P.O. Box 97 01 46, D-6000 Frankfurt/M.97, FRG.

SEPTEMBER 1988


OCTOBER 1988

2-7 1988 World Congress and Expo on Vegetable Protein for Human and Animal Use, Westin Stamford/Plaza Hotel, Raffles City, Singapore. Meetings Manager, American Oil Chemists' Society, PO. Box 3469, Champaign, IL 61821, USA.

9-12 Joint Meeting of the 11th Rochester Trophoblast Conference and The European Placenta Group, Rochester Plaza Hotel, Rochester, New York, USA. Dr. Richard K. Miller, 11th RTC/EPG, The Univ. of Rochester, Box 668, 601 Elmwood Ave., Rochester, NY 14642, USA.

9-13 8th International Symposium on Atherosclerosis, Rome, Italy. Dr. G. Crepaldi, Symposium Chairperson, c/o Organizing Secretariat, Centro Italiano Congressi C.I.C., Via L. Spallanzani, 11, 00161, Rome, Italy.

9-14 Annual Fall Meeting of The American Physiological Society/ American Society for Pharmacology and Experimental Therapeutics, Montreal, Quebec, Canada. FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814, USA.

NOVEMBER 1988

10-14 Sixth International Neurotoxicology Conference: Drug Abuse and Brain Development, Little Rock, Arkansas, USA. Dr. Joan M. Cranmer, Dept. of Pediatrics 512, Univ. of Arkansas for Medical Sciences, Little Rock, AR 72205, USA.

11-15 39th Annual Meeting of The American Society of Human Genetics, New Orleans, Louisiana, USA. Ms. Peggy Gardiner, Meetings Manager, ASHG Administrative Office, 9650 Rockville Pike, Bethesda, MD 20814, USA.


DECEMBER 1988

4-9 2nd International Conference on Mechanisms of Antimutagenesis and Anticarcinogenesis, Ohito Hotel, Ohito, Japan. Dr. Yukiaki Kuroda, National Inst. of Genetics, 1,111, Yata, Mishima, Shizuoka 411, Japan.

12-14 Regulation of the Acute Phase and Immune Responses: A New Cytokine, The Sheraton Centre, New York City, USA. Conference Dept., The New York Academy of Sciences, 2 E. 63rd St., New York, NY 10021, USA.

19-21 London Meeting of The Biochemical Society, Royal Free Hospital of Medicine, London, UK. Meetings Officer, The Biochemical Society, 7 Warwick Court, London, WC1R 5DP, UK.

FEBRUARY 1989

5-9 Royal Australian Chemical Institute Symposium on Advances in Biomedical Polymers, Observation City, Perth, Western Australia. The Secretary, W. A. Polymer Group, Royal Australian Chemical Inst., 125 Hay St., Perth WA 6000, Australia.


MARCH 1989

19-24 73rd Annual Meeting of the Federation of American Societies for Experimental Biology, New Orleans, Louisiana, USA. FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814, USA.

APRIL 1989

2-7 VI World Congress on In Vitro Fertilization and Embryo Transfer, Jerusalem, Israel. Congress Secretariat, VI World Congress, In Vitro Fertilization and Embryo Transfer, P.O. Box 50006, Tel Aviv 61500, Israel.

4-7 Society for General Microbiology Easter Meeting, University of Cambridge, UK. Dr. C. S. Dow, Dept. of Biological Sciences, Univ. of Warwick, Coventry CV4 7AL, UK.

9-14 American Chemical Society, Dallas, Texas, USA. ACS Meetings Dept., 1155 16th St. NW, Washington, DC 20036, USA.

12-14 Aberystwyth Meeting of The Biochemical Society, Aberystwyth, Wales. Meetings Officer, The Biochemical Society, 7 Warwick Court, London W1C1 5DP, UK.
AUGUST 1989

7-11 Conference on the Biochemistry and Genetics of Ribosomes, East Glacier, Montana, USA. Professor Walter E. Hill, Dept. of Chemistry, Univ. of Montana, Missoula, MT 59812, USA.


SEPTEMBER 1989

7-9 10th European Section Meeting, International Society for Heart Research, Rotterdam, The Netherlands. Dr. J. W. de Jong, Cardiovascular Lab./Thoraxcenter, Erasmus Univ. Rotterdam, PO. Box 1738, 3000 DR Rotterdam, The Netherlands.

10-15 American Chemical Society, Miami Beach, Florida, USA. ACS Meetings Dept., 1155 16th St. NW, Washington, DC 20036, USA.

19-22 Cork Meeting of The Biochemical Society, University College, Cork, Ireland. Meetings Officer, The Biochemical Society, 7 Warwick Court, London WC1R 5DP, UK.

24-29 10th International Conference on Enzyme Engineering, Kashiwajima, Japan. Engineering Foundation, 345 E. 47th St., New York, NY 10017, USA.

25-28 103rd Annual International Meeting and Exposition of Association of Official Analytical Chemists, The Clarion Hotel, St. Louis, Missouri, USA. Ms. Margaret Ridgell, AOAC, 1111 N. 19th St., Suite 210, Arlington, VA 22209, USA.

OCTOBER 1989

1-6 13th World Congress on Fertility and Sterility, Casablanca, Morocco. Congress Secretariat, Société Marocaine de Fertilité-Contraception, P.O. Box 12537, AÏNDIAB, Casablanca, Morocco.


NOVEMBER 1989

7-11 Drugs Affecting Lipid Metabolism, Houston, Texas, USA. Dr. Louis C. Smith, Baylor Coll. of Medicine, The Methodist Hospital, Dept. of Medicine, Mail Station A-601, 6556 Fannin St., Houston, TX 77030, USA.

8-10 Tenth International Symposium on Drugs Affecting Lipid Metabolism, Westin Galleria Hotel, Houston, Texas, USA. Ms. Lynne K. Tiras, International Meeting Managers, Inc., 4550 Post Oak Pl., Suite 248, Houston, TX 77027, USA.

11-15 40th Annual Meeting of The American Society of Human Genetics, Baltimore, Maryland, USA. Ms. Peggy Gardiner, Meeting Managers, ASHG Administrative Office, 9650 Rockville Pike, Bethesda, MD 20814, USA.

DECEMBER 1989

18-20 London Meeting of The Biochemical Society, St. Bartholomew's Hospital Medical School, London, UK. Meetings Officer, The Biochemical Society, 7 Warwick Court, London WC1R 5DP, UK.

APRIL 1990

1-6 74th Annual Meeting of the Federation of American Societies for Experimental Biology, Washington, DC, USA. FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814, USA.
APRIL 1990

3–6 Bath Meeting of The Biochemical Society, Bath, UK. Meetings Officer, The Biochemical Society, 7 Warwick Court, London WC1R 5DP, UK.

22–27 American Chemical Society, Boston, Massachusetts, USA. ACS Meetings Dept., 1155 16th St. NW, Washington, DC 20036, USA.

MAY 1990

23–26 Eighty-First Annual Meeting of the American Association for Cancer Research, Washington, DC, USA. Margaret Foti, Executive Director, AACR, Temple Univ. School of Medicine, West Bldg., Rm. 301, Broad and Tioga Sts., Philadelphia, PA 19140, USA.

SEPTEMBER 1990


OCTOBER 1990

21–26 International Congress on Obesity, Kobe, Japan. Prof. Yu-taka Oomura, Dept. of Physiology, Sch. of Medicine, Kyushu Univ., Fukuoka 812, Japan.

28 Oct. Annual Meeting of the Society for Neuroscience, St. Louis, Missouri, USA. Nancy Beang, Executive Director, Society for Neuroscience, 11 Dupont Circle, Suite 500, Washington, DC 20036, USA.

DECEMBER 1990


18–20 Birmingham Meeting of The Biochemical Society, Birmingham, UK. Meetings Officer, The Biochemical Society, 7 Warwick Court, London WC1R 5DP, UK.

APRIL 1991

10–12 Reading Meeting of The Biochemical Society, Reading, UK. Meetings Officer, The Biochemical Society, 7 Warwick Court, London WC1R 5DP, UK.

14–19 75th Annual Meeting of the Federation of American Societies for Experimental Biology, Atlanta, Georgia, USA. FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814, USA.

MAY 1991

15–18 Eighty-Second Annual Meeting of the American Association for Cancer Research, Houston, Texas, USA. Margaret Foti, Executive Director, AACR, Temple Univ. School of Medicine, West Bldg., Rm. 301, Broad and Tioga Sts., Philadelphia, PA 19140, USA.

JULY 1991

16–19 Manchester Meeting of The Biochemical Society, Manchester, UK. Meetings Officer, The Biochemical Society, 7 Warwick Court, London WC1R 5DP, UK.

SEPTEMBER 1991

4–6 Edinburgh Meeting of The Biochemical Society, Heriot Watt, Edinburgh, Scotland. Meetings Officer, The Biochemical Society, 7 Warwick Court, London WC1R 5DP, UK.

APRIL 1992

5–10 76th Annual Meeting of the Federation of American Societies for Experimental Biology, Anaheim, California, USA. FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814, USA.

MARCH 1993

28 Mar. 77th Annual Meeting of the Federation of American Societies for Experimental Biology, New Orleans, Louisiana, USA. FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814, USA.

AUGUST 1993

22–27 XVth International Congress of Nutrition, Adelaide, Australia. Dr. R. M. Smith, General Secretary, CSIRO Division of Human Nutrition, Kintore Ave., Adelaide, South Australia 5000.

Reviewed by Charles R. Park, Department of Molecular Physiology and Biophysics, Vanderbilt University School of Medicine, Nashville, Tennessee 37232, USA

This is a highly informative, well-presented compilation of papers presented at the Third International Symposium on Hypoglycemia in Rome, Italy, in 1986. Its emphasis is clinical, but it contains much of interest to the clinically oriented physiologist.

The first section of this book (pages 1-80) concerns the definition, incidence, and diagnosis of functional hypoglycemias. It is clear that a firm consensus is lacking with respect to these matters. The editors and W. Creutzfeld, however, have made an excellent summary of the eight papers on this subject. The syndrome has been greatly overdiagnosed and is, in fact, uncommon. Postprandial or reactive hypoglycemia has often been included among the functional hypoglycemias, but the former term should be applied only to syndromes caused by any of a large number of organic lesions (e.g., rapid gastric emptying, ingestion of sugar and alcohol, and gastrointestinal surgery). Functional hypoglycemia should be reserved for syndromes not organic in nature. Many useful procedures are presented to help the physician make a correct diagnosis, which is not done easily.

The second section (pages 81-148) presents four excellent papers describing hypoglycemia caused by immune phenomena. These include: 1) syndromes in which antibodies to insulin release their bound insulin as endogenous insulin secretion wanes postprandially; 2) antibodies to insulin antibody where the former may have insulin-like action; and 3) antibodies to the insulin receptor where the antibodies are insulin-like agonists. The autoimmune response to endogenous insulin (with no prior exposure to exogenous insulin) appears to be well established, and precipitating causes, particularly exposure to certain sulphydryl drugs, are discussed.

The third section (pages 149-200) discusses brain function, particularly the electroencephalogram and brain chemistry during insulin hypoglycemia. The progression of metabolic changes is described leading to loss of energy potential (ATP and creatine phosphate) followed by widespread catabolism of carbohydrate, fat, and nitrogenous components. Disappearance of glycogen, phospholipid breakdown, elevated aspartate and ammonia, and sharp declines in γ-amino butyric acid and certain amino acids are notable.

The fourth section (pages 200-236) discusses the mental profile and behavior characteristics of the hypoglycemic person. The role of alcohol in inducing hypoglycemia is emphasized as are the forensic difficulties in assessing criminality during hypoglycemic periods.

The last section of the book presents 22 short communications, a number of which are of interest.


Reviewed by Peter Day, Center for Agricultural Molecular Biology, Cook College, Rutgers, The State University of New Jersey, New Brunswick, New Jersey 08903, USA

The authors of this report were faced with the daunting task of evaluating the circumstantial evidence for a decline in the earth's biological diversity and recommending to the U.S. Congress what might be done about it. That the evidence is circumstantial comes from the knowledge that although it is impossible to catalog all life forms, there are nevertheless strong indications that some can no longer be found. How significant or important such observations are is controversial and it is pity the report did not spend more time questioning the convictions of its authors. The findings of the Advisory Panel and U.S. Office of Technology Assessment (OTA) Project Staff are presented in 11 chapters and 5 appendices, with an index. The first chapter is a summary and list of options for Congress. Since it will be all that many readers will have time for, I will return to it. Succeeding chapters deal with the importance, status, and management of diversity; on-site maintenance, and off-site maintenance for animals, plants, and microbes; and the role of institutions in maintaining biological diversity in the United States, internationally, and with development assistance. The final appendix lists the titles and authors of specially commissioned papers prepared for the study that are available as another volume.

Although this report is directed to Congress, it is concerned with a public policy issue and is of interest to a much wider audience. Although for the most part non-technical, it provides some references to original sources and other reviews.

The summary chapter concludes that diversity is being lost much more rapidly than it is being created, that the pace of loss will increase, and that there are likely to be serious consequences for civilization. OTA identifies a number of options for the U.S. Congress to strengthen the national commitment to maintaining biological diversity, to increase the nation's ability to do the job, to increase knowledge of biological diversity, to support international efforts to stem the losses, and to address the problem of loss of biological diversity in developing countries. What is needed now is a group in Congress to take the most fundamental form of action, namely, to argue for sufficient funds to begin these important initiatives. These actions include enactment of legislation to endorse the importance of the issues and provide guidance and education, the provision of more research funds, and support for improved data collection both at home and abroad; and to assist the U.S. Agency for International Development in taking a more active role in maintaining biological diversity.

Time alone will tell how persuasive OTA's arguments are in bringing about important and significant changes.
Reviewed by Adam Allerhand, Department of Chemistry, Indiana University, Bloomington, Indiana 47405, USA


\[ ^{13}\text{C} \text{NMR is less widely used to study biological problems than } ^{1}\text{H NMR. The recent book by Wüthrich, } \text{NMR of Proteins and Nucleic Acids, reviewed in the first issue of The FASEB Journal, deals almost exclusively with } ^{1}\text{H NMR and contains ample evidence of the power of high-field } ^{1}\text{H NMR in biological applications. Nevertheless, there are applications in which the very high resolving power of } ^{13}\text{C NMR is an advantage that offsets the drawbacks of } ^{13}\text{C NMR such as lower sensitivity and less versatility for conformational studies than provided by } ^{1}\text{H NMR. For example, } ^{13}\text{C NMR has been applied extensively in studies of biosynthetic pathways, with the use of } ^{13}\text{C-labeled precursors.} \]

The first two chapters, which comprise less than 20% of this book, contain mainly introductory material about NMR in general, with emphasis on the \( ^{13}\text{C} \) nucleus. This material can be found in numerous textbooks and does not provide a reason for purchasing this book. The real value of the book is contained in the remaining three chapters, which deal with \( ^{13}\text{C} \) spectral parameters and their relation to structure (chapter 3), \( ^{13}\text{C} \) NMR spectra of simple organic compounds (chapter 4), and \( ^{13}\text{C} \) NMR of natural products (chapter 5). Chapter 5, which comprises 30% of this book, is the most important one for anyone who wishes to apply \( ^{13}\text{C} \) NMR in biological research, but the material in chapters 3 and 4 greatly facilitates the interpretation of \( ^{13}\text{C} \) NMR data. These three chapters give a good introduction to \( ^{13}\text{C} \) NMR. However, a reader unfamiliar with \( ^{13}\text{C} \) NMR will encounter some difficulties with the listed tabulations of assignments of \( ^{13}\text{C} \) resonances to specific carbons. For example, Table 5.43 lists assignments for methyl palmitoleate, taken from an article published in 1972. These early tentative assignments are in part erroneous, as shown in later publications. The evaluation of the validity of published assignments is a tedious task. Early reports were often hand-waving guesses. Reliable methods have been developed and have been used increasingly in the last 15 years. Authors of books on \( ^{13}\text{C} \) NMR face the choice either to report published assignments without detailed scrutiny of their validity, or to devote enormous blocks of time to the evaluation of the validity of published data. Unfortunately, after dubious assignments are reproduced in textbooks and monographs, they become widely used and quoted, whereas rigorous assignments reported only in journal articles tend to be ignored.

In summary, this is a useful new book on \( ^{13}\text{C} \) NMR, and I recommend it as an entry-level text for scientists who wish to start using \( ^{13}\text{C} \) NMR spectroscopy. I anticipate that future books will omit extensive tabulations of reported chemical shifts, which should become available on inexpensive (I hope) optical disk cartridges for personal computers.


Reviewed by John J. Byrnes, Department of Medicine, University of Miami School of Medicine, Miami, Florida 33101, USA

A principal guru of bioscience, Arthur Kornberg, notes that much of life can be understood in rational terms if expressed in the language of chemistry (I). An obstacle to the fulfillment of this classical reductionist goal, Kornberg observes, has been cultural differences between the biologist and chemist, forming a gulf that must be bridged. The distance apart is primarily caused by the complexity of calculation necessary to define in precise terms biological systems consisting of proteins and nucleic acids in solution. This is the primary deterrent to attempts to precisely define and thus understand the structure-function relationships of these macromolecular assemblies. \textit{Dynamics of Protein and Nucleic Acids} is the first book directed to this goal. Protein and nucleic acid dynamics is the study of atomic movement within these macromolecules. The atomic mechanics of biologically active molecules is considered in terms of various energy functions. Computer simulation is used to project structure and its changes with time, thus related to function. This emerging discipline may therefore become the bridge that will span the gulf. The stated goals of the book are 1) to outline the theoretical methods and their capabilities; 2) to provide a sense of the nature and significance of biomolecular dynamics; and 3) to indicate some prospects and direction for future work. These goals are fully achieved.

The level of presentation is appropriate for graduate students as well as research workers in biophysics, physical biochemistry, and molecular biotechnology. Inasmuch as these studies involve application of molecular biology, chemical physics, and scientific computing, a full appreciation requires a modest background in each; however, in other circumstances substantial insight can be obtained as the concepts are clearly presented and developed verbally as well as mathematically expressed.

The first four chapters provide an introduction (chapter I) and conceptual foundations (chapter 2 and 3). A synopsis of protein and nucleic acid structure and interactions with solvent is followed by an overview of the dynamics of water, aqueous solution, proteins, and nucleic acids. Typical features of the internal motions of proteins and nucleic acids are described. Chapter 4 surveys various methods to obtain potential energy functions that describe the dynamics of the molecule. Modifications, simplifications, advantages and disadvantages, and computer resources are considered.

Chapters 5 through 8 present results of selected applications and describe the nature of the different types of molecular motion that are found in typical biological systems. Chapter 5 considers the types of motion that occur during time intervals of less than 100 ps. Chapter 6 covers local structural transitions that are often important in biological activity. The following chapter is on global structural changes, which are an essential part of protein folding, the binding of ligands, and allosteric effects. Hinge-bending motions of lysozyme and tRNA are examples discussed in detail. Chapter 8 concerns the dynamics of molecular associations such as between enzyme and substrate. Limitations of diffusional encounter rate constant calculations and their modification based on the influence of inter- and intramolecular processes are considered. The anomalous aspects of the diffusion-controlled reaction of superoxide catalyzed by the enzyme superoxide dismutase is used as an example.

"Recent developments and future directions" is the heading of the final chapter. The strengths and present limitations of the methods are put into perspective. Methodologic advances are projected and applications to important biological problems involving large molecules and motions on a time scale of 2 ns are anticipated.

FJ BOOK REVIEWS 2301

Reviewed by Karl H. Muench, Division of Genetic Medicine, University of Miami School of Medicine, Miami, Florida 33101, USA

All bacteria require iron, and those surviving in ordinary environments have elaborate mechanisms for obtaining it. A critical balance of available iron can make the difference between dormancy and rapid growth of bacteria; in an animal host, that becomes the difference between commensalism and pathogenicity. Of course, mammals also require iron. An average human adult male has about 4 g of iron, distributed as 2.5 g in hemoglobin, 0.5 g in myoglobin and enzymes, and 1 g in storage iron as ferritin and hemosiderin. All compartments are in equilibrium allowed by transport mechanisms; each day the average gain and loss to the environment is about 1 mg. Virtually none of the 4 g is free; the iron is in heme or is bound to proteins such as ferritin intracellularly and transferrin extracellularly. The concentration of free iron in equilibrium with binding proteins in tissue fluids is about $10^{-18}$ M. This low concentration is maintained by the normal twofold excess of unsaturated transferrin in human serum and by the sensitivity of apoferritin biosynthesis to the stimulus of iron availability. Thus potentially pathogenic bacteria are kept in check by the unavailability of iron in a normal host.

This fascinating book opens with a chapter on iron in biological systems that describes the host-pathogen relationship at every level from molecular to clinical with subsequent chapters on iron proteins, iron-uptake systems of pathogenic bacteria, bacterial iron metabolism, iron-binding proteins and host defense, iron and the antibacterial function of polymorphonuclear leukocytes, and clinical and physiological aspects of iron in infection. The closing chapter on iron and infection: future aspects is by the two editors, E. Griffiths and J. J. Bullen, who write five and contribute to six of the eight chapters. The other three authors are A. Bezkorovainy, J. H. Cross, and M. J. Kluger. Because of the limited number of contributors and the major participation by the editors the book is well organized and closely edited and provides the advantages of a multiauthored book without the disadvantages. Illustrations are relevant and of uniformly good quality. The index is accurate and useful. Minor errors, such as “depression” for “derepression” in a discussion of control of apoferritin biosynthesis, do not substantially diminish the general quality, and typographical errors are rare. Every chapter is extensively documented with references; for example, there are more than 120 references for chapter 1, about 140 for chapter 2, and well over 250 for the final chapter. This large amount of background literature emphasizes the diversity of disciplines that provide a foundation for the role of iron in infections. No previous work has brought together the background material for a comprehensive treatment of iron and infection.

In the preface the editors attribute the original recognition of a relation of iron to infection to a paper on the bacteriostatic properties of egg white. That work, by Schade and Caroline, was published in Science in 1944, but the role of iron in development of septicemia is still not common clinical knowledge. Thus, primary hemochromatosis, a common but frequently undiagnosed genetic disorder characterized by excessive (more than 15 g) iron stores, may contribute to the onset and progression of Vibrio vulnificus sepsis after ingestion of raw oysters. The oysters, although healthy and harvested from uncontaminated beds, may harbor this marine halophile. In Florida several deaths are recorded every year from V. vulnificus sepsis in persons made susceptible by iron overload. Accurate documentation of the full magnitude of this problem is not available, because media required for isolation of V. vulnificus are not routinely used, and because iron overload is frequently missed both clinically and at the autopsy table.

This book should be of particular interest to biochemists, microbiologists, and clinicians specializing in infectious diseases, but an even broader audience will find its reading worthwhile. For a 325-page book the price of $79.95 is somewhat prohibitive for personal acquisition, but the volume is a must for purchase by departmental and institutional libraries and should be made widely available in that way.

References

BOOK REVIEWERS

We invite readers who would be interested in reviewing books for our Book Review section to inquire about becoming a contributor. Reviews cover the subject matter, timeliness and importance of the contents, and the audience to which the book is directed (practicing biological scientists). The reviews should be approximately 500 words long, and would be expected within 8 weeks of receipt of the book, which would then become the property of the reviewer. Please address inquiries to the Editor-in-Chief, William J. Whelan, The FASEB Journal, P.O. Box 016129, Miami, FL 33101-6129, USA.
Encounter on the Airwaves

By Martin Frank

Executive Director, American Physiological Society

This article, describing the poignant feelings of our Executive Director as he defended the use of animals in research on a Washington-based radio talk show, is important for you to read to grasp the real intent of animal rights activists and to formulate a means of communicating the importance of animal research to local citizens when you are called on to defend our laboratory practices.

I urge you to relate to Dr. Frank your attitudes on what is, perhaps, the most important issue facing our Society: the use of animals in research. -- Aubrey E. Taylor, President-Elect, The American Physiological Society.

With anticipation I waited in my office for the telephone call that would enable me to rebut the accusations made by Ingrid Newkirk, National Director of People for the Ethical Treatment of Animals, who had condemned scientists as uncaring and unfeeling individuals who consciously treated laboratory animals inhumanely.

She also spoke glowingly to her radio audience of the exploits of terrorists who infiltrate and break into laboratories to liberate animals. To my dismay, her discussion of raids was met by the host's announcement that he would like to join her compatriots during the next raid.

While such words are shocking to all of us, it is our responsibility to stand up for the rights of the sick and infirm who hope for cures through discoveries employing laboratory animals. With that in mind, I was willing to participate in a telephone interview on the Ernie Davis Show where I could respond to callers to provide the

* "Encounter on the Airwaves" was first published in the December, 1987 issue of The Physiologist.
perspective of the biomedical community.

As a physiologist, I have done research on animals and treated them with the same respect I give to any living creature. I can explain easily why animal research is important and list numerous medical advances that were dependent on animal research.

An uncertainty prevailed, however, because of past experience with the animal rights activists and the possibility that I would be unable to answer a no-win question, such as the classic "when did you stop torturing experimental animals?"

By morning of my encounter, I had my game plan, based largely on the need to remain calm throughout the 60-minute show. Thoughtful, informative responses would be provided by me no matter how belligerent the question. Every attempt would be made to complete my interrupted answer before addressing the interjected question.

For me, the key for a successful encounter was to play the politician. Just like Reagan during his occasional press conference, my answers were for the listening audience, not for the questioner.

After the first commercials were aired at 9:00 A.M. I heard Ernie Davis make the following introduction.

"We have a guest the first hour, Dr. Martin Frank, Executive Secretary-Treasurer of the American Physiological Society. He's a scientist and these folks (sic) called up for a little rebuttal time. I guess the lady we had, who was against the use of animals in biological experiments, which I certainly am so, we are going to see how these people can justify what they do to the guise that they are doing so much for you and I and our health.

"If by torturing, hurting, or harming some poor animals it's going to give me five or more minutes to my lifetime, then I would rather say pass. I don't know how you feel, but that's exactly the way I feel. We'll be somewhat fair, try to be."

"I'm quite honestly not extremely looking forward to my conversation with my first guest because the topic kind of depresses me. I was going to say I could almost understand why it's necessary to use animals for experiments, but no it isn't, no it isn't. There has to be some other way they can do it. Our animal friends are exactly that, only that I believe the good Lord gave them to us because we love them for companionship, and I can't see doing what they are doing."

The next 60 minutes went rapidly as I responded to a wide range of questions. The ignorance of the questioners on the importance of animals in biomedical research was apparent from the start.

One man appeared to accept animal research after he agreed that he would refuse to be the first subject for coronary bypass surgery. Some callers wanted us to use cadavers or asked whether computers could be used. Ernie Davis condemned scientists for using fetuses for research and for acting as God by deciding who
should live and who should die. He even suggested our research was comparable to Nazi atrocities.

Callers also suggested that the billions spent on research should be directed into educational programs, the message being those who had abused their bodies by smoking and/or fat-laden diets should be sacrificed to educate future generations. A common topic of the questioners related to cosmetic testing.

As was obvious from the outset my 60-minute encounter with the animals rights movement was not limited to the use of animals in biomedical research. However, my answers were designed to enumerate instances in which animals had contributed to improving medical care and that laboratory animals are treated humanely.

I have no idea how many people listened to that radio show, nor do I know whether they were for or against research on animals. I do know that Ernie Davis and his staff were strongly sympathetic to the animal rights movement. Each animal rights caller was allowed to ask two questions, while the caller who supported the use of animals was cut off before he completed his statement through the magic of the seven-second delay between reception and transmission of the callers' remarks.

Richard Malvin indicates in the December issue of The Physiologist in his opinion piece, "Are Animal Activists Humane?", the arguments presented in defense of animal rights positions often times are irrational. This was apparent throughout my radio encounter. Because of this, it remains imperative for all scientists to speak up for animal research if we are to continue to work on animals.

Whether on radio or in small groups, all scientists must take the offensive, dispelling the myths trumpeted by animal rights activists. The inhumanity of animal rights activists must be stopped.
ANNOUNCEMENT

WELLCOME VISITING PROFESSORSHIPS IN THE BASIC MEDICAL SCIENCES 1988/89 SERIES
ADMINISTERED BY THE FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY

The Federation of American Societies for Experimental Biology invites nominations for the twelfth series of WELLCOME VISITING PROFESSORSHIPS IN THE BASIC MEDICAL SCIENCES, sponsored by The Burroughs Wellcome Fund. Administered by the Federation, the Professorships are offered annually to medical schools, universities and other scientific research institutions within the United States.

The purpose of the Visiting Professorships is to stimulate interest in the basic sciences and to enhance communication with scientists in Physiology, Biochemistry, Molecular Biology, Pharmacology, Pathology, Nutrition, Immunology and Cell Biology.

Selected U.S. institutions will receive distinguished scientists from within the United States or abroad whose interests relate to the above disciplines. Twenty-one awards will be made annually, of which up to four awards will be made to non-U.S. Visiting Professors. Each scientist will serve as a Wellcome Visiting Professor and spend two to five days at the institution engaged in teaching and discussion with students and faculty.

During the visit, each Visiting Professor will deliver a Wellcome Lecture on a subject pertinent to his/her discipline. An announcement of the Wellcome Lecture in the basic medical sciences will be prepared and publicized in advance by the institution.

APPLICATIONS FOR 1988/89 AWARD

Application for a Visiting Professorship for the 1988/89 academic year should be by letter from a university or scientific institution in the U.S. wishing to receive a Visiting Professor. No special forms are required. The application should not be made by an individual wishing to visit an institution.

Applications should include the following:

1) Co-signature of an appropriate official of the institution, e.g., Dean, Chancellor, Vice President.
2) Curriculum vitae of the invited scientist which should include a complete mailing address.
3) Selected bibliography of no more than 20 publications.
4) Statement indicating how the applying institution would benefit from the nominee’s visit, together with a tentative plan for achieving this benefit. Please specify the scientific discipline in which the nominee would be expected to serve as Visiting Professor.
5) All documents must be submitted in duplicate.

To avoid a situation in which the same eminent scientist is nominated by more than one institution, a prospective host institution should ascertain the nominee’s interest and availability before submitting an application.

An institution having previously received a Wellcome Visiting Professor within the past three years should submit an application in a discipline other than that in which the previous award was made.

Letters of application should be addressed to: The Wellcome Visiting Professorship Program, Executive Office, Federation of American Societies for Experimental Biology, 9650 Rockville Pike, Bethesda, MD 20814.

Phone: (301) 530-7090.

The deadline for receipt of applications is May 1, 1988.

AWARDS AND EXPENSES

The Burroughs Wellcome Fund will provide an award of $1,500 and a plaque to the host institution for presentation to the Visiting Professor at the time of the Wellcome Lecture. In order to assist with some of the attendant expenses, The Fund will provide $350 to each host institution. Local expenses (meals, lodging, etc.) will be borne by the host institution.

After the visit, a statement of travel expenses will be submitted by the Visiting Professor to the host institution for payment. Upon receipt of appropriate documentation, The Burroughs Wellcome Fund will reimburse the institution for travel expenses (equivalent to economy air fare). Travel expenses for an accompanying spouse will also be reimbursed by The Fund at the same level.

SELECTION

Applications are reviewed by committees of the member societies of the Federation, and final selections are made by the Federation Executive Committee.

It is intended there be at least three Professorships in each of the seven disciplines represented by the constituent Societies of the Federation.

Each year more applications are received than can be awarded. Selections will be based on the needs of the applying institution, the credentials of the nominee, the scope of the proposed programs, and the expected benefits.

In a given year, only one Professorship will be awarded to an institution, and a person may serve as a Visiting Professor at only one institution.

Awards will be announced by August 1, 1988.

SPONSOR

The Burroughs Wellcome Fund is a private nonprofit foundation located at 3030 Cornelius Road, Research Triangle Park, North Carolina 27709. It was organized in 1955 with funding from Burroughs Wellcome Co. to provide financial aid for the advancement of medical knowledge by research, or for other scientific, scholarly and educational purposes within the United States.

Prepared by the FASEB Office of Public Affairs

April 1988
Meeting Previews
The American Physiological Society
1988 FASEB Annual Meeting

Life-Threatening Arrhythmias in Myocardial Ischemia and Reperfusion
(Thematic Session Organized by APS)

**Chairs:** D. J. Hearse and D. P. Zipes

**Speakers:** M. R. Rosen, M. L. Janse, P. B. Corr, L. S. Gettes, D. J. Hearse, R. L. Verrier, R. J. Cohen, and D. P. Zipes

Ventricular arrhythmias occur unpredictably seconds, minutes, hours, or days after the onset of ischemia. They are often life threatening (accounting for many of the early deaths associated with evolving myocardial infarction), and their origins are complex and controversial. Arrhythmias are perhaps unique in the field of cardiac pathophysiology in that so many widely different triggers have been proposed to explain their mechanism of origin. Some investigators see ionic perturbations at the level of the plasma membrane as being critical for establishing the scenario for arrhythmogenesis. L. S. Gettes can provide a unique overview of this field, particularly in respect to potassium, which most would agree plays a pivotal role. Gettes will, however, consider other more controversial ions such as calcium and magnesium. Other investigators see a metabolic component as being critical (e.g., the formation of lysophosphatides), and more recently free radical-mediated membrane injury (including lipid peroxidation) has been proposed as a trigger; D. J. Hearse will speak about this.

Although controversy still rages over the genesis and pharmacological control of arrhythmias, a great deal is known about some of the fundamental mechanisms (automaticity, reentry, triggered activity, etc.), and M. R. Rosen and M. L. Janse can give masterly reviews of this vast field. In dealing with cardiac arrhythmias, it is important not to restrict our views simply to the heart: the brain and nervous system can play a major role; R. L. Verrier is an acknowledged international expert in the way in which the autonomic nervous system influences vulnerability to arrhythmias. The advent of thrombolysis and angioplasty has focused our attention on the consequences of reperfusion, and it is now well documented that reperfusion (e.g., after transient coronary spasm) can be a potent arrhythmogenic trigger. It is possible that mechanisms differ from those of ischemia-induced arrhythmias. P. B. Corr will review this complex and rapidly changing field. Finally, many questions remain to be answered. Despite the sophistication of many techniques there is a need for new methods for studying and modeling arrhythmias, and R. J. Cohen will introduce us to his challenging ideas about computer modeling, critical masses, etc. The symposium as proposed will cover a vast area, and no one would be better than D. P. Zipes to place it into a final perspective.

New Approaches to an Old Problem: Acute Myocardial Ischemia
(Thematic Session Organized by APS)

**Chairs:** J. M. Downey and D. M. Yellon

**Speakers:** A. K. Markov, G. D. Buckberg, E. Corday, L. C. Becker, R. Bolli, J. M. Downey, and C. E. Murray

Ischemic heart disease continues to be the number one killer of American adults. Although the etiology of acute myocardial infarction has been well understood for decades, only recently have aggressive therapies, such as thrombolysis, been developed to treat this condition. As our understanding of the cellular processes involved in the ischemic myocardium increases, more ways to intervene and protect the ischemic tissue become apparent. This symposium will explore some of those interventions that are particularly interesting and show promise. The organizer has chosen some very controversial subjects for this symposium. G. D. Buckberg reports that he revives ischemic myocardium even after 6 hours of total ischemia using the surgical resuscitation methods. Most conventional pathologists would claim that the tissue is irreversibly injured at this time. A. K. Markov has had dramatic results with fructose diphosphate, although other have been less than enthusiastic about this agent. L. C. Becker has found that coronary dilators such as dipyridamole reverse stunning in the dog model, even though the mechanism is obscure. E. Corday has found that the coronary sinus may be an excellent portal to the ischemic zone allowing for the deposition of nutrients and drugs. Finally, there are the oxygen radical scavengers; controversial as they are a great deal of attention has been focused on them. R. Bolli will recount his findings concerning the antioxidants in models of stunned myocardium, and J. M. Downey will address their performance in that ever-elusive field of infarct size modification.

Mechanisms of Cellular Injury in the Ischemic and Reperfused Myocardium
(Thematic Session Organized by APS)

**Chairs:** K. Reimer and B. Freeman

**Speakers:** K. A. Reimer, B. A. Freeman, W. Schaper, M. L. Buja, C. E. Ganocte, and J. L. Zweir

Although ischemia in the heart has been the subject of intense investigation for years, the actual mechanism by which the myocyte is injured in this process remains obscure. A number of theories have been put forth over the years but none have been proved. This symposium will explore some of the more prominent theories and examine the evidence supporting each. A variety of approaches to the problem will be examined, including histological, biochemical, physiological, and clinical approaches. It is not likely that progress will be made in this field until the basic sequence of events...
in the ischemic cell is elucidated and understood. This is a field in which controversy abounds and agreement is rare.

Leukocyte-Mediated Injury in Ischemia
(Thematic Session Organized by APS)

**Chairs:** G. W. Schmid-Schönbein and R. L. Engler

Recent evidence suggests that ischemia causes microvascular occlusion and the initiation of inflammatory reactions. There is evidence that lethal cell injury is mediated by oxygen radicals and lysosomal enzyme action derived from circulating granulocytes. A tragic consequence is that reperfusion by delivering oxygen and granulocytes exacerbates the injury process. The evidence comes from skeletal muscle, heart muscle, brain, liver, and lung and from hemorrhagic shock experiments. The following are questions that require further discussion. Where and by what factors do granulocytes become activated? What forms of injury are produced by oxygen radicals? What forms are produced by lytic enzymes? Which granulocytes are involved and what type of cellular interactions exist with platelets, endothelium, and parenchymal cells? What percentage of capillaries become obstructed? Do interventions delay or prevent injury? What are the manifestations in different organs? What natural protective mechanisms exist against granulocyte injuries?

**Molecular and Cellular Mechanisms of Tissue Repair**
(Thematic Session Organized by AAP)

**Chairs:** R. Ross and M. Sporn
**Speakers:** K. Sprugel, M. Klagsburn, E. Raines, A. B. Roberts, and D. B. Rifkin

**Coronary Vasospasm**
(Thematic Session Organized by AAP)

**Chairs:** P. M. Vanhoutte and M. Nakamura
**Speakers:** M. Nakamura, R. W. Alexander, R. A. Cohen, R. M. Robertson, H. Shimokawa, J. T. Willerson, and P. M. Vanhoutte

**Taxonomy of Plasma Membrane Anion Exchangers**

**Chair:** P. Aronson
**Speakers:** M. Jennings, E. Hoffman, L. Simchowitz, P. Aronson, and S. Alper

Recent transport studies indicate that anion exchange processes with features similar to but distinct from erythrocyte band III are present in the plasma membranes of virtually all cells. Recent molecular biological studies indicate the presence of mRNAs for band III homologues in multiple nonerythroid tissues. The purpose of this symposium is to compare and contrast the transport and molecular properties of the members of this important family of transport proteins.

**Neural Control of the Intestinal Epithelium**

**Chair:** H. J. Cooke
**Speakers:** F. Sundler, A. Surprenant, H. J. Cooke, and D. C. Dawson

This symposium will address the intrinsic neural innervation of the intestinal epithelium. It will focus on four areas of research, which include the identification of neurons and their projections within the intestine, electrical behavior of submucosal neurons that innervate the intestinal mucosa, effects of neurotransmitters on intestinal transport function, and cholinergic regulation of ion channel function of epithelial cells. It brings together morphologists, neurophysiologists, gastrointestinal physiologists, and epitheliologists who are experts in their areas and who all utilize different approaches to examining the neurobiology of the intestine.

**Myocardial Ischemia in the Hypertrophied Heart**

**Chair:** R. J. Bache
**Speakers:** S. P. Bishop, R. J. Bache, S. F. Vatner, M. L. Marcus, C. M. Boor, and C. Rose

Myocardial hypertrophy is a useful compensatory mechanism by which the heart adapts to an increased systolic load. As the ventricular wall hypertrophies, systolic stress decreases in proportion to the increased wall thickness until stress returns to near-normal levels. Despite the apparent appropriateness of the hypertrophic response to an increased systolic load, abnormalities of perfusion and mechanical function may exist in the hypertrophied heart that result in increased vulnerability to myocardial ischemic injury and may ultimately lead to development of cardiac failure. This symposium will review the present state of knowledge regarding mechanisms for abnormalities of perfusion and function in the chronically hypertrophied myocardium. Because abnormalities of myocardial perfusion could result from inadequate growth of coronary vasculature during the hypertrophic process or from functional abnormalities that impair perfusion of the hypertrophied myocardium, both pathological and functional characteristics of the coronary circulation in the hypertrophied heart will be discussed, and the importance of the coexistence of cardiac failure on myocardial perfusion will be examined. Mechanisms responsible for the impaired ability of the hypertrophied heart to tolerate acute coronary artery occlusion will be discussed, and the effects of superimposition of exercise conditioning on myocardial hypertrophy will be examined. The role of abnormalities of oxygen transport in mediating increased vulnerability of the hypertrophied heart to ischemia will be reported. This symposium will provide a timely update of current understanding of abnormalities of perfusion, oxygenation, and function of the hypertrophied myocardium.
Regulation of Blood Flow in Endocrine Glands

Chair: C. Desjardins
Speakers: J. D. Fenstermacher, G. A. Hedge, R. J. Traystman, P. R. Kvietsys, and C. Desjardins

The overall goal of this symposium is to identify the vascular mechanisms that limit or control the synthesis and secretion of hormones by endocrine cells. Speakers will provide a state-of-the-art analysis about two aspects of blood flow: 1) the physiological mechanisms that limit or control blood flow to specific glands and 2) the intravascular control over blood distribution within glandular tissues. Participants will identify deficits in our understanding of the mechanisms that serve to integrate blood flow with secretory activity. A premium will be placed on discussing new approaches to study the coupling between blood flow and the synthesis and secretion of hormones.

Excitation-Contraction Coupling in Striated Muscle: New Methodological Approaches and New Hypotheses

Chair: A. Fabiato
Speakers: S. Fleischer, G. Meissner, K. P. Campbell, N. Ikemoto, R. S. Eisenberg, E. Rios, O. Shimomura, C. C. Ashley, J. L. Vergara, P. Volpe, Y. Goldman, and A. Fabiato

The mechanism of excitation-contraction coupling in striated muscle is still unknown and remains the major stumbling block of muscle physiology. However, there has been some recent progress because of the development of new methodological approaches and of the proposal of new hypotheses. The aim of this symposium is to discuss these new developments in a forward-oriented manner without review of the classical hypotheses that have been proposed for excitation-contraction coupling. The new methodological approaches include new developments in the field of the photo-protein aequorin (discovered by Shimomura), which remains one of the most useful tools for the study of excitation-contraction coupling. In addition, caged calcium and new fluorescent calcium probes are now available. In this field as in many others the emphasis has been recently shifted from physiological experiments to more biochemical or biophysical approaches. Excitation-contraction coupling is, indeed, likely to involve more biochemical reactions than was initially thought. This may be the reason for which the mechanism of excitation-contraction coupling has not yet been discovered through purely physiological approaches. The recent biochemical approaches include the isolation of the putative calcium release channel of the junctional sarcoplasmic reticulum membrane, the isolation and identification of the ryanodine- and dihydropyridine-binding sites, and the production of monoclonal antibodies to some of the proteins associated with the junctional region of the sarcoplasmic reticulum. An additional approach involves high-resolution structural studies of these isolated components, one of which, the 300,000-dalton protein, forms square structures of similar dimensions and shape as the foot processes of the intact triad. A more biophysical approach consists of single-channel recording on the sarcoplasmic reticular membrane using patch clamp of membrane vesicles fused in lipid bilayers or patch clamp of the sarcoplasmic reticular membrane in situ in skinned fibers. The newest hypothesis is the inositol 1,4,5-trisphosphate-induced release of calcium, which will be discussed extensively. Among the classical hypotheses for excitation-contraction coupling in skeletal muscle, the charge movement hypothesis is the only one that has not yet been eliminated. Accordingly, it will be the only one discussed.

Atrial Natriuretic Peptide: Actions in Animal Models of Hypertension and Heart Failure

Chair: R. H. Freeman

This symposium is organized around the theme of atrial natriuretic peptides in animal models characterized by chronic disturbances in renal/fluid volume and arterial pressure regulation, i.e., heart failure and hypertension. Current knowledge of this cardiac hormonal system in hypertension and heart failure is expanding rapidly. There are chronic alterations in tissue and circulating levels of the endogenous atrial natriuretic peptide in both genetic and experimental animal models of hypertension and heart failure; also, the renal and cardiovascular responses to exogenous atrial peptide infusions appear to be altered in some of these models. The symposium speakers will identify both physiological and pharmacological aspects of the atrial natriuretic peptides in chronic animal models of hypertension and heart failure. These animal models have been particularly helpful in elucidating other important hormonal mechanisms involved in these disease states. This focus on the atrial natriuretic peptide system in hypertension and heart failure will increase our knowledge of this cardiac hormonal system and extend our understanding of the hormonal processes underlying these clinically relevant problems in humans.

Pathogenesis and Impact of Insulin Resistance in Non-Insulin-Dependent Diabetes Mellitus

Chair: J. Gerich
Speakers: J. Foley, G. Friedenberg, E. Ravussin, and J. Gerich

The purpose of this symposium is to provide the most recent information by prominent workers in the field, to attempt to resolve certain controversies, and to identify areas for future research. For example, although it is currently believed by most individuals not working in the area that reduced insulin receptor binding is the initial defect in the insulin resistance of diabetes mellitus, the data supporting this concept have come from one laboratory and have not been confirmed by many others. Evidence that defective insulin receptor kinase activity may be the cause of insulin resistance in diabetes is rapidly accumulating. An update on this concept will be presented as well as information on whether insulin tyrosine kinase activity is the basis for the action of insulin on glucose metabolism. Whether the main defect in muscle glucose metabolism in diabetes is impaired glucose transport, glucose storage, or glucose oxidation is also not resolved. Finally, it is presently controversial
whether hepatic or muscle insulin resistance is mainly responsible for the hyperglycemia in diabetes. Currently, the most commonly held view is that muscle insulin resistance is most important. New data will be presented showing that the degree of insulin resistance in liver and muscle is similar in diabetes and that because the liver plays the predominant role in regulating glucose metabolism, its insulin resistance rather than that of muscle is a more important factor for both fasting and postprandial hyperglycemia.

Physiology and Pathophysiology of Reactive Oxygen Metabolites in the Digestive System

Chairs: D. N. Granger and M. B. Grisham
Speakers: E. L. Thomas, C. Olson, J. T. LaMont, L. A. Hernandez, and M. B. Grisham

The digestive system is well endowed with the biochemical machinery necessary for the production of potent oxidants. The overall objective of this symposium is to define and discuss the available data regarding the production and cytotoxicity of reactive oxygen metabolites in normal and diseased tissues of the digestive system. Oxidants, normally produced in saliva, appear to play an important role in the control of bacterial growth in the mouth and upper gastrointestinal tract. The epithelial lining of the gastrointestinal mucosa is protected from salivary oxidants and other luminally derived oxidants by the mucus layer, which acts as a potent antioxidant. Oxidants produced by parenchymal oxidases and/or resident phagocytic leukocytes can injure epithelial cells. This injury is often manifested as mucosal ulceration and loss of microvascular integrity. An overproduction of oxidants has been implicated in the pathogenesis of ischemia/reperfusion and inflammatory disorders of the gastrointestinal tract. The information discussed in this symposium will help to identify areas of controversy and uncertainty regarding the role oxidants as mediators of cell injury in the digestive system.

The Cellular and Molecular Biology of Renal Hypertrophy

Chair: M. R. Hammerman

It has been recognized for a century that after experimental unilateral nephrectomy of adult animals, the contralateral kidney becomes enlarged. Enlargement involves primarily the renal cortex and reflects a true hypertrophy of the convoluted tubules. The physiological signal that triggers such hypertrophy and the mechanism by which hypertrophy is effected are unknown. The purpose of this symposium is to explore several approaches that are currently being taken toward achieving an understanding of the physiological basis for renal hypertrophy through the use of cellular and molecular biological techniques. Technical aspects relating to the use of peptide, RNA, and DNA probes to aid in understanding tissue growth will be reviewed briefly. The bulk of symposium will review current research employing these techniques toward an understanding of renal hypertrophy. Speakers will address specifically the potential roles of polypeptide growth factors in kidney growth, patterns of gene expression in models of renal cellular hypertrophy, and the potential role of the Na⁺-H⁺ exchanger as an initiator of proximal tubular hypertrophy.

Regulation of Cerebral Blood Flow

Chair: D. D. Heistad

Progress has been relatively slow in our understanding of factors that regulate cerebral circulation. It is not entirely clear why understanding of this important vascular bed has lagged behind understanding of circulation to other vascular beds. It seems that because the anatomical arrangement of cerebral vessels is unusually complex, limitations imposed by methods have retarded our understanding of the cerebral circulation. Two factors make this a propitious time for an intensified effort to understand cerebral blood vessels. First, recent discoveries have opened new areas of research. Some exciting new findings relate to endothelium; the blood-brain barrier; autoregulation; and the role of adenosine, peptides, eicosanoids, and oxygen in the regulation of cerebral circulation. Second, recent advances in methodology allow several new approaches. Some important methodological advances include the ability to measure cerebral blood flow and metabolism accurately, to study the microcirculation in brain stem as well as cerebrum, and to study endothelial-dependent responses. The symposium will allow new insight into physiological regulation of cerebral blood flow and insight into pathophysiology.

Mechanisms of Epithelial Ion Transport Across the Frog Skin

Chair: S. D. Hillyard

The frog skin has served as a model for the study of epithelial Na⁺ transport in a variety of mammalian tissues in addition to its role in amphibian osmoregulation. The symposium speakers will discuss recent advances in the following topics that relate to ion transport across the frog skin: 1) proton secretion as it relates to Na⁺ uptake across the apical membrane, 2) the gating mechanisms and regulation of apical Na⁺ channels, 3) apical K⁺ transport and amiloride-insensitive cation channels, 4) regulation of Cl⁻ transport across mitochondrial-rich cells, and 5) ontogeny of cation transport during metamorphosis. These discussions will provide a more detailed understanding of ion transport mechanisms that will be valuable to those interested in general processes of epithelial transport and to those who are interested in the zoophysiology of anurans.

Regulation of Renal Ionic Channels

Chair: L. G. Palmer
Speakers: H. Sackin, H. Oberleitner, L. G. Palmer, H. Garty, and S. A. Lewis

The major purpose of the symposium is to examine the different mechanisms
The symposium will bring together a number of investigators who have developed and are using different experimental approaches to study epithelial channel regulation. These techniques will include analysis of single-channel behavior using the patch-clamp technique, measurements of channel-mediated ion fluxes in a cell-free preparation of membrane vesicles, impedance and noise analysis, and the use of ion-selective electrodes in isolated fused kidney cells. These diverse approaches provide different kinds of information about ion channels. The symposium is designed to provide a forum at which the integration of this information can be begun.

Cardiovascular and Renal Actions of Epoxideicosatrienoic Acids: Novel Metabolites of Arachidonic Acid Produced by a Cytochrome P-450 Monoxygenase

Chair: K. G. Proctor

A third pathway of arachidonic acid metabolism has recently been discovered. Arachidonic acid can be metabolized by cyclooxygenase, lipoxygenase, and cytochrome P-450 monoxygenase enzymatic systems. The pathophysiological importance of the array of compounds from the first two pathways is universally recognized, but many of the diverse actions have been inferred from inhibitor studies. Because it is conceivable that cyclooxygenase or lipoxygenase inhibitors could redirect the metabolism of arachidonic acid to the third pathway or that the inhibitors could unmask biological actions of cytochrome P-450 metabolites, some effects that have been attributed to cyclooxygenase and/or lipoxygenase metabolites might have to be reexamined. Unfortunately, the physiological and pharmacological actions of these novel substances, the epoxideicosatrienoic acids (EETs), are generally unknown even though the fatty acid substrate and enzymatic systems are probably available to most cell types and tissues. A growing body of evidence has implicated the EETs and related eicosanoids in the regulation of widespread physiological responses. The interdisciplinary group of investigators assembled at this forum will discuss the biochemistry and the known structure-activity relationships of these compounds, present evidence linking the EETs to the regulation of renal salt and water metabolism, and consider indirect evidence implicating the EETs in the regulation of vasomotor tone in the coronary and peripheral circulations.

Molecular Aspects of Epithelial and Photoreceptor Cell Polarity

Chair: E. Rodriguez-Boulan

Model systems have become available to study the cell and molecular biological aspects of generation of epithelial cell polarity. Polarity of epithelia is a fundamental biological phenomenon, key to the understanding of the function of vital organs, such as liver, intestine, and endocrine/exocrine glands. Epithelial polarity also plays an important and as yet not understood role in the development of the nervous system and the heart. This symposium will cover exciting new research in the following areas: 1) protein targeting to apical and basolateral domains of epithelial cells and to specific neuronal compartments. In vitro culture model systems have become available to study these problems. Recombinant DNA work in different laboratories is providing clues on the localization of specific address markers in apical and basolateral plasma membrane proteins. 2) Role of the submembrane cytoskeleton in the regionalization of apical and basolateral proteins. Proteins are not free to diffuse in the membrane. Recent evidence indicates that specific components of the cytoskeleton (fodrin, ankyrin) are associated with the basolateral membrane and may play an important role in the maintenance of surface polarity in epithelial cells. 3) Polarity of ionic channels. 4) Polarity patterns in developing photoreceptor cells.

Control of the Pharyngeal Airway

Chair: D. P. White

Until the last 10 years, investigation into pharyngeal respiratory function was scant. Recently, however, there has been considerable interest in this area because of an increased awareness of the obstructive sleep apnea syndrome. In individuals with this disorder the pharyngeal airway repetitively occludes during sleep, yielding potentially severe blood gas derangements, cardiovascular abnormalities, and sleep disruption. The basic aim of this symposium is to collectively improve our understanding of the mechanisms necessary for maintaining pharyngeal patency and to determine how sleep affects these mechanisms. The pharyngeal airway will be addressed from a variety of approaches including 1) neural control of the muscle; 2) anatomy, growth, and development of the pharynx; 3) intrinsic properties of the pharyngeal muscles; and 4) the influence of sleep on upper airway control and patency. Such an integrated approach will, it is hoped, not only elucidate what is known about the control of this airway segment but also direct us toward promising future avenues of investigation from both physiological and technical perspectives.

Metabolic Acidosis and the Circulation

Chair: A. I. Arieff
Speakers: to be announced

Hormonal Regulation of Fluid and Electrolytes: Environmental Effects

Chairs: J. R. Claybaugh and C. E. Wade
Speakers: K. B. Pandolf, M. J. Fregly, J. R. Claybaugh, S. A. Cucinell, and J. A. Krasney
Renal Physiology: People and Ideas

Chair: C. W. Gottshalk

Regulation and Role of Vascular Capacitance

Chair: C. F. Rothe
Speakers: C. Rothe, A. Shoukas, C. Greenway, W. W. Lautt, S. Goldman, L. Rowell, and N. Trippodo

Endothelium: A Source and Target of Oxygen Radical Injury

Chair: U. S. Ryan
Speakers: R. Hebbel, U. S. Ryan, K. L. Brigham, B. Freeman, and M. Ziff

Endothelium is a primary target of inflammatory attack, and much of the vascular damage associated with inflammation has been attributed to activation of neutrophils and consequent liberation of oxygen radicals. In some cases injury can be reduced by the use of scavengers or inhibitors of oxygen radical formation. Presumably, mechanisms for metabolism of molecular oxygen evolved to fight invaders such as bacteria, parasites, and other foreign bodies. We now know that endothelial cells can not only phagocytize bacteria but can mount a bactericidal attack including a respiratory burst and other macrophage-like activities. Products designed to kill bacteria including oxygen radicals also leak out of endothelial cells and may provide vascular damage akin to that derived from neutrophils. This symposium will therefore consider the endothelial surface as both a target and a source of reactive oxygen species and will address the role of endothelium in inflammatory and immune reactions in the host response to injury. It will also consider the potential of the endothelium for both combating and amplifying vascular damage in, for example, ARDS, sepsis, reperfusion injury, and bacterial endocarditis.

Biology of the Pulmonary Intracapillary Macrophages

Chair: N. C. Staub

Impedance Techniques in Biological Systems (BMES)

Chair: H. H. Sun and J. M. Van DeWater

Impedance techniques in biological systems have many applications in impedance plethysmography in general and impedance cardiography in particular. These are noninvasive techniques in measuring impedance of a particular body segment continuously. By use of the Minnesota Impedance Cardiograph with Kubicek's equation together with new miniaturized instrumentation utilizing signal-averaging techniques, impedance change can be used to evaluate overall cardiac functions in both critically ill patients and patients with suspected cardiovascular diseases. Various indices such as heart rate, stroke volume, cardiac output, left ventricular ejection time, and ejection fraction, together with heart sounds and electrocardiogram, can be displayed in real time with each ventricular ejection with great accuracy. Electrical impedance is a simple, inexpensive, reliable, noninvasive method to determine fluid volume changes, regional blood flow, arterial and venous outflow, cardiac stroke volume, and cardiac contractility. This method has a good correlation with standard methods and high diagnostic accuracy. It is noninvasive, portable, and easy to apply to outpatients, inpatients, and critical care patients, especially in the intensive care unit and coronary care unit.

Newly Discovered Actions of 1,25-Dihydroxyvitamin D₃ (SEBM)

Chair: H. F. DeLuca

Vitamin D was originally discovered because of its action in promoting mineralization of the skeleton and in the regulation of plasma calcium and phosphorus concentrations. From this angle, the active form of vitamin D was isolated, identified, and chemically synthesized. This active form, termed 1,25-dihydroxyvitamin D₃, has been found to work through a nuclear mechanism and localizes in the nuclei of target organs involved in the function of vitamin D. Besides the classical sites of intestine, kidney, and bone, it has now been determined that the active form of vitamin D localizes in the nuclei of a number of other tissues, and those tissues possess a specific protein receptor for the hormone. As a result, it is now clear that the vitamin D hormone has biological functions beyond regulating plasma calcium and phosphorus concentrations and in the mineralization of skeleton. This symposium will be devoted to the evidence for some of these new actions.

Osteoporosis: Basis and Treatment (SEBM)

Chair: H. F. DeLuca
Speakers: C. Johnston, R. Mazess, R. Recker, R. Lindsay, L. Riggs, and J. C. Gallagher

This symposium is dedicated to presenting the latest information on what leads to the disease osteoporosis, how widespread it is, and what is available in terms of diagnosis and treatment. There have been many recent advances in understanding the hormones that govern bone metabolism and function and the hormones that regulate calcium metabolism. Furthermore, noninvasive methods of measuring bone density have been
developed for detection of disease and for following treatment. Finally, some forms of osteoporosis are definitely treatable. This symposium will address these questions and will lay open the discussion for both basic scientists and physicians as to the current status.

Reconstituting Motility In Vitro (SGP)

Chairs: J. A. Spudich and Y. E. Goldman  
Speakers: Y. Toyoshima, T. Yanagida, M. Sheetz, and R. Vale

Investigation of many aspects of motility and contractility requires reconstitution of a functioning motile system from isolated and purified proteins. In the past few years, great progress has been made in developing methods to assay motion of purified contractile and motility proteins including actin-based and microtubule-based systems. A highly successful technique was the observation of polystyrene beads, coated with myosin, moving along bundles of actin filaments found inside Nitella cells. A significant advance will be reported by Y. Toyoshima. She is characterizing the movement of fluorescently labeled actin along a layer of carefully purified myosin subfragment-1 heads. Her experiments definitively locate the site of force generation in the head domain, even though the structural change leading to the motion is unclear. (Direct evidence for the head rotation commonly shown in textbooks is still lacking.) T. Yanagida, a leader in innovative methods to attempt to measure step sizes of the myosin motor, will describe those methods as well as experiments directed toward measuring force generated by purified actin and myosin. M. Sheetz will then speak on computerized analysis of the movement of both myosin and kinesin, a new microtubule-based motor. His experiments show that it may be possible to resolve individual molecular events in motility. R. Vale will end the symposium by describing a new in vitro motility assay for ciliary dynein. Properties of dynein-induced motility will be compared with kinesin-induced movement.

The Dynamics of Excitable Media (SMB)


The topics will deal with various aspects of the dynamics of excitable cells, including an analysis of the transitions that lead to bursting, cardiac pacemaking and wave propagation in cardiac tissue, wave propagation in the aggregation phase of certain cell systems, and collective phenomena in the brain. The overall goal is to expose biologists and physiologists to some of the more theoretical work being done by mathematicians and to expose mathematicians to some of the concrete modeling work being done on particular systems.
Meeting Previews
The American Association of Immunologists
75th Anniversary Celebration
1988 FASEB Annual Meeting

75th Anniversary Celebatory Symposium: Immunology in Perspective
Honorary Chair: M. Heidelberger
Cochair: D. C. Shreffler
Speakers: B. Benacerraf, E. A. Kabat, G. J. V. Nossal, and D. W. Talmage

Antigen Processing and Presentation: The Biological Role of MHC Molecules in Determinant Selection. Baruj Benacerraf

Protein determinants, recognized by antibodies, depend on the native conformation of the respective antigens. In contrast, T cell receptors, because they recognize membrane-associated antigens, are specific for selected amino acid sequences, specifically bound to autologous MHC molecules, in denatured unfolded peptide fragments. Therefore, to be immunogenic, a foreign, water-soluble, hydrophilic protein must be processed into a membrane-associated fragment capable of specific interaction with autologous MHC molecules. The discoveries from many laboratories will be discussed that resulted in: 1) present views of antigen processing and presentation, with a special emphasis on the biological function of MHC molecules as specific receptors for foreign and autologous peptides, and their role in determinant selection; and 2) the detailed understanding of the structure of MHC molecules in relation to their function as receptors for peptides. I shall also emphasize that autologous proteins and foreign protein antigens are similarly processed and interact identically with autologous MHC molecules as a basis for T cell tolerance to self-proteins.

Immunology in Perspective: Antibody Complementarity and Antibody Structure. Elvin A. Kabat

The subject will be reviewed as it developed during the last 50 years beginning when many workers did not believe that antibodies were proteins, although globulin concentrates were used in therapy. Acceptance of antibodies as proteins came from the development of physical, chemical, and immunological methods of study, notably, including the quantitative precipitin reaction, ultracentrifugation, free and gel electrophoresis, and immunoelectrophoresis and the isolation of antibody Fab and Fc fragments by digestion with enzymes. The establishment of the two-chain structure of immunoglobulins and the development of amino acid sequencing of proteins led to the recognition of variable and constant regions, the antibody-combining site being associated with the former. Amino acid sequencing of large numbers of light chains (Bence-Jones proteins) permitted statistical examination of variability at each position in the V region and three linear segments of hypervariability were recognized first in light and later in heavy chains. These were postulated to fold up to form three-dimensional antibody-combining sites. X-ray crystallographic studies confirmed that these hypervariable regions were the complementarity-determining regions and formed the walls of the antibody-combining site with the rest of the molecule serving as a framework. The cloning and sequencing of V regions of various antibodies have become an enormous enterprise and the data permit attempts to model antibody-combining sites. They have also led to understanding the genetic mechanism by which the body can generate the seemingly limitless repertoire of antibody specificities. The variability plot has been used to map polymorphisms in the major histocompatibility complex and to find strain differences in AIDS viruses.

Cellular Mechanisms in B Lymphocyte Activation and Tolerance. Sir Gustav J. V. Nossal

The chief features of this address relate to an analysis of a system of B lymphocyte activation that depends on the use of single, antigen-specific B cells, and their stimulation by a mixture of authentic antigen and various cytokines. Attention will be paid particularly to interleukins 1, 2, 4, 5, and 6, and to interferon. The role of antigens and cytokines in clonal isotype switching and in factor receptor regulation will be described. Tolerant cells display peculiar properties in activation situations. The details of their behavior reveal part of nature's grand strategy for self/non-self-discrimination. The latest data on both B and T lymphocyte tolerance models will be provided and discussed.

Beyond Molecular Immunology: A Century of Progress. David W. Talmage

A century of progress has elapsed since the experiments of Pasteur made immunology a practical science. This century can be divided into four phases. First came the animal phase when the phenomena of immunity and allergy were described and studied. Then came the serologic phase when antibodies in the serum were purified and characterized and the specificity of their reactions with antigen was determined. Third came cellular immunology with its explosion of information about B cells and their interactions with accessory cells. We are currently in the fourth phase, that of molecular immunology. With new technologies it has been possible to characterize the molecular markers and products of immune cells and to study their genetic control. Each of the four phases has lasted approximately 25 years. Therefore, it is reasonable to ask, "What comes next?" Attempts will be made to answer this question by analyzing the way each successive phase, in the progress of immunology, has strengthened and amplified the experimental approaches of the previous phase. On the basis of this information I will predict that, as substantial information is gained regarding the molecular biology of immune reactions, more emphasis will be placed on applying this knowledge to an understanding of allergy and immunity.
Third Annual Symposium on Contemporary Topics in Immunology

Chairs: Bernard W. Janicki, Joseph F. Albright, Sheldon G. Cohen

The Third Annual AAI-NIAID Symposium on Contemporary Topics in Immunology will convene on Sunday, May 1, 1988, thus launching the scientific program of the AAI at FASEB 1988. In recognition of the 75 years of past and present vigor of the AAI and the science of immunology, this symposium is designed to reflect that intensity. The key speakers represent four broad areas of immunological interest and activity. Each area will be discussed first from a historic perspective and then from a contemporary view, and focusing on a more specific research problem. The session is geared to an interdisciplinary approach.

Speakers:
Control of Antibody-Mediated Hypersensitivity. Historic: Zoltan Ovary; Contemporary: Kimishige Ishizaka.

Immunogenetics of Histocompatibility Substances. Historic: Rupert E. Billingham; Contemporary: Peter Parham.


Immunity to Viruses. Historic: Jonas E. Salk; Contemporary: Barry R. Bloom

AAI Theme Symposium: Receptors and Growth Factors

Organizer: Joost J. Oppenheim

Session 1: Receptors and Growth Factors for Mesenchymal Cells. Chairs: Russell Ross and Michael B. Sporn

Growth factors for mesenchymal cells represent an important component of the growth factor field, specifically because they play critical roles in embryogenesis and development, and in numerous disease processes including atherosclerosis, neoplasia, rheumatoid arthritis, liver cirrhosis, pulmonary fibrosis, and other fibroproliferative diseases. A number of these growth factors have multiple functions, whereas others appear to be quite specific. A great deal of new research in the field of receptors for these growth factors has increased our understanding of the factors together with their characterization and specificity. Most of the factors have been cloned and expressed, as have their receptors. Many aspects of the signal transduction elements are understood. Monoclonal antibodies are available for many of the factors as well as some of the receptors. Thus many tools are available to study these factors at the level of cell and molecular biology. This presents opportunities to understand the role played by each factor, in normal biology as well as in disease.

Session 2: Neuroneuroendocrine Receptors and Growth Factors. Chairs: Michael P. Czech and Henry Rozengurt

The molecular relationships will be explored between neuroendocrine hormone and growth factor receptors and their signal transduction mechanisms. A number of receptor systems that exemplify various specific signaling pathways linked to diverse bioresponses will be discussed. We shall try to focus attention on latest developments in our understanding of the immediate biochemical steps that take place after ligand-receptor interaction. The session will begin with a summary of concepts related to the multiple signaling pathways currently understood and the receptor systems to which they are linked. New insights will follow on the primary structure of the nerve growth factor receptor (NGF) and the relationship to the metabolic and morphological actions of NGF on nerve tissue function. Novel data will be presented on the molecular mechanisms of GTP-binding protein function in coupling receptor systems to signaling effectors. Completing the session will be a presentation on the newly acquired primary structure of the type II insulin-like growth factor receptor and insights about its function derived from such structural information.

Session 3: Receptors and Growth Factors for Myeloid Cells. Chairs: T. Michael Dexter and Donald Metcalf

Session 4: Receptors and Growth Factors for Lymphoid Cells. Chairs: Thomas A. Waldman and Maureen Howard

The immune system utilizes an array of extremely potent proteins termed lymphokines and monokines made by lymphocytes and monocytes to regulate the immune response. This field is in the midst of a revolution from a largely phenomenological science based on the analysis of the action of partially purified factors to a deeply analytic discipline. Recently, the genes encoding at least six of these factors, including interleukins 1 through 4 that control lymphocyte growth and proliferation, have been molecularly cloned. In many cases, receptors for these factors controlling lymphocyte proliferation and differentiation have been defined at a protein and molecular genetic level. These fundamental insights concerning the nature and mode of action of these growth factors have provided new information concerning the normal regulation of the immune response and the disorders in this regulation in disease. Furthermore, these insights have provided the scientific basis for new approaches for the treatment of patients with immunodeficiency diseases, autoimmune disorders, and neoplasia.

Session 5: Receptors and Growth Factors in Differentiation and Neoplasia. Chairs: Harold L. Moses and Charles D. Stiles

This session will encompass recent work concerned with the role of growth regulatory polypeptides in differentiation and neoplasia, and will stress the intracellular mechanisms whereby these factors exert their effect. It is now well accepted that the peptide growth factors act rapidly, inducing specific genes, including selected protooncogenes, after binding to specific cell-surface receptors. The products of many of the early genes induced probably act by regulating the expression of other genes necessary for the growth stimulation or differentiation response. Recent work on oncogenes has identified putative growth factor receptors, which indicates new growth factors that may be involved in neoplastic transformation as well as normal growth control. Growth inhibitory polypeptides such as transforming growth factor B are also involved in regulation of growth and differentiation in both normal and neoplastic cells. The growth inhibitory polypeptides appear to act through selective suppression of the expression of growth factor-inducible genes. Molecular mechanisms of action will be emphasized in this symposium.


The thrust of this session is on signal transduction via receptor kinases and G
proteins. Particular attention will be given to domain analysis of kinases, the function of biologically significant substrates, and the networks that connect various hormone receptors to each other in both normal physiological and cancer-related processes. Speakers will discuss insulin receptor, epidermal growth factor receptor, c-Src kinase, phorbol ester receptor C-kinase, and C kinase substrates of significance as well as the β-adrenergic receptor–G protein connections. Signal transduction studies have implications for prevention and treatment of cancer as well as for understanding the regulation of a variety of normal processes involved in growth and differentiation. A number of oncogenes encode protein kinases that must exert their activity via phosphorylation of transformation relevant substrates. Other oncogenes encode members of the G protein family involved in binding guanine nucleotides and in regulating such enzymes as adenylate cyclase. To the extent that activated oncogenes are involved in inducing cancer or in maintaining tumor cell phenotype, agents that function at the level of signal transduction may be effective in the prevention or treatment of cancer.

Molecular and Genetic Immunoprobes for Biotechnology
Organizer: Everly Conway de Macario

In the past few years we have witnessed a shift in biological research with a preponderance of talent evolving within the industrial sector. Therefore, it has become increasingly important to provide a forum that enables scientists from academia and industry to interact by discussing the current immunological developments such as monoclonal antibodies, interleukins, growth factors, and vaccines. The presentations will focus on the development of immunoprobes in basic research laboratories and how such probes can be improved and tested for applications in further research, disease control, and other practical purposes. This type of session will invigorate ongoing research in topics of interest common to the two complementary groups of scientists. It will also expose graduate students and postdoctoral fellows to scientific research in both academic and industrial settings.

Speakers:
The Objectives. Everly Conway de Macario


Interleukins and Growth Factors. Christopher S. Henney.

Joint Projects between Universities and Industries. Irwin C. Gunsalus.

Minisymposia

Block A: B Lymphocyte Development, Activation, and Regulation. Chair: Kim Bottomly

Immunoglobulins: Gene and Protein Structure
Chair: Ursula Storb

The objectives of the symposium are to summarize: 1) the current status of the regulation of the expression of immunoglobulin genes, specifically with respect to the molecular mechanism of immunoglobulin gene rearrangement; 2) the control of immunoglobulin gene expression with respect to promoters and enhancers; and 3) the regulation of allelic exclusion and isotypic exclusion.

B Cell Development
Chair: Donald E. Mosier

The intent is to focus on current issues in B cell development as to whether: 1) there is ordered rearrangement of immunoglobulin V genes; 2) there are separate lineages of B cell development, e.g., conventional Ly-1 B; and 3) there is expression of the functional immunoglobulin light chains at the pre-B cell level and, if so, does this contribute to the regulation of B cell development? These are three of the newest and most controversial areas in the field of B cell development. The topics have major implications for our understanding of antibody diversity and the origin of autoantibodies and, thus, relate directly to the large set of clinical problems associated with autoantibody formation.

Mechanisms of B Cell Activation
Chair: Anthony L. De Franco

The minisymposium will focus on early events in B cell activation. Recent work has suggested that antigen receptors on B cells, membrane IgM, etc., are capable of triggering phosphoinositide breakdown, leading to generation of inositol polyphosphates, elevation of cytosolic free calcium, and activation of protein kinase C. The latter two events have been shown to be capable of inducing many of the early cellular responses seen on addition of anti-IgM. Work with purified antigen-specific B cells has shown that specific antigen can also trigger phosphoinositide breakdown. Current efforts in these areas will be featured. Also highlighted will be recent research exploring the initial interactions of B cells and MHC-restricted, antigen-specific helper T cells. These interactions appear to deliver to the B cell a unique signal involved in early activation in response to T-dependent antigens.

Regulation of B Cell Growth and Differentiation
Chair: Richard J. Hodes

B cell growth and differentiation are subject to complex regulatory influences that continue to be the object of extensive investigation. The role of regulatory T cells has been well documented and recent studies have identified differential effects of distinct T cell subpopulations on B cell responses. In addition, a variety of lymphokines have been shown to be active in B cell triggering to both proliferation and differentiation. The present minisymposium will focus on the function of regulatory T cells and defined cytokines in B cell activation. Attempts to better define these regulatory factors should provide both an understanding of the mechanisms involved in activation and the potential to intervene in vivo in modifying B cell antibody responses.

Expression of Immunoglobulin Genes
Chair: Alfred L. M. Bothwell

The participants will examine the current mechanisms involved in the regulation of the expression of lymphoid-specific gene with a special emphasis on Ig genes. The proteins that interact with
the octamer sequence in Ig promoters and presumably the x B sequence will be described. New information will be outlined concerning the molecular mechanisms involved in the induction of heavy-chain class switching.

**Block B: T Cells. Chair: Charles A. Janeway**

**T Cell Receptor 1 (γδ): Structure and Function**
*Chair: Susumu Tonegawa*

**T Cell Receptor 2 (αβ): Structure and Function**
*Chair: Mark Davis*

**T Cell Development**
*Chair: Ada M. Kruijshoek*

Issues to be addressed in this symposium are which receptor-ligand interactions and lymphokines are utilized as signals for expansion or differentiation at the early fetal development stages before a conventional T cell receptor (TCR) αβ heterodimer is present, i.e., before day 17 of mouse fetal development. In considering this period of T cell development, it is necessary to also address the possible role of thymocytes with a TCR-γδ heterodimer: which intrathymically expressed molecules serve as ligands for this receptor; which lymphokines do these cells produce; and how does their presence affect the development of TCR-αβ cells? Other issues to be addressed are the mechanisms resulting in selection of the repertoire of TCR αβ cells at later stages of intrathymic T cell development: what is the nature of the selective forces leading to the predominance of T cells tolerant to self-components and yet restricted to self-MMC glycoproteins, and what is the relationship between TCR expression and repertoire selection? Finally, because it is clear that TCR-αβ expression can also occur extrathymically, attention will be focused on regulation of TCR rearrangements, transcription, and expression in nude mice as well.

**T Cell Activation**
*Chair: Ellen V. Rothenberg*

Examined and discussed will be the relationship between a triggering signal and the response it elicits in a T cell. Several aspects of the complexity of T cell responses to triggering have become accessible to analysis. Identification of the components of the core pathway has enabled the participants to identify cases where one or another element (e.g., increased calcium levels) may *not* be required to elicit a given functional output and allows for dissection of T cell activation into several overlapping but distinct gene expression programs. Careful analysis also suggests that the dependence on interleukin 1 that is manifest in several T cell responses is not mediated via phosphoinositide pathway intermediates. Thus, additional cell-surface interactions can amplify or modify signaling via the core pathway. Furthermore, it has been shown that contact with antigen under certain conditions may result not in activation, but in paralysis at the single-cell level. Identification of the distinctive signaling pathways involved will be of great interest. Finally, the diversity of responses and of triggering requirements may vary according to the context of a particular T cell differentiation state. Evidence will be presented that the repertoire of gene whose transcription can potentially be activated by stimulation changes both with intrathymic maturation and with postthymic antigen contact.

**T Cell Surface Molecules**
*Chair: Jane R. Parnes*

The participants will deal with cell surface molecules that play an important role in T cell recognition or function but are distinct from the T cell receptor molecules. The structure, function, and regulation of molecules such as CD4, CD8, CD3, and CD2, and lymphocyte function-associated antigens will be considered. Questions to be addressed include: 1) What are the roles of CD4 and CD8 in antigen recognition? 2) Do these molecules act as receptors for class II and class I major histocompatibility antigens? 3) Do CD4 and CD8 transmit signals, either positive or negative, to the T cells? 4) What is the function of the CD3 molecular complex, and what is the nature of its interaction with the T cell receptor? 5) How are the roles of CD2 in T cell surface molecules regulated? It is the hope that general conclusions can be reached concerning the roles of these T cell surface molecules and that testable hypotheses can be generated for further experimentation.

**T Cell Interactions**
*Chair: Ronald H. Schwartz*

Emphasis will be placed on two aspects of T cell interaction: 1) a three-signal model for T cell activation; and 2) the role of accessory molecules in T cell interactions.

**T Cell Regulation of the Immune Response**
*Chair: Charles A. Janeway, Jr.*

The symposium will focus on three aspects of immune regulation: first, the role of subpopulations of CD4+ T cells in controlling immune responses; in particular, we wish to examine the question of those factors that lead selectively to activation of helper or inflammatory CD4+ T cells. Second, we will examine the evidence for, and molecular basis of, antigen-specific immune regulation, in particular, evidence for cells or secreted products that mediate antigen-specific regulation. Third, we will examine experimental systems in which receptor-based regulation appears to play a role, especially the role of T cells in the recognition of B or T lymphocyte receptors in regulating immune responses.

**Block C: Regional Immunology. Chair: J. Wayne Streilein**

**Regional Specialization in Antigen Presentation**
*Chair: J. Wayne Streilein*

The process by which antigens are endocytosed, modified, and returned to the cell surface in immunogenic form for recognition by immunocompetent lymphocytes has certain generic properties that apply whether the phenomenon takes place in a culture dish, in the spleen, or in other regions of the body. However, not all antigen-presenting cells are equivalent, and not all encounters with antigens that are presented in various nonlymphoid regions and organs of the body produce similar immunological outcomes. This minisymposium will address the specialized and unique features of regionally diverse antigen-presenting cells—such as epidermal Langerhans cells, dendritic cells of...
Peyer's patches of the gastrointestinal tract, astrocytes of the central nervous system—in terms of the manner in which the activities and properties of these cells dictate the immune response to the relevant antigens, and with respect to the immunopathogenesis of tissue-restricted and autoimmune diseases.

**Lymphocyte Migration Pathways**

Chair: Yee-Hon Chin

Lymphocyte migration in which T cells and B cells are delivered to peripheral lymphoid organs is responsible for the continuous redistribution and realignment of immunocompetent cells throughout the body. The patterns of migration into and within lymphoid and nonlymphoid tissues are not random, and play a crucial role in the unique aspects of regional immunity. This symposium aims to analyze the cellular and molecular mechanisms regulating lymphocyte migration to lymphoid organs and inflammatory sites. Topics will include: molecules responsible for migration of lymphocytes through high endothelial venules; lymphocyte adhesion molecules for vascular endothelium; preferential migration pathways to spleen, lymph nodes, mucosal lymphoid tissues, and skin; migration of lymphoblasts and cloned lymphocytes; regulation of lymphocyte traffic by cytokines (e.g., interferon-γ and interleukin 1), bacterial products and hormones, and lymphocyte locomotion.

**Regionally Distinct Effector Functions**

Chair: Joan Stein-Streilein

The immune system responds to challenges with antigens and pathogens by producing effector cells and/or antibodies that are responsible for eliminating or inactivating the offender. Not only is the range of antigens/pathogens that confront the immune system great, but the types of antigens vary from site to site throughout the body—skin, gastrointestinal tract, genitourinary tract, and lung. Not surprisingly, the immune system has adapted its specific responses in such a manner that the effector modalities employed within particular nonlymphoid organs or tissues are partially nonoverlapping and unique. In this minisymposium, results of current experimental studies of the specializations in types of effector functions that are found in different organs will be addressed, e.g., IgA antibodies in the secretions from the mucosal surfaces of the gut, natural killer cells within the interstitium of the lung in comparison with similar cells found within the air spaces, and intraepithelial lymphocytes that infiltrate the epithelial lining of the small intestine.

**Block D: The Major Histocompatibility Complex and Antigen Presentation. Chair: Laurie H. Glimcher**

**Cell Biology and Protein Chemistry of MHC Molecules**

Chair: David J. McKeon

Class I and class II molecules are cell recognition structures that are involved in regulating the activation of an antigen-specific immune response. Characterization of these molecules has moved from the level of serology to protein chemistry and most recently to molecular biology. This minisymposium will focus on identifying the molecules that regulate MHC gene expression, the molecular events that regulate intracellular transport, the intracellular events initiated by cross-linking MHC molecules, and the regions on the MHC molecules that are responsible for determining serologic epitopes, antigen-binding sites, chain association, T cell receptor-binding sites, and intracellular transport.

**Antigen Processing and Antigen Presentation**

Chair: Paul M. Allen

This minisymposium will discuss the recognition of antigen by both helper and cytotoxic T cells. Through their αβ heterodimer T cell receptor, these T cells recognize foreign antigen in the context of an MHC molecule. Recently, tremendous insights have been gained as to the nature of the antigen/MHC structure. It now seems established that processed antigens can bind to both class I and class II MHC molecules; however, there appears to be a tremendous influence by the route of entry of the antigen into the cell as to which molecules are used as restriction elements. If the antigen is internalized exogenously, class I presentation predominates, whereas if the antigen is synthesized endogenously, then class I presentation predominates. This minisymposium will focus on both class I- and class II-restricted antigen, especially with regard to the key structural features of the antigens, the molecular events involved in processing, and the site of the formation of the antigen/MHC complex. From these presentations we will be able to begin to compare and contrast the class I and class II processing and presentation pathways, with the overall goal of completely elucidating these seminal pathways in an immune response.

**Regulation of MHC Genes**

Chairs: Laurie H. Glimcher and Dinah S. Singer

The minisymposium will focus primarily on the transcriptional regulation of the MHC class I and class II genes. Areas of interest to be covered are the identity and characterization of sequence-specific DNA-binding proteins important in regulating class I and class II expressions, the identification of conserved upstream sequences for these genes, the basis for tissue-specific expression, and examination of positive and negative regulatory control elements.

**Block E: Lymphokines and Cytokines. Chair: Joost J. Oppenheim**

**T and B Cell Activation Factors**

Chair: Fred D. Finkelman

**Receptors and Postreceptor Intracellular Events**

Chair: Richard J. Robb

Cytokines constitute a diverse set of intracellular communicators. Many of these proteins have been cloned and several are under active scrutiny in clinical trials aimed at modulating immune responses. Because antigens often trigger the secretion of a cascade of these factors, sorting out the role of each one has been an enormously complicated task. One helpful approach has been to study cell-surface receptors for these molecules. Although various cytokines cause overlapping sets of cellular responses, most seem to interact with unique receptors. In this workshop, we will examine the structure and signal transduction processes associated with
a number of cytokine receptors. Special emphasis will be placed on identifying common and unique structural features such as the number of subunits comprising the receptors and the nature of the associated enzymatic activities and signal transduction pathways. Understanding the mechanism by which cytokines trigger cellular responses will play a key role in their utilization for immunotherapy.

Cytokines: Genes and Protein Structure
Chair: David Cosman

The recent explosion of research in the area of cytokines (also known as lymphokines, growth factors, inhibitory factors, and differentiation factors) has led to a realization that the networks controlling the interactions between the immune system and different tissues and their response to injury or infection are exceedingly complex. It has also been a recurring theme that factors discovered and defined by their role in one biological system are found subsequently to have unsuspected actions in other systems. This complexity makes it imperative to define cytokines at the molecular level in terms of their genetic and protein structure. Molecular cloning of cytokine genes can lead to the production of pure recombinant protein and the generation of highly specific and sensitive antibodies that can be used to probe the role of the particular cytokine. In this minisymposium we will focus on several cytokines that have recently been cloned and get a progress report on their molecular definition and biological activities. This should lead to a better understanding of the proteins involved in immune regulation and their interactions with each other.

In Vivo Effects of Cytokines
Chair: Jordan U. Guttermann

Block F: Lymphocyte and Macrophage Effector Function. Chair: Pierre Henkart

Lymphocyte-Mediated Cytolysis: Pathways and Mechanisms
Chair: John H. Russell

Lymphocytes able to recognize and lyse aberrant cells play an important role in graft rejection and the protection of the host from viral infection and the spread of neoplastic disease. Over the last 20 years, evidence has been presented supporting two different pathways of lysis. One of these involves the insertion of a pore-forming protein from the lymphocyte into the target cell membrane and subsequent passive death by colloid-osmotic shock. This pore-forming protein has structural homology to the terminal component of complement (C9) and thus offers an attractive, unifying mechanism for both humoral and cellular cytotoxicity. The alternative hypothesis suggests an active participation by the target cell in an autolytic cascade initiated by the lymphocyte during lymphocyte-target contact. This pathway has been supported by morphological and biochemical differences during target cell death initiated by humoral and cellular cytotoxicity. This symposium will explore these pathways in more detail and offer an opportunity for a better understanding of the molecular mechanisms of lymphocyte lytic function and their relative significance in different immunological responses.

NK Cells and Other Natural Effector Cells
Chair: Craig W. Reynolds

A variety of natural effector cells, including cells with NK activity, play an important role in the immunological control of hematopoiesis and microbial infections, and in inhibiting the development of the spread of tumors. These natural effector cells share the common characteristic of mediating these non-MHC-restricted functions seemingly in the absence of antigen stimulation. This minisymposium will focus on recent data that further characterize these natural effector cells, including discussions on: 1) the separation of distinct subpopulations of natural effector cells; 2) analysis of new functional activities; and 3) mechanisms or mechanisms by which these cells mediate their functions. In addition, there will be emphasis on the experimental data relevant to the in vivo role of these various functional activities mediated by natural effector cells. The hope is that the detailed analysis of the biology and functions of natural effector cells will eventually lead to a better understanding of how their activity can be modulated by biological response modifiers (BRMs). Ultimately, it is hoped that the modulation of natural effector cells by BRMs will lead to executing new forms of therapy for microbial infections and tumors.

Macrophage Immunobiology
Chair: Stephen W. Russell

The participants will summarize and extend what is known about the many effects that cytokines can have on mononuclear phagocytes. The effects of individual cytokines will be considered as well as interactions between two or more that augment, synergistically amplify, or inhibit a biological response. Autocrine effects will be discussed, in addition to those attributable to mediators produced by cell types other than mononuclear phagocytes. The areas to be emphasized will be: 1) cytokines that affect the development and differentiation of mononuclear phagocytes; 2) cytokines that modulate the functions of macrophages, especially activation for various purposes; and 3) the pathogenetic influence that cytokines can have on infectious diseases that are associated with mononuclear phagocytes.

Second Messengers in Lymphocyte Function
Chair: John C. Cambier

Lymphocyte growth differentiation and effector functions are regulated by a variety of species, including antigen, lymphokines, cytokines from other sources, hormones, and perhaps by cell-association ligands. To retain the fidelity of signaling by elements of this intricate system, lymphocytes presumably express specific receptors for each that are in turn coupled to distinct second-messenger generating systems. The complexity and apparent necessity for the use of multiple messengers by lymphocytes may be unparalleled in any other biological system. This minisymposium will address the molecular basis of transmembrane signaling in T and B cells. It will address interplay or crosstalk among signaling cascades as well as the occurrence and molecular basis of receptor desensitization. Finally, it will address the role of specific second messengers to determine the ultimate biological response of the cell. Information
presented should advance our understanding of the molecular biology of intracellular communication in the immune system.

Block G: Inflammation. Chair: Charles G. Cochrane

Leukocyte Stimulation: Receptor, Membrane, and Metabolic Events, Part I
Chair: Gary M. Bokoch

The neutrophil plays a key role in the inflammatory process, contributing to both the desirable physiological responses to inflammatory stimuli and the pathological manifestations of the process. An understanding of the mechanisms by which this cell responds to membrane stimuli and becomes activated is paramount for therapeutic manipulation of the inflammatory state. Because of the neutrophil's complex nature, determining these mechanisms at the molecular level has required investigators to make increasing use of the foremost technological methods developed in molecular and cellular biology. It is now clear that the activation process involves a cascade, beginning with the cell-surface receptors specific for chemoattractant and other ligands, proceeding to a large extent through one or several GTP-binding regulatory proteins, which either directly couple receptors to the relevant cellular channels and enzymes or through the stimulation of the generation of second-messenger molecules, result in such channels and enzymes becoming activated. The mechanisms by which these second messengers induce cell activation is complex, involving Ca²⁺ mobilization activation of various phospholipases and kinases, and probably many as-yet-undefined pathways. In this minisymposium, we hope to focus on the molecular mechanisms of this signal transduction cascade, the components involved, and how their function is regulated. We will also attempt to define areas and questions of particular interest to the field at the present time.

Leukocyte Stimulation: Receptor, Membrane, and Metabolic Events, Part II
Chair: Alfred I. Tauber

The symposium will concentrate principally on two specific aspects of leukocyte stimulation. The first relates to neutrophil priming and deactivation and the mechanisms controlling these effector functions, e.g., control of ionized intracellular calcium levels and dependency on rise or impaired response. The second feature of the session deals with the real-time comparisons of changes in the mechanism or mechanisms of neutrophil activation by receptor agonist or agonists.

Interactions between Leukocytes and Other Cells
Chair: Robert F. Todd, III

During this session, the participants will focus on: 1) the role of the CD11b/CD18 glycoprotein (Mol) in promoting neutrophil-monocyte adhesive interactions; 2) a novel in vitro model of human neutrophil-endothelial diapedesis; and 3) lymphocyte-endothelial interactions with particular reference to lymphocyte homing receptors.

Block H: Tumor Immunology. Chair: Philip D. Greenberg

Oncogenes and Tumor-Associated Antigens
Chair: Karl Erik Hellström

This symposium will provide the state of the art as well as the most recent information relative to the use of antibodies for targeting and the induction in cancer patients of an immune response to tumor antigens. Immunological approaches to cancer are more promising today than ever before in view of the possibilities offered by the use of monoclonal antibodies for cancer therapy, for staging by nuclear imaging with radiolabeled antibodies, and in the approach with LAK cells. Some antitumor antibodies have anticancer activity by themselves even in patients, but the major therapeutic use of antibodies is likely to be for targeting drugs, toxins, immunomodulators, radioisotopes, etc. Knowledge of the nature of tumor antigens is a key to further progress in this area. Such antigens are rarely (if ever) unique to tumors, but many of them possess the level of specificity needed for therapeutic and diagnostic purposes.

Effects of Lymphokines, Antibodies, and Immunotherapy
Chair: Martin A. Cheever

Lymphokines, antibodies, and other molecules that normally participate in physiological immune responses are becoming increasingly available for use in vivo as potential therapeutic reagents. Recent clinical studies have suggested that lymphokines, monokines, antibodies, and adoptively transferred lymphocytes can have significant antitumor effects in human cancer therapy. However, additional basic and preclinical information is required to provide insights into how to optimize the efficacy and minimize the toxicity of such biological response modifiers. Discussed during this session will be: 1) the prospects for treatment of B cell lymphomas with antiidiotype antibody; 2) the interrelationships between cytokines and growth factors in the generation of antitumor immunity; and 3) the potential uses of lymphokines and cultured lymphocytes in the adoptive cellular immunotherapy of cancer.

Immune Response to Tumors
Chair: Robert J. North

The symposium will deal with current knowledge about the immune response to strongly immunogenic and weakly immunogenic tumors. The nature of tumor-specific transplantation antigens will be dealt with, as will the type of immune response they evoke in a syngeneic host. The T cell subsets that mediate, express, and suppress immunity will be discussed, and attention given to hypotheses that attempt to explain the inadequacy of the antitumor immune response to terms of its downregulation by suppressor T cells. Examples of spontaneous regression of established tumors after treatment of the syngeneic host with agents capable of eliminating suppression will be presented. It is hoped that this information will draw attention to the importance of taking the underlying antitumor immune response into account before attempting to cause tumor regression by treatment with immunomodulating agents.
Mechanisms and Modulation of Mediator Release

Chairs: Anne Kagey-Sobotka and Michael A. Beaven

After a brief overview of signal transduction mechanisms in IgE-receptor-mediated secretion, the session will be broad in scope to cover all potential messenger systems and ion channels. Included will be a discussion of the recent indications that arachidonic acid may play a role in a signal transduction, in addition to being a source of a variety of inflammatory mediators. Opportunities will be discussed for devising different therapeutic strategies in the treatment of allergic and other disorders of the immune system.

IgE: IgE Receptors and IgE Production

Chairs: Kimishige Ishizaka and Barbara Baird

This minisymposium will cover Fcε receptors (FcεRI) on mast cells/basophils, particularly the structural basis of the Fc portion of chains for the binding to the receptors. It is clear that Fcε RI on B lymphocytes, macrophages, and eosinophils, i.e., FcαRII, are distinct molecules from FcεRII. Characterization of FcεRII and its biological function will be discussed. The FcεRII on human B cells are identical to CD23, which may be involved in the activation/proliferation of B cells. On the other hand, IgE-binding factors from T cells are involved in the type-specific regulation of the IgE response. The possible relationship between the soluble fragments of FcεRII on B cells and IgE-binding factors will be a matter of discussion. The minisymposium may cover approaches for suppressing the IgE antibody response of experimental models.

Block J: Complement. Chair: Michael M. Frank

Complement Proteins in Control of Cellular Functions

Chair: Moon L. Shin

Complement plays a pivotal role in host defense by mediating a diverse range of biological activities depending on its mode of activation. Activation of complement generates a group of factors that mediate a variety of activities, such as chemotaxis, opsonization, cytolysis, and activation of cells of the immune system including macrophages and B and T lymphocytes. During the past 2 decades, significant advances have been made in elucidating the biochemical properties and activation cascade of the complement proteins. The biology of cell-mediated host defenses that are under the control of complement peptides is being explored at the molecular level as a consequence of recent advances in the molecular biology of complement receptors and transmembrane signal transduction. In this minisymposium, discussions will be focused on the process of phagocytosis by macrophages and activation of T and B lymphocytes mediated by specific complement receptors that are vitally important in host defense and immunomodulation. Also included will be the newly described receptor-independent signal transduction pathways by sublytic terminal complement complexes. We hope to bring together the protein chemistry and molecular biology of the complement proteins and receptors to better understand the cellular functions of host defense operate against microbes.

Imunochemistry and Molecular Biology of Complement Proteins

Chair: M. Edward Medof

Block K: Microbial Immunity and Parasitology. Chair: Michael B. A. Oldstone

Autoimmunity and Infections

Chair: Ralph Williams

Immune Suppression and Infection

Chair: Michael J. Buchmeier

Immunosuppression by pathogens is an important component of pathogenesis in a variety of infections. Classical studies by von Pirquet of measles virus-associated suppression of immune responses to PPD have been followed but by no means superseded by the observations of profound suppression and even ablation of helper cell function as a major component of the pathogenesis of AIDS. In this symposium three key speakers will present work that illustrates three distinct mechanisms of microbial immunosuppression. These are: highly specific suppression of cytotoxic T lymphocyte responses to lymphocytic choriomeningitis virus; specific suppression of B cell function by measles virus; and generalized suppression of helper cell function by the human immunodeficiency virus. The chairperson will attempt to incorporate suppression by bacterial pathogens and mechanisms of suppression that operate at the level of the macrophage to round out the program.

Molecular Approaches to Vaccination

Chair: Enzo Paoloetti

The participants will discuss the exciting recent developments in vaccine preparation using the latest approaches of molecular biology. A number of technical approaches to vaccine resolution of AIDS will be presented. This will involve expression of HIV-immunopertinent antigens in mammalian and bacterial cells as well as the expression and presentation of HIV immunogens by live viral vectors. These discussions should provide state-of-the-art information on the critical infectious disease of HIV. Additional data on the preparation of candidate vaccines against cancers will be presented. Other live recombinant vectors that are conditionally infective will be considered and, thus, provide a novel focus of attention in the development of vaccination strategies.

Microbial-Immune Response Interactions

Chair: Raymond M. Welsh

This session will provide an overview of different aspects of the cellular response to infectious agents, including: 1) macrophage activation and the role of macrophage in resistance to infectious agents; 2) the response of NK and cytotoxic T cells to viral infections in vivo; and 3) evidence that antibody-dependent, cell-mediated cytotoxicity (ADCC) may play a significant role in...
vivo as well as the relative roles of NK cells and macrophages in ADCC. It is hoped that the session, in general, will provide a historic overview of work elucidating the immune response to infectious agents along with the most recent breakthroughs in this field.

Block L: Clinical and Preclinical Immunology. Chair: Max D. Cooper

Human T Cells
Chair: Arthur Weiss
A great deal of progress in our understanding of T cell biology has occurred during the last few years. The availability of monoclonal antibodies, reactive with a large number of human T cell-surface molecules that regulate cellular responses, as well as the identification of genes encoding these receptors and some of the cellular response genes, has greatly facilitated the study of the regulation of human T cell function. The aims of this symposium are: 1) to define the cell-surface molecules that are responsible for cognitive functions of the T cell. This will include the various forms of the T cell antigen receptor (α/β and γ/δ) and accessory molecules. In addition, phenotypic heterogeneity of T cell populations, as it relates to the expression of distinct cell surface molecules, will be addressed. 2) An examination of how such cognitive interactions may translate into intracellular signals and cellular responses. Signal transduction and regulation of lymphokine genes and their receptors will be covered. 3) Discussion of how these events result in the varied cellular manifestations of T cell activation, including cell growth and differentiated functions.

Human Bone Marrow Transplantation
Chair: Richard J. O'Reilly
A transplant of bone marrow from an HLA-identical sibling is currently recognized as a curative treatment for severe aplastic anemia and for an increasing number of lethal genetic diseases of lymphocyte development, hematopoiesis, and metabolism. Such transplants also represent the only curative treatment available for chronic myelogenous leukemia or acute leukemias after initial relapse. In the past, graft vs. host disease (GvHD) and its sequelae have limited the success of HLA-identical marrow transplants and have precluded application of such transplants to patients lacking an HLA-matched sibling donor. Recently, improved understanding of the biology of acute and chronic GvHD, the development of novel combinations of immunosuppressive drugs and biologics, and particularly the development of techniques for depleting alloreactive T cells from the marrow graft have radically reduced or eliminated graft vs. host disease as a limiting feature of allogeneic marrow transplants, reducing transplant-associated mortality in older patients and fostering applications of HLA-nonidentical related or unrelated marrow transplants to patients lacking a matched sibling. However, these graft modifications have also placed patients at higher risk of rejection and, in some instances, regrowth of host leukemic cells. This minisymposium will focus on recent advances made toward an elucidation of the genetic and cellular bases of graft rejection and GvHD-complicating human marrow transplants, and a delineation of the processes that may contribute to the antileukemic effect of an allogeneic marrow graft.

Pathogenesis of Autoimmune Disease
Chair: Robert S. Schwartz
Three of the fundamental issues in autoimmunization will be discussed. First, the molecular mechanisms will be described concerning the linkage of certain autoimmune disease to the major histocompatibility system. The microheterogeneity of MHC genes and structural features that are found in disease-associated MHC genes will be discussed. Second, the molecular aspects of autoantibody V genes will be considered. An important issue is whether autoantibodies arise by a process of antigen-independent polyclonal B cell activation, or whether their origin entails antigen stimulation. Structural analyses of monoclonal autoantibodies will provide important clues about these two processes. Third, a new concept will be reviewed of the basic elements of the immune system, and how such elements relate to the problem of autoimmunity. Does autoimmune mold the immune repertoire and, if so, how does it exert its influence at the molecular level?

Fc Receptors on Human Blood Cells
Chair: Clark L. Anderson
IgG immune complexes interact with Fc receptors on human cells to mediate a host of biological responses including endocytosis of antibody complexes, release of inflammatory mediators, antibody-dependent cell-mediated cytotoxicity, modulation of the immune response, and stimulation of the platelet release reaction. Three distinct classes of IgG FcR have been described and are being characterized. Significant progress has been made in the analysis of the structure of one of the receptors by inference from cloned cDNA sequences. Monoclonal antibodies against each of them are being used to dissect their structure and function and to manipulate their associated biological responses for therapeutic purposes. Within each class of receptors significant structural and functional polymorphism is seen. Moreover, the study of individuals who lack one of these receptors is expected to contribute greatly to our understanding of receptor function. The molecular mechanisms by which the receptors signal their action are being vigorously pursued.

Immune Deficiency States
Chair: Raif S. Geha
Advances in the understanding of the genetic molecular and cellular mechanisms involved in various immunodeficiency states will be presented. Included will be a review of the work on molecular cloning of the leukocyte adhesion molecule and the role of these molecules in lymphocyte activation and in macrophage in vitro function. Data will be presented on the molecular cloning of the gene for the C1 inhibitor deficiency. A review is included of the T cell activation defect in children with combined immunodeficiency such as the Wiskott-Aldrich syndrome.

Human B Cell Repertoire
Chair: Max D. Cooper
A burgeoning amount of information is being accrued on the human B cell repertoire. This symposium will bring together the available information on the (V) variable gene pool in humans and the order of VH gene rearrange-
ment and expression during development. The rearrangement sequence of heavy- and light-chain genes will be discussed, along with the possible regulatory mechanisms governing the sequence under normal conditions and in the model of pre-B cells clonally transformed with Epstein-Barr virus. Possible clinical implications of this new information will receive attention in this session devoted to human immunoglobulin genes and their expression.

**T and B Cell Activation Factors**

*Chair: Fred Finkelman*

This session will concentrate on studies of the ability of lymphokines to influence T lymphocyte development and B lymphocyte proliferation and differentiation. Differences will be examined in the phenotypes of thymocytes that have developed in vitro in the presence of interleukin (IL) 4 or IL 2. There will be an examination of the relative abilities of TH1 cells, which secrete IL 2 and interferon-γ, and TH2 cells, which secrete IL 4 and IL 5, to stimulate B cells to differentiate into antibody-secreting cells. In vivo or in vitro regulation of Ig isotype selection by the lymphokines interferon-γ and IL 4 will be examined. The information evolving should increase understanding of the global effects on the immune system of the relative activation of the TH1 and TH2 subsets.
Ethanol Levels In Vivo

Dear Dr. Whelan:

In *The FASEB Journal*, volume 1, number 6, December 1987, on page 469, Parent et al. suggest that 1% ethanol is "physiologically attainable." Unfortunately, this is a misleading statement in an otherwise accurate and important set of observations. Other than in the intestinal lumen, 1% ethanol is never even approached in vivo. For any human, alcoholic or otherwise, 1% ethanol in the blood is fatal. A level of 0.1%, which had no effect on MHC expression in this study, is equivalent to legal intoxication. Even chronic alcoholics usually do not have blood levels in excess of 0.3%, a level that could cause coma in the non-alcoholic. Therefore, 1% is "markedly higher than that which can be achieved in vivo."

Sincerely yours,

Stanley E. Fisher
Department of Pediatrics
Cornell University Medical College
North Shore University Hospital
Manhasset, NY 11030, USA

Dear Dr. Whelan:

Our demonstration that treatment of cell lines with ethanol, at concentrations between 0.1 and 1%, results in increased class I MHC antigen expression led us to speculate that alcohol-related diseases may have an immunological component. One prediction from this hypothesis is that peripheral blood lymphocytes derived from ethanol-intoxicated individuals should express levels of class I MHC antigen higher than controls. In collaboration with Dr. R. M. Walls, we conducted a study of acutely ethanol-intoxicated patients. As measured by gas chromatographic determination of ethanol in serum, blood alcohol concentrations of individuals arriving at the Emergency Unit (George Washington Medical Center) ranged from 0.1% to as high as 0.71%. PBL from intoxicated patients expressed significantly higher levels of class I MHC antigens than PBL from controls. Thus, although it is possible to attain levels of close to 1% ethanol in vivo, it appears that blood alcohol levels as low as 0.1% are sufficient to elevate class I antigen levels. These studies are being reported in detail elsewhere.

We thank Dr. Fisher for his interest in our earlier observations and hope that he will find our new studies equally interesting.

Sincerely,

Dinah S. Singer
Michael A. Kolber
Immunology Branch
National Cancer Institute
National Institutes of Health
Bethesda, MD 20892, USA
The FASEB Journal Information for Authors*

Purpose and Scope

The FASEB Journal (FJ) is the official publication of the Federation of American Societies for Experimental Biology (FASEB). FJ publishes two types of articles: 1) brief, definitive, and essentially final research communications of broad interest that are considered to warrant prompt publication; and 2) state-of-the-art reviews, drawn from the topics of the FASEB symposia.

Manuscripts containing original communications, or proposals for reviews, should be sent to the Editor-in-Chief, Dr. W. J. Whelan, The FASEB Journal, P.O. Box 016129, Miami, FL 33101-6129, USA, or, if a private courier is used, to the University of Miami School of Medicine, Room 6052, 1600 NW 10th Ave., Miami, FL 33136-1015, USA.

Original Research Communications

FJ devotes a major portion of its pages (outside the meeting abstracts) to the publication of brief, definitive, original, and essentially final research communications that are considered to warrant prompt publication.

The aim of FJ is to illustrate the unity of biology and the interdependence of its constituent disciplines. Therefore, in keeping with this policy, and to qualify for acceptance, an original communication must not only be of outstanding scientific quality but must also be of broad interest.

The subject coverage of FJ is illustrated by the following disciplinary areas: biochemistry, biophysics, cell biology, developmental biology, genetics, immunology, neurobiology, nutrition, pathology, pharmacology, and physiology.

Papers should begin with an abstract written for the general reader and be free from jargon. They should continue with an introduction followed by the results and discussion; they should conclude with a succinct bibliography. Methods may be included within the figure legends and tables or as a separate section. Papers may not occupy more than four printed pages (equivalent of 4000 words and inclusive of illustrations and diagrams) and will be returned as unacceptable if they exceed this limitation.

Papers (an original and four copies) should be sent to the Editor-in-Chief. Upon acceptance of acceptable papers will be ensured by careful conformity to the instructions to contributors and the expeditious return of proofs.

State-of-the-Art Reviews

FJ also presents research reviews. Heretofore these have been in the form of extended reports emanating from symposia or mini-symposia presented at FASEB meetings. To provide such research summaries in a more compact form and thereby to allow, within space limitations, a more comprehensive and representative survey of the acquisition of new biological knowledge, FJ publishes state-of-the-art reviews that emphasize interdisciplinary aspects of the growing points of research.

These reviews will serve as a window on topics addressed at Society-sponsored symposia or plenary lectures. Therefore, review authors are sought from among those engaged in organizing the symposia. At the same time, volunteered reviews are welcomed that embody the principles of timeliness, topicality, and broad interest. A proposal for such a review, not a completed review, should be sent to the Editor-in-Chief, who will advise on its acceptability.

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Authors will be asked to certify that an original communication has not been published other than as an abstract and is not being considered for publication elsewhere, and that the paper will not be submitted for publication elsewhere until its acceptability for FJ has been decided. Authors of reviews will be asked to certify that the review has not been published, is not being considered elsewhere, and will not be submitted elsewhere until its acceptability for FJ has been decided.

Style of Manuscript

General Instructions

1) Manuscripts should be typewritten, with double spacing and 1-inch margins, on 8½ x 11 inch bond paper. Computer printouts of manuscripts must be readable; a dot-matrix printer is generally unacceptable. Metric units should be used. An original and four copies, with figures and tables, should be submitted to the Editor-in-Chief. Pages should be arranged and numbered consecutively in the following order: title page, footnotes, abstract of up to 200 words and indexing key words (maximum of five), text, references, figure legends, tables, and illustrations.

2) The title page should show: title of article; author(s); laboratory or institution of origin with city and state or country; complete address for mailing proofs and telephone number for corresponding author; and shortened title (maximum of 50 characters and spaces) for the running foot.

3) The title should be brief (no more than 90 characters, including letters, spaces, and punctuation) and informative. Do not use phrases in which more than three words modify another word (use “Renal hemodynamic effects of atrial natriuretic factor” rather than “Atrial natriuretic factor renal hemodynamic effects”). Serial titles, such as “Interferon, IX,” are not permitted, except as a footnote.

4) The abstract, a paragraph of no more than 200 words, should be written for the general readership and be free from jargon. It should be self-explanatory and suitable for use by abstracting services without rewriting. It should state the purpose and major findings and conclusions of the study. Citation of references should be avoided; if used, include bibliographic information.

5) Footnotes, double-spaced, should be assembled on one or more separate sheets; they should be numbered consecutively throughout.

6) The text should be readable, clear, and concise. Any corrections should be neat and legible. Standard nomenclature should be used; unfamiliar or new items should be defined at first mention. (See Abbreviations section below.) Foreign words not in general use in the English language should be underlined for italic type; italics should not be used for emphasis. Latin plurals should not be used if the English equivalent has been accepted, e.g., lamellae, not lamellas. Webster’s new collegiate dictionary (1977) should be followed for spelling, compounding, and word separation.

7) Drugs and Trade Names. The chemical or generic name should precede the abbreviation of a drug name the first time it appears. Proprietary (trademarked) names should be capitalized and the spelling carefully checked. Trade names of chemicals or equipment should also be capitalized. Authors should supply an acceptable scientific name in every case as an alternative to the trade name. Trade names should not ordinarily be used in titles. More generally, the use of trade names should conform to the customary standards of good taste in scientific literature.

8) Active voice rather than passive voice should be used whenever possible. Present tense is used for references to existing knowledge or accepted concepts, and for proven conclusions from the present work; past tense is used when describing experimental work on which the paper is based.

Abbreviations, Symbols, and Terminology

Each author must include, as a footnote to the first page of text, a list of any new or special abbreviations used in the paper, with the spelled-out form and definition if necessary for clarity. For information on style in general, authors are referred to the CBE style manual, 5th ed. (1983), prepared by the CBE Style Manual Committee (Bethesda, MD). Chemical and biochemical terms and abbreviations should be in accordance with the recommendations for usage by the International Union of Pure and Applied Chemistry (IUPAC) and its committee on nomenclature [see Biochemical

*April 1988.
nomenclature and related documents, a compendium of IUPAC-International Union of Biochemistry (IUB) documents, available from The Biochemical Society, P.O. Box 32, Commerce Way, Colchester, CO2 8HP, Essex, UK. Isotopic specifications should conform to the IUPAC system, with the mass number placed as a superscript preceding the chemical symbol as superscript 12C. Genotypes are italicized; phenotypes are not. Enzyme names should be identified with their EC number and recommended name, in accordance with the recommendations of the IUB; see Enzyme nomenclature: recommendations (1984) of the Nomenclature Committee of the International Union of Biochemistry (Orlando, FL: Academic; 1984). For specialized fields, see: "Glossary on respiration and gas exchange" (J. Appl. Physiol. 34: 549–558; 1973); "Glossary of terms for thermal physiology" (J. Appl. Physiol. 35: 941–961; 1973); The ACS study guide: a manual for authors and editors, edited by J. S. Dodd and M. C. Brogan (Washington, DC: American Chemical Society; 1986); A manual for authors of mathematical papers (Providence, RI: American Mathematical Society; 1980); Style manual for guidance in the preparation of papers for journals published by the American Institute of Physics and its member societies, 3rd ed. (New York: American Institute of Physics; 1978).

The following abbreviations or acronyms may be used without explanation; others should be defined at first use in the text.

A - ampere; blood group; chromosome group
A - angstrom
a - atto;
ac - alternating current
AM - before noon
AMP, ADP, ATP, AMPase, ADPase, ATPase - adenosine phosphates
aq - aqueous
at. wt - atomic weight
BCG - bacille Calmette-Guérin
bp - boiling point
Beq - Becquerel
Btu - British thermal unit
c - coulomb
°C - Celsius
c - centi-
ca. - about
cal - calorie
cAMP, cGMP, etc. - cyclic AMP, cyclic GMP, etc.
CD - circular dichroism
cd - candela
cDNA - complementary DNA
cf - compare
Ci - curie
cm, cm², cm³ - centimeters
CMP, CDP, CTP - cytidine phosphates
CoA - coenzyme A
CoASAc - acetyl coenzyme A
cpm - counts per minute
cps - counts per second
cp - centipoise
c/s - cycles per second
cRNA - complementary RNA
cubic - use exponent 3
° - degree, angle
D - diffusion, coefficient
d - dextro configuration
d - density
d, (+) - dextrorotatory
Da - dalton
da - deca-
dB - decibel
dc - direct current
DDT - 1,1,1-trichloro-2,2-bis-(p-chlorophenyl)ethane
DEAE-cellulose - O-(diethylaminoethyl)cellulose
df - degrees of freedom
dNA - deoxyribonucleic acid
dNase - deoxyribonuclease
dpns - disintegrations per minute
dpps - disintegrations per second
dyne - thymidine phosphates
emf - electromotive force; exa-
effect - electrode potential; energy
E - effective concentration, 50%
ed - editor
eD - effective dose, 50%
editions - ethylendiaminetetraacetic acid
EGTA - for example
ethylene glycol bis(β-aminoethyl ether)-N,N,N',N'-tetraacetic acid
eq - electromotive force
eq. - electron paramagnetic resonance
eq., Eq., Eqs. - equation(s)
eqal. - electron spin resonance
etc. - and others
exp - and so forth
expression - electron volt
exponential
F - farad; filial generations
°F - Fahrenheit
f - femto-
FAD, FADH₂ - flavin adenine dinucleotides
fc - foot-candle
Fig. - figure(s)
FMN, FMNH - flavin mononucleotides
ft - freezing point
ft lb - foot-pound
G - gauss; general; giga-
g - gravitational constant
g - guanosine phosphates
GMP, GDP, GTP - greater than
GSH, GSSG - glutathiones
H - hen
h - hectar; hour
Hb - hemoglobin
hnRNA - heterogeneous nuclear RNA
hp - horsepower
ht - height
Hz - hertz
IC₅₀ - inhibitory concentration, 50%
ID₅₀ - infective dose, 50%
i.d. - inside diameter
i.e., that is
Ig - immunoglobulin
ImP, IDP, ITP - intramuscular
inosine phosphates
in - inch
i.p. - intraperitoneal
IR - infrared
IU - international unit
i.v. - intravenous
J - joule
Jr. - junior, with names
K - kelvin
Kₘ - Michaelis constant
K - kcal
kilo-
k - kilocalorie
kg - kilogram
km - kilometer
L - levo configuration
l. - liter
lb - pounds
lb/in² - pounds per square inch
LC₅₀ - lethal concentration, 50%
LD₅₀ - lethal dose, 50%
< - less than
lm
ln
log
lx
M
M_r
m
m_
meq
mg
mi
min
ml
m/min
mm, mm^3, mm^4
mm Hg
mol
mol wt
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NADH, NADP,
NADP^+, NADPH
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Rh
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rRNA
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sp., spp.
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STP
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T	extit{ert}
TMP, TDP, TTP
Tri
Tri
transfer RNA
U
UHF
UMP, UDP, UTP
UV
V
Vs.
W
Wb
W-h
wk
wt
wt/vol
wt/wt
\bar{x}
XMP, XDP, XTP
yd
yr

\textit{Note:} standard three-letter or single-letter abbreviations for amino acids may be used in sequences and in tables and figures.

References

References should be cited in the text in numerical order, with the numeral placed in parentheses. References should be typed separately with inclusive pages and titles, double-spaced, with only one reference per number. Authors are completely responsible for the accuracy and completeness of their references; they will not be checked in the Editorial Office.

Citations to unpublished work should not be entered in the list of references unless the paper has been accepted for publication. Include them in the text as "(unpublished observations),"

"(personal communications)," or "(manuscript in preparation)," with authors' initials and surnames.

For titles of journals, follow the abbreviations listed in \textit{Serial sources for the BIOSIS data base}. The form of references to periodicals should be in accordance with the following example. (Titles and inclusive pages must be used.)

Book references should include information in the following order: author(s), title, city of publication, publisher, year, and pages. The title of the book should be underlined or italicized. If one chapter is cited, its title and page numbers should be included, and the book's authors or editors should be named.


Illustrations

Illustrations should be identified lightly with pencil on the reverse side with the figure number and author name(s), when necessary, the top should be clearly marked. They should be referred to as figures in the text, and should be numbered with Arabic numerals; each should have a legend.

Inasmuch as good illustrations are possible only from good copy, authors should pay particular attention to the following:

1) Illustrations should be sharp, contrasty, unmounted photographs on glossy paper. Photographs should be the width of one column (3 1/2 inches) or two columns (7 1/4 inches). All drawings for reduction to a given size should be drawn and lettered to the same scale.

2) Lettering should be done in black ink and must be legible after reduction (i.e., at least 1.5 mm high). The smallest elements (subscripts or superscripts) should be readable when reduced. Typewritten or computer-generated lettering is not preferred.

3) Graphs such as electrocardiograms, kymograms, and oscillograms should be prepared by a skillful photographer so that the dark cross-hatched background is eliminated, the faint portions of the graphs are intensified, and sharp, contrasty prints are obtained. To avoid this processing, use blue-rulled instead of black-rulled recording paper for the original records.

4) When possible, all lettering should be within the framework of the illustration; likewise the key to symbols should be on the face of the chart. When the figure is so filled that it is necessary to explain symbols in the legend, only these standard characters should be used: □ ■ ○ ● △ ▽ □ △ ▽ ▪ ▼ ◊.

5) Actual magnification of all photomicrographs should be given. The Editorial Office will make corrections for reduction. An appropriate scale on the photomicrograph itself is, however, preferable and more accurate.

6) Arrangements must be made well in advance with the Editorial Office for the reproduction of any illustrations in color. Authors must have funds available to meet the full cost of color plates and their printing.

7) The approximate position of each figure in the text should be indicated in the margin of the manuscript.

8) Inasmuch as it is the policy of *FJ* to reproduce figures and charts in the smallest size consistent with readability and purpose of the illustration, it is understood that an author will accept the decision of the Editors on the printed size; however, recommendations may be submitted for reduction or enlargement.

9) If illustrations that have been published elsewhere are included, permission must be obtained from the publisher and the author for their use in *FJ*. A copy of the letters granting such permission must be submitted with the manuscript to the Editorial Office.

10) Figure legends should be typed double-spaced, consecutively on one or more sheets of paper. They should contain sufficient information to provide adequate description without reference to text.

Tables

Each should be typed double-spaced, on a separate sheet of paper. Each should have a brief title and should be numbered with Arabic numerals. Explanatory matter should be in footnotes. Table footnotes should be listed in order of their appearance with consecutive superior letters.

Tables should not duplicate material in text or illustrations. They should be prepared for printing either 3 1/2 or 7 1/2 inches wide. Nonsignificant figures in tabular data should be omitted. Short or abbreviated column heads should be used. Statistical measures of variation, P, SD, SE, etc., should be identified as such.

The approximate position of each table should be indicated in the margin of the text.

Formulas and Equations

Structural chemical formulas, process flow diagrams, and complicated mathematical expressions should be precisely and carefully arranged, but they should be kept to a minimum because in typesetting they are composed by hand and are expensive. Glossy prints of complicated formulas and expressions suitable as line drawings are preferred. All subscripts, superscripts, Greek letters, and unusual characters must be clearly identified.

Acknowledgments

It is customary to acknowledge only persons who have made substantive contributions to the studies reported in the manuscript. Authors will please obtain written permission for everyone acknowledged by name (including references to unpublished work) because readers may infer their endorsement of the paper and its conclusions.

If appropriate, a statement of grant support may be included. Names of grant sources should not be abbreviated.

Experimental Procedures

This journal endorses the principles embodied in the Declaration of Helsinki and expects that all investigations involving humans will have been conducted in conformity with these principles. It is expected that the "Guiding Principles in the Care and Use of Animals" will have been observed in all animal experimentation reported in *FJ*.

Auxiliary Publication

Additional detailed tables, appendixes, descriptions of materials and methods, mathematical derivations, extra figures, and other supplementary matter too costly to be included in the journal article may be submitted for deposition without charge to the author with the American Society for Information Science (ASIS), National Auxiliary Publications Service. Material is deposited by the Editorial Office with the consent of the author, and a footnote is carried in the published article to the effect that photoprints or microfiche copies are available at moderate cost.

Author Charges

Authors are allowed a certain amount of illustrative material free of charge. Normally this will cover the equivalent of one full page of tables, figures, and halftones, or a half page of chemical and mathematical formulas and equations. Authors are charged for material exceeding this allowance. When excess charges are anticipated, authors should make the necessary arrangements at the time a manuscript is submitted (i.e., initiation of an institutional purchase order, obligation of funds under a grant, etc.).

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Two sets of page proofs together with the original manuscript are sent to the author. Proofs should be carefully checked without delay and any necessary changes or printer's errors (to be marked in red) should be clearly indicated in the margins. Except for correction of typographic errors, the cost of authors' alterations of subject matter in type will be charged to authors if these charges exceed the journal's allowance. Proofs should be returned promptly to the Editorial Office. The *FASED Journal*, 9650 Rockville Pike, Bethesda, MD 20814, USA. A delay in returning the proofs will result in a delay in publication.

Reprints

Each author receives with the proofs a reprint order form that must be completed and returned with the proofs to the Editorial Office if reprints are desired. Orders submitted after the journal is printed are subject to considerably increased prices.
POSITIONS AVAILABLE — Classified advertisement rates: $170.00 for first column inch, $150.00 for each additional inch or portion thereof. A column inch consists of eight lines, each 3½ inches long and containing approximately 70 characters (letters, numbers, symbols, punctuation marks, spaces). Display advertisement rates: $570.00 for ¼ page (3½ inches x 5 inches); $850.00 for ½ page (vertical 3½ inches x 10 inches or horizontal 7¼ inches x 5 inches); $1130.00 for full page (7¼ inches x 10 inches); copy received not camera-ready is subject to additional typesetting fee of approximately 5% of rate. Advertisements will be published in next available issue unless otherwise specified. Payment or purchase order is required with insertion copy. Advertisements are noncommissionable to agents; no cash discounts are allowed. Blind advertisements are not accepted.

POSITIONS DESIRED — Candidates registered with FASEB Placement Service are allowed one advertisement of five lines, each containing approximately 70 characters (letters, numbers, symbols, punctuation marks, spaces). The issue in which advertisement appears will be based on date of receipt of copy. Fee for publication in additional issues: $10.00 per issue.

Primary employers desiring identification and additional details concerning Positions Desired advertisers should write to address below, indicating hyphenated number appearing as last element of advertisement; a one-page application from advertiser(s) will be provided immediately. Advance telephonic determination of current availability of advertisers from earlier-than-current issues is recommended. Employers not currently registered with Placement Service are charged a minimum fee of $30.00 for identification of up to 10 advertisers, plus $3.00 for each above 10, payable in advance to FASEB Placement Service.

Some registered candidates do not prepare Positions Desired advertisements; some advertisements are published at times not coinciding with employer recruitment activities. Primary employers not finding advertisements that appear to match current or projected needs are invited to request a search of all active candidate files. Telephone a description of the desired qualifications; results of search will be discussed telephonically with requesting official, and applications from candidates declared suitable will be forwarded. Employers not currently registered with Placement Service are charged a minimum fee of $30.00 for up to 10 applications, plus $3.00 for each above 10.

In publishing these advertisements FASEB assumes no obligations as to qualifications of prospective employees or responsibility of employers, nor shall FASEB obtain further information concerning positions advertised or those seeking employment. Accuracy and completeness of all listings are the responsibility of the submitting party.

Various U.S. state and national laws against discrimination, including the Federal Civil Rights Act of 1964, prohibit discrimination in employment in the United States because of race, color, religion, national origin, age, sex, or any reason not based on a bona fide occupational qualification. The Federation of American Societies for Experimental Biology endorses these principles and reserves the right to edit all copy and to refuse advertisements not in consonance therewith.

Employment in countries other than the United States may be restricted by government visa and other policies. Moreover, it is suggested that the generally accepted employment practices, the cultural conditions, and the exact provisions of the specific positions being considered be investigated thoroughly. The U.S. Embassies in countries of interest to potential employees should be able to provide up-to-date data concerning internal conditions.

For a description of operation at annual meetings, please refer to the January or February issue or contact the Placement Service. Address all correspondence to FASEB Placement Service, 9650 Rockville Pike, Bethesda, MD 20814. (301) 530-7020

POSITIONS AVAILABLE

PULMONARY DIVISION, UNIVERSITY OF PITTSBURGH SCHOOL OF MEDICINE. Tenure/tenure-track position at the assistant professor level available for Ph.D. with a strong background in cellular physiology and biochemistry. The candidate would be expected to pursue an independent research program as well as collaborate with M.D.'s interested in the role of soluble mediators of inflammation elaborated by neutrophils, macrophages and lymphocytes in a variety of parenchymal lung diseases. Experience in tissue culture, ultrastructure, and lipid and protein identification/purification is desired. Applicants should submit CV, a statement of research interests, and three letters of reference to James Dauber, M.D., Pulmonary Medicine, 440 Scaife Hall, Pittsburgh, PA 15261. An equal opportunity/affirmative action employer.

GASTROINTESTINAL RESEARCH PHYSIOLOGIST. Experience in vitamin and fatty acid transport, segmental perfusion, vesicles, permeability studies. Past record in obtaining national grant support. Academic qualifications for Associate Adjunct Professor. Apply to D. Hollander, M.D., University of California, Irvine, Irvine, CA 92717. UCI is AA/EOE.

ACADEMIC PATHOLOGIST. Applications are invited for a full-time faculty position of Assistant, Associate, or Full Professor of Pathology at Tulane University Medical Center. Applicants should be board certified or board eligible in Anatomic and Clinical Pathology or should have a Ph.D. In addition, applicants should have a strong academic background with interest in teaching and research, preferably in chemical pathology or immunopathology. Applications including CV, bibliography and the names of three references should be sent by April 30, 1988 to Michael A. Gerber, M.D., Professor and Chairman, Department of Pathology, Tulane University School of Medicine, 1430 Tulane Avenue, New Orleans, LA 70112. Tulane Medical Center is an equal opportunity/affirmative action employer.

THE UNIVERSITY OF IOWA COLLEGE OF MEDICINE is seeking to recruit a distinguished scientist with a record of scientific leadership to fill an endowed chair in oncology and molecular biology. These areas are broadly defined in the context of growth and development and may include individuals whose work is not normally viewed as restricted to cancer. This position carries with it a substantial commitment in research support and space. The salary will be commensurate with experience. Please address letters of interest or nomination to Dr. P. Michael Conn, Search Committee Chairman, Professor and Head of Pharmacology, 2-434 Bowen Science Building, The University of Iowa College of Medicine, Iowa City, IA 52242. The University of Iowa is an equal opportunity/affirmative action employer.
SENIOR RESEARCH SCIENTIST

Acquired Immunodeficiency Syndrome (AIDS) Program, National Institute of Allergy and Infectious Diseases (NIH) is seeking a senior level scientist in microbiology (to include virology), immunology or molecular biology, to serve as Chief of the Pathogenesis Branch. Responsibilities of the position include planning and directing major extramural research efforts in the areas of basic research into the biologic properties, molecular biology, and host response to infection by HIV and its sequelae in order to improve the basic understanding of the causative agents, to improve diagnostic and prognostic indicators, and to develop and improve methods of prevention and treatment. Applicants should have a Ph.D.; a broad background in microbiology, virology, immunology and molecular biology; postdoctoral laboratory research experience; experience in research program administration; publications in recognized referenced journals in field of scientific expertise; and knowledge of Federal Government extramural research program administration.

Salary range is $54,907-$71,377. U.S. citizenship is required. Send CV to Daniel F. Hoth, M.D., Acting Director, AIDS Program, NIAID, NIH, Building 31, Room 7A46, 9000 Rockville Pike, Bethesda, MD 20892. NIH is an equal opportunity employer.

CAREER OPPORTUNITIES IN CANCER RESEARCH
AMERICAN HEALTH FOUNDATION

Several positions are available for postdoctoral fellows, senior postdoctoral fellows, or associate research scientists in divisions of the American Health Foundation.

These openings offer the possibility of development into permanent staff positions for individuals who are interested in establishing independent research programs related to cancer care and prevention.

Openings exist in the areas of:

- Organic synthesis
- Metabolic activation and DNA binding of carcinogens
- Oncogene activation and related areas of molecular biology
- Cancer chemoprevention
- Nutritional biochemistry

Applicants should submit CV to:

Dr. Stephen S. Hecht
Director of Research
American Health Foundation
1 Dana Road
Valhalla, NY 10595

An equal opportunity/affirmative action employer, M/F/H/V.

LIPID SYNTHETIC CHEMIST

GM-13 $39,501 to $51,354 per annum
(Salary dependent upon qualifications)

The Chemistry Division of the Naval Research Laboratory is seeking a research staff scientist in the field of lipid synthetic chemistry.

Applicants must demonstrate ability to design and synthesize heterobifunctional lipids for microstructure applications; synthesize novel disoctylenic lipids; supervise and participate in modification of lipids, antigens, and antibodies to be used for development of ultrasensitive detection systems, and characterizes lipids and microstructures using physical, analytical techniques.

Selectee must possess a Ph.D. in Chemistry or equivalent education and experience which includes at least three years of research expertise in organic chemistry, polymer chemistry, biochemistry, and polymerizable lipids. Evidence of publications in science literature; presentations at scientific meetings; and patents or patent disclosures is highly desirable. Must show expertise in synthesis of a variety of polymer lipids, liposomes, controlled release materials, microtubules, thermochromic lipids, bioactive membranes, and materials for solar energy conversion.

Interested applicants must submit a Personal Qualifications Statement (SF-171) or detailed resume, no later than 30 April 1988, to:

NAVAL RESEARCH LABORATORY
Civilian Personnel Office
Attn. 61-165-14.KW (FAEB)
4555 Overlook Avenue, SW
Washington, D.C. 20375-5000

AN EQUAL OPPORTUNITY EMPLOYER • U.S. CITIZENSHIP REQUIRED
NATIONAL INSTITUTES OF HEALTH, CHIEF, LABORATORY OF MICROBIAL ECOLOGY. The Intramural Research Program of the National Institute of Dental Research invites applications for the position of Chief, Laboratory of Microbial Ecology. Candidates must have a M.D./Ph.D./D.D.S., or equivalent with demonstrated accomplishments in research in the area of Microbial Ecology. Candidates from relevant areas of microbiology and immunology will be considered. U.S. citizenship required. Salary range for Medical Officers $55,917 to a maximum payable rate of $72,500. Salary range for all other categories $46,679-$71,377. Physicians may be eligible for an additional Comparability Allowance of up to $20,000. Send CV, research plans, with the names and addresses of three references to L. A. Salzman, Ph.D., Assistant Scientific Director, NIDR, Building 30, Room 132, Bethesda, MD 20892. NIH is an equal opportunity employer.

NATIONAL INSTITUTES OF HEALTH, LABORATORY OF MICROBIAL ECOLOGY. The Intramural Research Program of the National Institute of Dental Research invites applications from investigators with a M.D./Ph.D./D.D.S. or equivalent with demonstrated accomplishments in research in the area of basic retrovirology (HIV). Must be a U.S. citizen or eligible resident alien. Salary will be commensurate with education and experience with a range of $20,000-$49,266. Send CV, research interest, with the names and addresses of three references to L. A. Salzman, Ph.D., Assistant Scientific Director, NIDR, Building 30, Room 132, 9000 Rockville Pike, Bethesda, MD 20892. NIH is an equal opportunity employer.

POSTDOCTORAL POSITION. Study processing of macromolecules and receptor ligand interactions by bile duct epithelial cells. The applicant should be a recent Ph.D. with a strong background in cell biology and experience in morphology and cell culture. Send CV, summary of research experience, and names of three references to Dr. N. F. LaRusso, Mayo Medical School, Rochester, MN 55905. An equal opportunity/affirmative action institution.

POSTDOCTORAL POSITION available for a scientist interested in the enzymeology and molecular biology of peptide hormones including angiotensin, natriureptins and hypothalamic peptides. Send resume and three references to Professor J. B. Wilson, Department of Chemistry and Biochemistry, University of Colorado, Boulder, CO 80309-0215. The University is an equal opportunity employer.

CELL BIOLOGIST. The Institute for Environmental Medicine of the University of Pennsylvania Medical Center seeks a cell biologist for a tenure-track appointment as Assistant Professor. Successful candidate will establish an independent research program and will supervise a core electron microscopy laboratory. Research areas of special interest include lipid-protein interactions, endocytosis, secretion, epithelial cell differentiation, macromolecular synthesis and lipid peroxidation. Guaranteed salary range is a well-equipped laboratory, and generous start-up funds are available. Deadline for applications is May 15, 1988. Send CV and statement of research interest to Cell Biology Search Committee, c/o Maureen Doran, Executive Assistant, Institute for Environmental Medicine, University of Pennsylvania, One John Morgan Building, 36th St. & Hamilton Walk, Philadelphia, PA 19104-6068. The University of Pennsylvania is an equal opportunity/affirmative action employer.

MOLECULAR IMMUNOLOGY, ASSISTANT PROFESSOR. The Department of Microbiology and Immunology of New York Medical College invites applications for the position of an Assistant Professor in Molecular Immunology. It is expected that the applicant has had extensive experience in the molecular aspects of tumor immunology and substantial training in molecular biology. The position requires active participation in teaching of graduate and medical students and a broad teaching experience is therefore required. Salary and benefits commensurate with experience. Forward CV, publications and three letters of references to Soldano Ferrone, M.D., Professor and Chairman, Department of Microbiology and Immunology, New York Medical College, Valhalla, NY 10595.

POSTDOCTORAL POSITION for research concerning ventricular performance and cardiovascular hemodynamics in chronically instrumented conscious models. Ph.D. in physiology or pharmacology preferred and strong engineering background would be very helpful. Send CV and summary of research interests to Dr. Klopenstein, The Bowman Gray School of Medicine, 300 S. Hawthorne Road, Winston-Salem, NC 27103. AA/EOE.

DEPARTMENT OF MICROBIOLOGY/CHAIRPERSON. The search for a chairperson, Department of Microbiology, College of Medicine, Howard University, has been reopened. Candidates should possess the Ph.D., M.D., or equivalent degree, have a distinguished record of research publications, experience in directing a research program, and a commitment to graduate education. A broadly interested and knowledgeable scientist-leader capable of developing, unifying, and inspiring research and educational program based in the College of Medicine is sought. Address inquiries or send applications (CV, names and addresses of three references) to Dr. Thomas E. Smith, Chairman, Search Committee for Microbiology, College of Medicine, 520 W Street, N.W., Washington, DC 20059. New applicants will be evaluated starting March 15, 1988. Previous candidates need not reapply. Applications will be accepted until the position is filled. Howard University is an equal opportunity/affirmative action employer (M/F/H).
NATIONAL INSTITUTE OF ARTHRITIS AND MUSCULOSKELETAL AND SKIN DISEASE (NIAMS). National Institutes of Health, Public Health Service. The Section on Chemical Immunology of the Arthritis and Rheumatism Branch is seeking an M.D. trained in membrane biochemistry and molecular genetics with an interest in investigating the early events in IgE-mediated degranulation of mast cells at the molecular level. The Branch is part of the intramural program of NIAMS with major interests in autoimmunity, chronic inflammation and clinical investigations in autoimmune diseases. Applicants should have at least three years postdoctoral training/experience, and will be considered for a permanent career or career conditional appointment at the GS-13 level ($48,162-59,787 p.a.). Applicants should send a CV, bibliography, a short statement of research interests, as well as the names of three references to Henry Metzger, M.D., Director, Intramural Research Program, Bldg. 10, Rm. 9N240, NIAMS, NIH, 9000 Rockville Pike, Bethesda, MD 20892, (301) 496-3375. U.S. citizenship required. NIH is an equal opportunity employer.

VASCULAR CELL BIOLOGY. The Department of Medical Physiology and the Microcirculation Research Institute at Texas A&M University announce the creation of two new tenure-track faculty positions at the assistant/associate professor levels. We are interested in individuals specializing in molecular and cellular physiology of vascular smooth muscle. Preference will be given to investigators who have already demonstrated the ability to conduct independent research and to garner peer-reviewed grant funding at the national level. The successful candidate will join a faculty composed exclusively of cardiovascular scientists with research interests ranging from molecular biology to system physiology. The new faculty members will participate in the department's medical and graduate education programs. Please send CV, statement of research interests, and the names of three references to Harris J. Granger, Ph.D., Professor and Head, Department of Medical Physiology, College of Medicine, Texas A&M University, College Station, TX 77843.

POSITIONS DESIRED

Ph.D., 1988 (expected); Biochemistry; Modern molecular biological techniques and classical genetic techniques as applied to hexose phosphate transport in E. coli; Date negot.; Postdoc. position in academia or industry; Salary negot. 2-2276

Ph.D., 1969; Cardiovascular and pulmonary physiology: Nonadrenergic-noncholinergic mediation of baroreceptor and chemoreceptor reflexes, bronchial circulation, airway reactivity, aseptic surgery small and large animals, in vivo/in vitro models, funding record; Industrial or academic research preferred; Salary negot. 1-2503

Ph.D., 1973; Pharmacology, biochemistry, toxicology, cell biology, biochemical-analytical chemistry; Biomembranes and glycoproteins struct. and funct., receptor studies, carcinogenesis, drug toxicity, patents, drug discovery; Avail. immedi.; Prefer lab. manager/prin. scient./dir. pos., industry/acad.; Sal. negot. 3-2521

Ph.D., 1988 (expected); Pharmacology, immunochemistry; Experience: tonic pain (analgesic) test development, in vivo testing for physical dependence, central injections in mice, in vivo assay of tachykinins, HPLC, single-unit recording, Macintosh PC; Avail. Sept. 1988; Pain pharmacol./physiol. postdoctoral position in industry, academia, or institute; Salary negot. 3-2535

Ph.D., 1988 (expected); Biochemistry, molecular biology, protein chemistry, Microtubuli proteins and their binding of GTP, gel chromatography, protein purification and isolation, Western blotting, HPLC, FPLC, TEF, SDS-PAGE, radioactive labeling, four yr. professional experience; Avail. Aug. 1988; Academia or industry; Salary negot. 2-2581

Ph.D., 1985; Biochemistry; Three yr. postdoc., enzymology/protein chemistry, purification, chemical modification, bioluminescence, proteins/inhibitors, mast cells/allergy, coagulation, cell culture, hybridoma technol., ELISA, HPLC, biochemical toxicology; in vitro drug studies; Available fall 1988; Staff position in industry; Salary negot. 2-2606

Ph.D., 1985; Biochemistry, enzymology/protein chemistry; Mechanism of protease inactivation by endogenous inhibitors, metal ion binding, UV-VIS and fluorescence spectroscopy, background in thrombosis, enzyme purification, fermentation of E. coli, and MS-DOS computers; Available July 1988; Staff position in industry; Salary negot. 2-2608

Ph.D., 1985; Peptide/protein chemistry, biochemistry, enzymology; Experience in peptide synthesis and purification, peptide sequencing, amino acid analysis, molecular modeling and computer graphics, synthetic organic chemistry, HPLC general instrumentation; Available fall 1988; Teaching and/or research preferred; Salary negot. 2-2609

Ph.D., 1985; Biochemistry, enzymology/registration; Experience in tissue culture, drug cytotoxicity and mechanism studies, HPLC for protein purification and quantification small molecules, antibody prep., ELISA, Western blot, animal models diabetes, drug pharmacokinetics and metabolism; Date negot.; Research preferred; Salary negot. 2-2610

Ph.D., 1971; Biochemistry, analytical biochemistry, protein chemistry; Experience in cell culture, platelet and red cell biochemistry, cancer research, HPLC, GC, TLC, radioisotope methods, electroporation of cells or cell membranes; Date negot.; Staff position in industry preferred, others considered; Salary open. 2-2611

Ph.D., 1988 (expected); Biochemistry, protein chemistry/enzymology; Experience in protein purification and characterization, trace element metabolism by mammals, background in tissue culture and HPLC analysis; Available May 1988; Postdoc. in academia or industri.; Salary negot. 2-2614

Ph.D., 1986; Biochemistry, protein chemistry/structure-function; Large-scale enzyme prep. and purif., characterization by chromatography, HPLC, FPLC, affinity, spectroscopy: UV/VIS, circular dichroism, fluorescence, immunological: ELISA, immunoblots, tissue culture; Available immedi.; Industrial res. or postdoc.; Salary negot. 2-2615

Ph.D., 1988 (expected); Molecular biology, immunochemistry; Experience in gene cloning, mapping, transformation, transfection, tissue culture, electrophoresis, protein analysis, hybridoma, immunoassay; Available fall 1988; Molec. biol. postdoc. position; Salary negot. 2-2616

Ph.D., 1988 (expected); Biochemistry, mechanistic enzymology/protein chemistry; Experience in protein and peptide isolation, HPLC of proteins and peptides, chemical modification of proteins, enzyme kinetics, nucleotide analog synthesis; Available early 1989; Protein chemistry postdoctoral position in academia or industry; Salary negot. 2-2617

Ph.D., 1985; Pharmacology, physiology, microcirculation, vascular resistance; Experience in macromolecular permeability studies with inflammatory mediators, immune complexes, endogenous regulation, pharmacological inhibition, segmental vascular resistance; Available Sept. 1988; Research/teaching; Salary negot. 3-2618

Ph.D., 1988 (expected); Immunopharmacology, pharmacology; Regulation of immune syst. by neuropeptides, lymphokine receptors, transduction mech., tissue culture, affinity plating, FACS, ELISA (FN-γ), CTLII (IL 2), radiolabel-binding assay; Available summer 1988; Postdoctoral position in academia, institute, institute; Salary negot. 3-2619

Ph.D., 1988 (expected); Pharmacology, autonomic/cardiovascular pharmacology and physiology, Shock (hemorrhage and endotxin), mediators, radioenzymatic assay development, radioimmunoassay, protein purification; Avail. July 1988; Staff position or postdoctoral research in academia or industry; Salary negot. 3-2620

Ph.D., 1988; Nutritional biochemistry, cell physiology, Lipoprotein isolation and purification, isolation and culture of liver cells, radioisotope techniques, chromatography, electrophoresis; Available December 1988; Research position in government or industry; Salary negot. 5-2621

M.S., 1987; Food and nutrition, physiology: Experience in HPLC, GCL, TLC, radiotracers, fluorometry, atomic absorption, enzymatic assays, various proximate analysis methods, computers, small-animal maintenance, proficient at writing. M.S. research: effect of fiber on bile acid metabolism; Research/writing in industry or academia; Salary negot. 5-2622
Ph.D., 1987; Community nutrition, nutritional epidemiology, nutrition education; Assessment of growth, iron and vitamin A status, relationship between nutrition and disease, experience in field research and teaching; Available July 1988; Position in academia or government; Salary negot. 5-2623

Ph.D., 1987; Human and animal nutrition, physiology, biochemistry, computer sci.; Experience in dietary fib. and carbohydrate analysis, digestive marker techniques, design and analysis of experiments, computer programming; Available June 1988; Teaching and/or research preferred; Salary negot. 5-2624

Ph.D., 1986; Nutritional sciences, biochemistry; Registered dietitian, xenobiotic/drug metabolism studies in animals, human studies for assessment of nutritional status; Available October 1988; Washington, DC or San Francisco area; Staff research position in academia, government, or industry in the area of nutrition and cancer; Salary negot. 5-2625

Ph.D., 1984; Microbiology, immunoochemistry, enzymology/protein chemistry; Experience in large-scale purification and characterization, tissue culture, hybridoma, clinical diagnostics; Available immediately; Position in government, academia, or industry; Salary open. 6-2626

Ph.D., 1988 (expected); Immunology, cell biology, biochemistry, protein chemistry; Tissue culture technology, immunopathology, parasitology, characterization or immunologic regulators; Available fall 1988; Postdoctoral position, academia or industry; Salary negot. 6-2627

Ph.D., 1988 (expected); Molecular immunology/immunology; Experience in recombinant DNA, DNA sequencing, protein purification, tissue culture and hybridoma techniques; Available January 1989; Postdoctoral position in academia, government, or industry; Salary negot. 6-2628

Ph.D., 1984; Four yr. postdoc. exp. in immunoochemistry, tumor biology, tumor radioimmunolocalization in animals, clinical trials, glycoconjugate purification, characterization, chemical analysis, monoclonal antibodies, tissue culture, HPLC, teaching and supervis. exp.; Avail. summer 1988; Academia or industry; Salary negot. 6-2629

Ph.D., 1988 (expected); Physiol./cell biol./protein biochem/pharmacol.; Experience in tissue perfusion, microscopy (TEM, SEM, STEM, EDXS, cryo., immuno.), chromatography (affinity, filtration, ion), IEF, SDS-PAGE, pharmacol. of 5-HT, GABA, and ACh, computer appl./instrument interface and BASIC; Avail. 3/89; Postdoc., acad./ind.; Salary negot. 1-2630

Ph.D., 1985; Dairy science, bacteriology (minor), basic nutrition and metabolism; Dietary fiber analysis and bacterial fermentation in the gut, gut function and digesta kinetics in small and large animals, carbohydrate analysis by GC and HPLC; Date negot.; Staff/postdoctoral position in academia or industry; Salary open. 5-2632

Ph.D., 1986; Physical biochemistry and organic synthesis; Design and synthesis of new ADP analogues and use with blood platelets in binding studies, affinity chromatography and photoaffinity labeling, protein purification and kinetic studies of Zn-protein interactions; Available July 1988; Staff position in academia or industry; Salary negot. 2-2633

Ph.D., 1988 (expected); Bioluminescence (firefly and other beetle luciferases), gene cloning and expression, sequence analysis, protein engineering; Available 1989; Basic or applied research in industry or postdoctoral position in academia; Salary negot. 2-2634

Ph.D., 1971; Microbiology, biochemistry, molecular biology; Several yr. teaching and research exp. in bacterial physiology, fungal genetics, tumor biochemistry, and phospholipid-mediated signal transduction mechanisms; Desire pharmaceutical industry position in receptor biochem. 2-2636

Ph.D., 1988 (expected); Biochemistry, metabolism, metabolic regulation, mammalian phys.; Experience in radioisotope techniques, RIA, enzymatic assays, design and RIA, HPLC, GC, GC-MS, organic derivitization, small-animal surgery; Available summer 1988; Pacific NW/Rocky Mtns.; Postdoctoral position in academia/industry; Salary negot. 2-2637

Ph.D., 1983; Physiology, endocrinology, developmental biology, immunology; Experience in steroid assays, lipid biochemistry, cell and tissue culture, embryo culture, IVF; Clinical IVF program, research, teaching position; Salary and location open. 1-2638

Ph.D., 1983; Pharmacology, physiology, electrophysiology; Vascular smooth muscle: cell culture, intracellular recording, patch clamp, tension recording, cyclic nucleotide assays; Available immediately; Research and/or teaching preferred; Salary negot. 1-2639

Ph.D., 1985; Pathology, cancer biology; Experience in tumor cell-platelet-endothelial cell interactions and role of arachidonic acid metabolism, background in tissue culture, immunoassays, chromatography, microcomputers, research management; Available fall 1988; Staff position in academia, government, or industry; Salary negot. 4-2640

Ph.D., 1985; Pharmacology, physiology; Cerebral and peripheral cardiovascular regulatory mechanisms, experience in in vivo and in vitro measurement of cardiovascular function, RIA, prostanooids; Available July 1988; Staff position in academia or industry; Salary negot. 3-2641

Ph.D., Dec. 1985; Neuropharm.; Experience/background in antipsychotics, drugs of abuse (THC, PCP, sigma opiates), DA and ACh pharm., transmitter release in a dual-label superfusion paradigm, ligand binding, tyrosine hydrox. assay, behavioral tests; Avail. late 1988; Permanent position in academia, govt., industry; Salary/location negot. 3-2642

Ph.D., 1988 (expected); Pharmacology and cell biophysics; Characterization of membrane receptors, pharmacological studies in cardiac and vascular smooth muscle, subcellular localization of membrane receptors, microelectrode technique; Available Sept. 1988; Staff or postdoctoral position in industry; Salary negot. 3-2643

Ph.D., 1988 (expected); Pharmacology, pituitary/reproductive endocrinology, biochemistry, protein chemistry/immunology; Experience in pharmacological methods, protein purification, Nb2 node lymphoma cell bioassay, HPLC, RIA, electrophoresis, subcellular fractionation; Avail. Jan. 1989; Oncology-related postdoctoral position in industry; Salary negot. 3-2644

Ph.D., 1988 (expected); Behavioral pharmacology, experimental psychology; Naloxone sensitivity, characterization/pA2 analysis of opioids on schedule-controlled behav., drug discrimination, shock titration, conditional discrimination; Available Nov. 1988; Behavioral pharmacology postdoctoral position; Salary negot. 3-2645

Ph.D., 1988 (exp.); Pharmacology of antithrombotic drugs incl. heparin and LMW heparins, pharmacokinetics, modeling of thrombotic and hemorrhagic states, measurement of prethrombotic, thrombotic, and fibrinolytic states using techniques, bioassays, chromogenic and clot-based assays, RIA and ELISA; Position in academia or industry; Salary open. 3-2646

Ph.D., 1981; Pharmacology, biochemistry, enzymology, protein and steroid chemistry; Enzyme purification, substrate and inhibition kinetics, affinity alkylation, organic synthesis, all types chromatography, electrophoresis, antithyroid drugs, animal surgery; Date negot.; Faculty or staff position in academia or industry; Salary negot. 3-2648

Ph.D., 1985; Nutrition, analytical biochem.; HPLC, affinity chromatography, radioisotope techniques, cell culture, math and computer skills, college teaching, scientific writing; Available Oct. 1988; Prefer north-eastern USA; R&D in food/drug industry or analytical instrumental sales/service preferred; $30,000-35,000. 5-2649

Ph.D., 1988 (expected); Nutritional biochemistry, public health, divalent ion metabolism, statistics; Animal metabolic balance, nutrient transport in everted gut sacs, atomic absorption spectrophotometry, microcomputer literate; Available July 1988; Staff position in industry/govt.; Salary negot. 5-2650

Ph.D., 1988 (expected); Nutritional biochemistry and metabolism, public health, clinical dietetics; Animal metabolic balance, indirect/direct blood pressure measurement, nutrient transport in everted gut sacs, atomic absorption spectrophotometry, microcomputer literate; Available Aug. 1988; Southern CA; Pos. in academia/industry; Salary negot. 5-2651
Ph.D., 1988 (expected); Physiology, coronary, microcirculation; Background in cardiaic, renal, and exercise physiology, experience with chronic animal studies, various hyperventilated animal models, in vivo preparations; Available December 1988; Postdoctoral position in academia or industry; Salary negot. 1-2680

Ph.D., 1988 (expected); Physiology, endothelial cell biology; Experience in in vivo and in vitro models of micro- and macrovascular permeability, assays for vasoactive amines, inosidites, cell transport, flow cytometry; Date negot.; Postdoctoral/staff pos. in acad. or industr.; Salary negot. 1-2681

Ph.D., 1989 (expected); Nutritional sciences, biochemistry, animal nutrition; Purification of membrane protein, development of antibodies, electrophoresis and protein blotting, radioactive ligand-binding assays; Available March 1989; Postdoctoral position in academia; Salary negot. 5-2684

Ph.D., 1981; Nutrition, food science, physiology, statistics; Experience dietary fiber, vitamins, pharmocokinetic models, rat, swine, human studies of digestion and absorption, nutrient analysis and stability in processing, data acquisition and analysis; Senior research or technical position; Date and salary negot. 5-2685

Ph.D., 1986; Nutrition, biochemical toxicology, drug metabolism; Experience in enzymology, protein chemistry, spectrometry, fluorimetry, radiochemistry, column chromatography, HPLC; Available April 1988; Position in industry or academia; Salary negot. 5-2686

Ph.D., 1986; Immunopharmacology, receptor biochemistry, cell biology; Dispersion of tissue mast cells and their morphological and functional characterization, signal transduction and mechanism of mediator release in mast cells and basophils; Available summer 1988; Staff position in academia or industry; Salary negot. 6-2687

Ph.D., 1988 (expected); Immunology and cell biology; Tissue culture: primary culture of monocytes and lymphocytes, mechanism of steroid action, electrophoresis, gradient fractionation, recombinant DNA techniques, ELISA, RIA; Available summer 1988; Postdoctoral position in academia; Salary negot. 6-2688

Ph.D., 1988 (expected); Immunology and cell biology; Tissue culture, T cell cloning, in vitro assays, MAb purification and in vivo therapy (in mice), induction of DTH responses and antigen-specific tolerance in mice, background in clinical chemistry; Available Jan. 1989; Postdoctoral position in industry or academia; Salary negot. 6-2689

Ph.D./M.D., 1986; Immunology, cell biology, Tissue culture, in vitro bioassays, T cell separation, monoclonal antibody technique, parasitic Ag isolation, flow cytometry, autoradiography, medical training; Seek staff position in academia or government; Salary and starting date negot. 6-2690

Ph.D., 1984; Molecular biology and biochemistry; Experience in library construction and screening, DNA sequencing, in vitro mutagenesis and expression in E. coli, antibody production, protein purification, tissue culture; Available August 1988; Staff position in industry or nonprofit; Salary open. 2-2691

Ph.D., 1986; Protein biochemistry and biophysics; More than 9 yr. in protein research, purification, structure-function characterization of cytoplasmic and membrane-bound proteins, CD/CD spectroscopy, electrophoresis, chromatography, ultracentrifugation; West coast preferred; PI research position in academia/government/industry; Date/salary negot. 2-2692

Ph.D., 1985; Biochemistry, immunology, protein chemistry; Primer extension, in vitro reconstitution of ribosomes, animal tissue culture, protein phosphorylation, two-dimens. gel electrophoresis, peptide antibody preparation, protein cross-linking and enzyme purification; Available fall 1988; Research associate in academia or industry; Salary negot. 2-2693

Ph.D., 1986; Physiology, cell physiology, biochemistry, enzymeology; Drug inhibition, protease action on activities of membrane-bound ATPases in human RBC; characterization and endocrine control of Ca-ATPases in gill epithelium; Avail. 8/88; Research and/or teaching; Salary negot. 2-2694

Ph.D., 1988 (expected); Molecular biology, biochemistry, cell biology; Studies on the structure of a liver-specific gene, mechanism of steroid action, experience in DNA cloning, sequencing, cell culture, and basic techniques of molecular biology; Available January 1988; Postdoctoral position in academia or industry; Salary negot. 2-2695

Ph.D., 1986; Biochemistry, physiology, cell biology, drug metabolism; Biochemical, enzymatic, histologic studies of ethanol metabolism in mice and rats, background in endocrinology, nutrition, exercise physiology, cell culture; Avail. June 1988; Large metro. area; Research and/or teaching in academia, gorv., or industry; $20,000+. 2-2696

Ph.D., 1985; Nutritional biochem.; Regulation of gene expression and cellular metabolism by minerals (esp. Cu and Zn) and hormones, molecular biology tech. (dot blots with synthetic oligos, Northern, Western, footprinting, nuclear transcription), computer modeling with SAAM program, HPLC, electrophoresis; Avail. Aug. 1988; Staff position in acad., industr. 5-2702

Ph.D., 1988 (expected); Pharmacology, physiology, cell biology; Cellular transport renal tubules, adrenergic coupling to Na/H antiporter, receptor-intracellular coupling, metabolism/respiration; Available June 1988; Postdoctoral position in academia or industry; Salary negot. 3-2703

Ph.D., 1988 (expected); Molecular biology, bacterial genetics, DNA repair; Experience in cloning, DNA sequencing, RNA isolation, primer extension, characterization or protein fusions and mutagenesis techniques; Available Sept. 1988; Postdoc. in gene regulation in prokaryotic or eukaryotic systems, academia or industry; Salary negot. 2-2705

M.D., 1983, M.S., 1988 (expected); Immunology and cell biology; Tissue culture, characterization of lymphokine, in vitro bioassay, nucleic acid purification and characterization, protein chemistry, electrophoresis, gradient fractionation; Available Sept. 1988; Staff position in industry or academia; Salary negot. 6-2707

Ph.D., 1988 (expected); Physiology, cell biology; Developed in vitro model to study effects of shear stress on mass transfer and biochemical changes using endothelial monolayer grown on filter, tissue culture, exp. animal surgery, TEM and SEM; Available Sept. 1988; Postdoctoral position in academia or industry; Salary open. 1-2709

Ph.D., 1989 (expected); Free radical pathology; nutritional biochemistry; Light and electron microscopy, tissue processing, role of antioxidants in protecting against hyperbaric oxygen damage; Available summer 1989; Postdoc.; Salary negot. 5-2710

Ph.D., 1989 (expected); Molecular parasitology; Molecular characterization of gene expression, DNA, RNA and protein extraction and electrophoresis, DNA cloning, Southern, Northern, and Western transfers, radiolabeling of DNA probes (P32), deoxy sequencing of DNA (P32, S35); Avail. Jan. 1989; Postdoctoral position in academia or industry; 6-2711

Ph.D., 1988 (expected); Physiology, cardiovascular; In vitro isolated vessel and in vivo acute and chronic cardiac surgery and fluoroscopic catheterization, microscopy, Doppler, electromagnetic, thermodilution flow measurement, HPLC determination of blood chemistry; Available fall 1988; Postdoctoral position in academia or industry; Salary open. 1-2709

Ph.D., 1989 (expected); Cell biology, immunology, neuroimmunology; Experience in host defense and macrophage activation studies, cell culture and separation techniques, cytototoxicity, oxygen metabolite and in vitro bioassays, research/teaching; Available July 1988; Staff position in academia or industry; Salary negot. 6-2714

Ph.D., 1988 (expected); Cell and tissue biology, immunology; Tissue culture, light and electron microscopy (TEM), photomicroscopy, immunostaining, characterization of immune response to skin grafting; Avail. fall 1988; Postdoctoral position in academia or industry; Salary negot. 7-2715
Ph.D., 1988 (expected); Cancer biology and immunology; Clonal variation in T cell receptors of human T cell tumors, hybridoma work, protein chemistry (immunoprecipitation, electrophoresis, glycosylation analysis), molecular biology (Southern, Northern blotting, cDNA cloning, PCR); Avail. July 1988; Postdoc. and/or teaching; Salary negot. 6-2750

Ph.D., 1988 (expected); Cancer biology and immunology; Clonal variation in T cell receptors of human T cell tumors, hybridoma work, protein chemistry (immunoprecipitation, electrophoresis, glycosylation analysis), molecular biology (Southern, Northern blotting, cDNA cloning, PCR); Avail. July 1988; Postdoc. and/or teaching; Salary negot. 6-2750

Ph.D., 1988 (expected); Physiology, exercise physiology; Microperfusion of isolated kidney tubule segments, ion transport in renal epithelia, pH effects, background in exercise-related techniques on human performance; Avail. fall 1988; Postdoc. or staff position in academia or industry; Salary negot. 1-2751

Ph.D., 1977; Pharmacology, cardiovascular pharmacology; Methods for antihypertensives, renal clearance, in vivo/in vitro methods, bioassay of autonomic drugs, myocardial ischemia, programmed stimulation, coronary thrombolysis; Avail. July 1988; Staff position in industry; Salary negot. 3-2753

M.D., 1973, Ph.D., 1986; Ob./gyn. pathology; Extracellular matrix elastin biochemistry, regulation synthesis and degradation in uterus, isolation and separation techniques, tissue culture, in vitro assays; Avail. fall 1988; Salary negot. 4-2754

Ph.D., 1988 (expected); Biochemistry and molecular biology; Gene isolation, construction plasmid and phage genomic libraries, DNA sequencing, protein purification, lipid metabolism radioisotope techniques; Postdoc. position. 2-2755

Ph.D., 1986; Physiology, electrophysiology, tissue transport; Intracellular microelectrode recording, fabrication of ion (K, Na, Cl, H, Ca)-selective microelectrodes and microcirculation, background in general and thoracic surgery; Avail. winter 1988; Staff or postdoc. position in academia or industry; Salary negot. 1-2757

Ph.D., 1981; Pharmacology, chemotherapy/autonomic nervous system; Drug screening for antiparasitic activity using in vivo/in vitro models, neurotoxicology involving behavioral and histopathological studies; Avail. July 1988; Research and/or teaching preferred; Salary negot. 3-2758

M.D., 1982, ABIM, 1985; Endocrine/metabolism board eligible, university trained, clinical research regulation of vasopressin secretion, essential hypertension, basic research hormonal regulation gene expression; Avail. 7/88; Northeast; Desire practice/teaching. E-202
PLACEMENT SERVICE

The Federation operates a Placement Service, year-round and at annual meetings. It matches candidates seeking postdoctoral training and permanent positions with recruiting employers from academia, government, industry and elsewhere. Most candidates are at the doctoral level and in disciplines represented by member societies; individuals holding degrees below the doctorate are not excluded. Candidates and employers participating in Placement Service activities at any annual meeting must register for attendance at that meeting. Features of the Placement Service:

CANDIDATES

Registration is in effect for one year from receipt of completed registration materials and $10 registration fee. During that year, the candidate is entitled to:

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- Publication of Position Desired advertisement in one issue of The FASEB Journal (resulting in referral of about 1900 applications each year)
- Use of interviewing facilities at annual meeting, including interview scheduling services (about 4300 interviews scheduled per year), review of posted position vacancy descriptions (about 750 posted per year) and distribution of application to each participating employer
- Availability of application for review by employers visiting the FASEB campus and by FASEB staff members conducting searches on behalf of employers (resulting in referral of about 1900 applications per year)

EMPLOYERS

Registration is on a calendar year basis. Fee for 1988 is $450 for commercial organizations, $225 for academic and other nonprofit institutions, with a minimal additional fee for more than two interviewers at annual meeting to the limit of five per employer registration. During the year of registration, the employer is entitled to:

- Receipt of one copy of annual Candidates, published and distributed in February (includes about 450 applications)
- Inclusion of unlimited number of position vacancy descriptions in annual Positions, published and distributed in March (distribution is about 450)
- Posting of unlimited number of position vacancy descriptions in Placement Service area at annual meeting
- Receipt of copy of application of each candidate attending annual meeting
- Use of interviewing facilities at annual meeting including interview scheduling services (about 4500 interviews scheduled per year)

Following services, of principal use to employers not registered and who are charged a modest fee, are also provided at no charge to registered employers:

- Receipt, upon request, of applications from candidates who insert Position Desired advertisement in The FASEB Journal
- Receipt of applications from candidates identified by search of active files, conducted by Placement Service staff based on description of desired qualifications as provided by employers

GENERAL

Position vacancy descriptions received from any principal employer, whether or not otherwise participating in Placement Service operations, will be included without charge in annual Positions, if received by early February. This publication is for sale to candidates for $10. Yearly average positions included: 375.

Registration of candidates and employers by mid-January and early February, respectively, will provide the advantage of publication in Candidates or Positions, as described above. Later advance registration until nine days before the Sunday on which the annual meeting begins, and at-meeting registration are also available. Schedule for Placement Service operations at annual meetings will appear in several issues of The FASEB Journal, as well as in the Program and other materials distributed in advance of the meeting.

For application forms and instructions and other details, please write or call: FASEB Placement Service, 9650 Rockville Pike, Bethesda, Maryland 20814. (301) 530-7020.

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South Hall, Convention Center—Las Vegas, Nevada

REGISTRATION
Sun, May 1 2:00 pm-8:00 pm
Mon–Tues, May 2–3 8:30 am-4:30 pm
Wed, May 4 8:30 am-1:00 pm

INTERVIEW SCHEDULING
Mon–Wed, May 2–4 8:30 am-4:30 pm

INTERVIEWS
Mon, May 2 1:00 pm-4:30 pm
Tues–Wed, May 3–4 9:00 am-4:30 pm
Thurs, May 5 9:00 am-1:00 pm
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April 1988

THE FASEB JOURNAL 9a
The American Society for Cell Biology is sponsoring a summer conference entitled "Algal Experimental Systems in Cell Biological Research" to bring together investigators and students to discuss basic cell biological phenomena being studied with algal models. A major purpose of the meeting is to promote exchange of information on techniques and materials to the mutual benefit of researchers now working in diverse areas. The numerous advantages of using appropriate algal models for basic research should become more apparent to the research community from the proceedings and subsequent publication.

In addition to post-presentation question periods, there will be scheduled discussion times on topics and on organisms of particular interest. There will be workshops/demonstrations on immuno microscopy, potentials of image analysis, fluorescence/flow cytometry, and microinjection and electrofuslon techniques. The organizers for the conference are Dr. A.W. Coleman, Brown University, Providence and L.J. Goff, University of California, Santa Cruz. The deadline for submission of Applications is May 1, 1988.

Tentative speakers and titles are:

The Role of Algal Spindles in Elucidating Mechanisms of Cell Division. Z. Cande, University of California, Berkeley.

Genetic Analysis of Basal Body Mutants. S. Dutcher, University of Colorado, Boulder.

Calcium-Sensitive Contractile Organelles. J. Salisbury, Case Western Reserve School of Medicine, Cleveland.

The Algal Cytoskeleton I: The Interaction of Actin and Myosin in Cytoplasmic Movement. J. LaClaire, University of Texas, Austin.

Maintenance and Dynamic Changes of Cytoplasmic Organization Controlled by Cytoskeletal Assemblies in Acetabularia. D. Menzel, Lehrstuhl fuer der Universitaet, Heidelberg, FRG.

The Algal Cytoskeleton III: The Assembly, Secretion and Deployment of Scales and Spines. R. Wetherbee, University of Melbourne, Australia.

Self-Assembly of the Components of the Cell Wall Layers in Chlamydomonas. S. Adair, Washington University, St. Louis.

Cellular Morphogenesis: The Desmoid Model System. O. Kiermayer, Paris-Lodron University, Salzburg.

Cellular Morphogenesis In the Filamentous Red Alga Griffithsia. S. Waaland, University of Puget Sound, Tacoma.


Cell Differentiation in Volvox Carteri: The Use of Mutants in Understanding its Control and its Patterns. R. Starr, University of Texas, Austin.

The Chlamydomonas Rhodopin Pathways. K. Foster, Syracuse University, Syracuse.

Chloroplast Migration in the Dinoflagellate Pyrocystis Fusiformis. B. Sweeney, University of California, Santa Barbara.

Organization of the Photosynthetic Apparatus. K. Miller, Brown University, Providence.

Light Intensity Regulation of Photosystems I & II and the Antennae in Reds: Correlation of Photosynthetic Activity with Biochemical and Structural Changes. E. Gantt, University of Maryland, College Park.


Sexual Interactions and Mating Systems in Chlamydomonas Reinhardtii. U. Goodenough, Washington University, St. Louis.

Sexual Interactions in Chlamydomonas Eugametos. A. Musgrave, University of Amsterdam, The Netherlands.

The Role of Pheromones in Sexual Reproduction of Brown Algae. D. Muller, Fachbereich Biologie der Universitaet, Konstanz, FRG.

Cell-Cell Interactions in Algal Symbioses. L. Goff, University of California, Santa Cruz.

Requests for Program and Application Information should be addressed to: ASCB Summer Research Conference, National Office, 9650 Rockville Pike, Bethesda, MD 20814 (301) 530-7153.
INDEX OF ADVERTISERS

Academic Press, Inc. ........................................... 9a
Brandel, Inc. ...................................................... 1a
Brinkmann Instruments, Inc. ............................... 13a
Charles River Laboratories, Inc. ......................... C/3
Charles C Thomas · Publisher .............................. 13a
Chemical Abstracts Service ................................. 6a, 11a, 14a
Chemofux .......................................................... 5a
Council of Biology Editors .................................... 11a
Dialog Information Services, Inc. ....................... 8a
E-C Apparatus Corp. ........................................... C/4
IRL Press .......................................................... 12a
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Contents of Volume 1 Number 6

Commentaries — Artifacts in the application of linear free energy analysis D A Estell
Linear free energy relationships are valid! A R Fersht
Linear free energy relationships are valid: using plots of log k versus log (k/k0) to prove their existence is not D A Estell
Patentability of engineered proteins P Bahn

Review — Second-generation plasminogen activators T J R Harris

Original articles — The 3.0 A crystal structure of xylose isomerase from Streptomyces olivochromogenes G K Farber et al
Comparison of backbone structures of glucose isomerase from Streptomyces and Arthrobacter K Henrick et al
Three-dimensional structure of protein C inhibitor predicted from structure of a/antithrombin with computer graphics K Toma et al
Relationship of protein flexibility to thermostability M Vihinen
Hierarchical strategy for protein folding and design: synthesis and expression of T4 lysozyme gene and two putative folding mutants S A Narang et al
Efficient cleavage by a-thrombin of a recombinant fused protein which contains insulin-like growth factor I S Nishikawa et al
Diphtheria toxin receptor binding domain substitution with Interleukin-2: genetic construction and properties of a diphtheria toxin-related Interleukin-2 fusion protein D P Williams et al
Expression in COS cells of a mouse–human chimaeric B72.3 antibody N Whittle et al

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