

PROGRESS in
CLINICAL and
BIOLOGICAL RESEARCH
VOLUME 66A

CONTROL OF CELLULAR DIVISION AND DEVELOPMENT Part A

EDITORS: Dennis Cunningham
Eugene Goldwasser
James Watson
C. Fred Fox

ALAN R. LISS, INC., NEW YORK

CONTROL OF CELLULAR DIVISION AND DEVELOPMENT

Part A

**Proceedings of the ICN-UCLA Symposium
held at Keystone, Colorado
March 2-8, 1980, Part A**

Editors

DENNIS CUNNINGHAM *et al.*

**University of California
Irvine, California**

EUGENE GOLDWASSER

**University of Chicago
Chicago, Illinois**

JAMES WATSON

**University of California
Irvine, California**

C. FRED FOX

**University of California
Los Angeles, California**

Alan R. Liss, Inc. •

Address all Inquiries to the Publisher
Alan R. Liss, Inc., 150 Fifth Avenue, New York, NY 10011
Copyright © 1981 Alan R. Liss, Inc.

Printed in the United States of America.

Under the conditions stated below the owner of copyright for this book hereby grants permission to users to make photocopy reproductions of any part or all of its contents for personal or internal organizational use, or for personal or internal use of specific clients. This consent is given on the condition that the copier pay the stated per-copy fee through the Copyright Clearance Center, Incorporated, 21 Congress Street, Salem, MA 01970, as listed in the most current issue of "Permissions to Photocopy" (Publisher's Fee List, distributed by CCC, Inc.) for copying beyond that permitted by sections 107 or 108 of the US Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale.

Library of Congress Cataloging in Publication Data

Main entry under title:

Control of cellular division and development.

(Progress in clinical and biological research;
v. 66)

Includes bibliographical references and index.

1. Cellular control mechanisms — Congresses.
2. Cell division — Congresses. 3. Developmental
cytology — Congresses. I. Cunningham, Dennis.
II. ICN Pharmaceuticals, inc. III. University of
California, Los Angeles. IV. Series. [DNLM:
1. Cell division — Congresses. 2. Cell differentia-
tion — Congresses. W1 PR668E v. 66/QH 605 C764
1980]

QH604.C654	574.87'6	81-8434
ISBN 0-8451-0066-1 (2-Volume Set)		AACR2
ISBN 0-8451-0156-0 (pt. A)		
ISBN 0-8451-0157-9 (pt. B)		

**CONTROL OF CELLULAR
DIVISION AND DEVELOPMENT**
Part A

PROGRESS IN CLINICAL AND BIOLOGICAL RESEARCH

Series Editors

Nathan Back
George J. Brewer

Vincent P. Eijssvoogel
Robert Grover
Kurt Hirschhorn

Seymour S. Kety
Sidney Udenfriend
Jonathan W. Uhr

RECENT TITLES

- Vol 52: **Conduction Velocity Distributions: A Population Approach to Electrophysiology of Nerve**, Leslie J. Dorfman, Kenneth L. Cummins, and Larry J. Leifer, *Editors*
- Vol 53: **Cancer Among Black Populations**, Curtis Mettlin and Gerald P. Murphy, *Editors*
- Vol 54: **Connective Tissue Research: Chemistry, Biology, and Physiology**, Zdenek Deyl and Milan Adam, *Editors*
- Vol 55: **The Red Cell: Fifth Ann Arbor Conference**, George J. Brewer, *Editor*
- Vol 56: **Erythrocyte Membranes 2: Recent Clinical and Experimental Advances**, Walter C. Kruckeberg, John W. Eaton, and George J. Brewer, *Editors*
- Vol 57: **Progress in Cancer Control**, Curtis Mettlin and Gerald P. Murphy, *Editors*
- Vol 58: **The Lymphocyte**, Kenneth W. Sell and William V. Miller, *Editors*
- Vol 59: **Eleventh International Congress of Anatomy**, Enrique Acosta Vidrio, *Editor-in-Chief*. Published in 3 volumes:
Part A: **Glial and Neuronal Cell Biology**, Sergey Fedoroff, *Editor*
Part B: **Advances in the Morphology of Cells and Tissues**, Miguel A. Galina, *Editor*
Part C: **Biological Rhythms in Structure and Function**, Heinz von Mayersbach, Lawrence E. Scheving, and John E. Pauly, *Editors*
- Vol 60: **Advances in Hemoglobin Analysis**, Samir M. Hanash and George J. Brewer, *Editors*
- Vol 61: **Nutrition and Child Health: Perspectives for the 1980s**, Reginald C. Tsang and Buford Lee Nichols, Jr., *Editors*
- Vol 62: **Pathophysiological Effects of Endotoxins at the Cellular Level**, Jeannine A. Majde and Robert J. Person, *Editors*
- Vol 63: **Membrane Transport and Neuroreceptors**, Dale Oxender, Arthur Blume, Ivan Diamond, and C. Fred Fox, *Editors*
- Vol 64: **Bacteriophage Assembly**, Michael S. DuBow, *Editor*
- Vol 65: **Apheresis: Development, Applications, and Collection Procedures**, C. Harold Mielke, Jr., *Editor*
- Vol 66: **Control of Cellular Division and Development**, Dennis Cunningham, Eugene Goldwasser, James Watson, and C. Fred Fox, *Editors*. Published in 2 Volumes.
- Vol 67: **Nutrition in the 1980s: Constraints on Our Knowledge**, Nancy Selvey and Philip L. White, *Editors*
- Vol 68: **The Role of Peptides and Amino Acids as Neurotransmitters**, J. Barry Lombardini and Alexander D. Kenny, *Editors*
- Vol 69: **Twin Research 3, Proceedings of the Third International Congress on Twin Studies**, Luigi Gedda, Paolo Parisi and Walter E. Nance, *Editors*. Published in 3 Volumes:
Part A: **Twin Biology and Multiple Pregnancy**
Part B: **Intelligence, Personality, and Development**
Part C: **Epidemiological and Clinical Studies**
- Vol 70: **Reproductive Immunology**, Norbert Gleicher, *Editor*
- Vol 71: **Psychopharmacology of Clonidine**, Harbans Lal and Stuart Fielding, *Editors*

See pages 613-614 for previous titles in the series.

Pages 1–472 of this volume are reprinted from the *Journal of Supramolecular Structure*, Volumes 13 and 14, and the *Journal of Supramolecular Structure and Cellular Biochemistry*, Volume 15. The *Journal* is the only appropriate literature citation for the articles printed on these pages. The page numbers in the table of contents, contributors list, and subject index of this volume correspond to the page numbers at the foot of these pages.

The table of contents does not necessarily follow the pattern of the plenary sessions. Instead, it reflects the thrust of the meeting as it evolved from the combination of plenary sessions, poster sessions, and workshops, culminating in the final collection of invited papers, submitted papers, and workshop summaries. The order in which articles appear in this volume does not follow the order of citation in the table of contents. Many of the articles in this volume were published in the *Journal of Supramolecular Structure* (now *Journal of Supramolecular Structure and Cellular Biochemistry*), and they are reprinted here. These articles appear in the order in which they were accepted for publication and then published in the *Journal*. They are followed by papers which were submitted solely for publication in the proceedings.

Contents of Part B

INTRACELLULAR EVENTS IN THE TRIGGERING OF CELL DIVISION AND DEVELOPMENT

Hormonal Regulation of the Adrenocortical Cell / *Gordon N. Gill, Peter J. Hornsby, and Michael H. Simonian*

Total and Exchangeable Calcium in Lymphocytes: Effects of PHA and A23187 / *Andrew H. Lichtman, George B. Segel, and Marshall A. Lichtman*

Specific Protein Phosphorylation During Cyclic AMP-Mediated Morphological Reversion of Transformed Cells / *George S. Bloom and Arthur H. Lockwood*

Interleukin 2 in Cell-Mediated Immune Responses / *Verner Paetkau, Jennifer Shaw, Barry Caplan, Gordon B. Mills, and Kwok-Choy Lee*

Alterations in the Responsiveness of Diabetic Fibroblasts to Insulin / *Mohan K. Raizada and Robert E. Fellows*

Inhibition of Adipose Conversion in 3T3-L2 Cells by Retinoic Acid / *Thomas Murray and Thomas R. Russell*

Induction of an Intracellular Mitogenic Messenger by Epidermal Growth Factor / *Manjusri Das*

Intracellular Events in Growth and Development: Role of Ions as Intracellular Transducers:

Workshop Report / *H. Rubin*

ORGANIZATION AND EXPRESSION OF GENES

Glucocorticoid-Induced Lymphocytolysis: State of the Genetic Analysis / *Suzanne Bourgeois*

Hybrid Ia Antigens: Genetic, Serologic, and Biochemical Analyses / *William P. Lafuse, Shumpei Yokota, and Chella S. David*

Expression of Red Cell Membrane Proteins in Erythroid Precursor Cells / *Peter D. Yurchenco and Heinz Furthmayr*

Restricted Expression of an MHC Alloantigen in Cells of the Erythroid Series: A Specific Marker for Erythroid Differentiation / *B.M. Longenecker and T.R. Mosmann*

In Vitro Maintenance of Differentiation Marker Synthesis by Subpopulations of Mouse Thymocytes / *Ellen Rothenberg and Dennis Triglia*

Effect of Heme on Globin Messenger RNA Synthesis in Spleen Erythroid Cells / *O. Fuchs, P. Ponka, J. Borova, J. Neuwirt, and M. Travnicek*

Neonatal Imprinting and Hepatic Cytochrome P-450 II. Partial Purification of a Sex-Dependent and Neonatally Imprinted Form(s) of Cytochrome P-450 / *Leland W.K. Chung, Mark Colvin, and Haiyen Chao*

The T/t-Complex in the Mouse: Mutations That Impair Differentiation / *Dorothea Bennett*

Definition of the Transcription Unit of the Natural Ovalbumin Gene / *Dennis R. Roop, Sophia Y. Tsai, Ming-Jer Tsai, and Bert W. O'Malley*

Some New Developments in Genetic Analysis of Somatic Mammalian Cells / *Theodore T. Puck*

Regulation of Expression of Genes for Specialized Proteins: Actin, Insulin, Globins: Workshop Report / *G. Stamatoyannopoulos and P.A. Marks*

TUMOR CELL BIOLOGY AND TERATOCARCINOMA

Alterations in Growth Requirements of Kidney Epithelial Cells in Defined Medium Associated With Malignant Transformation / *Mary Taub, Ben U, Lorraine Chuman, Michael J. Rindler, Milton H. Saier, Jr., and Gordon Sato*

Plate-Induced Tumors of BALB / 3T3 Cells Exhibiting Foci of Differentiation Into Pericytes, Chondrocytes, and Fibroblasts / *Charles W. Boone and Robert E. Scott*

H1 Histone and Nucleosome Repeat Length Alterations Associated With the In Vitro Differentiation of Murine Embryonal Carcinoma Cells to Extra-Embryonic Endoderm / *Robert Oshima, Diana Curiel, and Elwood Linney*

The Effects of Laminin on the Growth and Differentiation of Embryonal Carcinoma Cells in Defined Media / *Angie Rizzino, Victor Terranova, David Rohrbach, Craig Crowley, and Heather Rizzino*

Restricted Infectivity of Ecotropic Type C Retroviruses in Mouse Teratocarcinoma Cells: Studies on Viral DNA Intermediates / *Wen K. Yang, Luc d'Auriol, Den-Mei Yang, James O. Kiggans, Jr., Chin-yih Ou, Jorge Périès, and Rodica Emanoil-Ravicovitch*

The Regulation of SV40 Gene Expression in Nonpermissive Cells / *S. Segal and G. Khoury*
 Murine Teratocarcinoma: A Model for Virus-Cell Interaction in a Differentiating Cell System / *Thomas D. Friedrich and John M. Lehman*

CLONAL SELECTION OF CELL POPULATIONS

Promotion of Hematopoietic Stem Cell Differentiation In Vitro by a Soluble Mediator, Allogeneic Effect Factor / *Amnon Altman, Thomas D. Gilmartin, and David H. Katz*
 An In Vitro Assay for T Lymphocyte Progenitors (CFU-preT) / *Bonita R. Acuff and J. John Cohen*

The Role of Cells and Their Products in the Regulation of In Vitro Stem Cell Proliferation and Granulocyte Development / *T.M. Dexter, E. Spooncer, D. Toksoz, and L.G. Lajtha*

Immunoregulation by Thymopoietin / *Gideon Goldstein and Catherine Y. Lau*
 Self-Renewal of Factor-Dependent Hemopoietic Progenitor Cell-Lines Derived From Long-Term Bone Marrow Cultures Demonstrates Significant Mouse Strain Genotypic Variation / *Joel S. Greenberger*

Control of Mouse Myoblast Commitment to Terminal Differentiation by Mitogens / *Thomas A. Linkhart, Christopher H. Clegg, and Stephen D. Hauschka*

H-2 I Alloantigens and Recall of Memory Cytotoxic Responses / *Charles G. Orosz, Stuart Macphail, and Fritz H. Bach*

Enhanced Lymphoid and Decreased Myeloid Reconstituting Ability of Stem Cells From Long-Term Cultures of Mouse Bone Marrow / *R.A. Phillips*

Characterization of Monolayer and Organ Cultures of Cloned and Enriched Lymphohematopoietic Stromal Cell Populations / *R.W. Anderson and J.G. Sharp*

Induction and Long-Term Maintenance of Thy-1 Positive T Lymphocytes: Derivation From Continuous Bone Marrow Cultures / *Gérard Tertian, Yee Pang Yung, and Malcolm A.S. Moore*
 Hemopoietic Stem Cells: Workshop Report / *J. Byron, C.J. Eaves, G.R. Johnson, B. Lord, and H.A. Messner*

Lymphocyte Effector Molecules and Clonal Growth of Lymphoid Cells: Workshop Report / *Steven B. Mizel, Markus Nabholz, and Kendall A. Smith*

IMPROVED CELL CULTURE SYSTEMS

Extracellular Regulation of Fibroblast Multiplication: A Direct Kinetic Approach to Analysis of Role of Low Molecular Weight Nutrients and Serum Growth Factors / *Wallace L. McKeegan and Kerstin A. McKeegan*

Long-Term Maintenance of "Cloned" Human PLT Cells in TCGF With LCL Cells as a Feeder Layer / *Jacquelyn A. Hank, Hiroo Inouye, Lynn A. Guy, Barbara J. Alter, and Fritz H. Bach*
 Culture of Hematopoietic Cells: Workshop Report / *A. Axelrad, A. Burgess, N. Iscove, and G. Wagemaker*

Defined Culture Media for Anchorage-Dependent Cells: Workshop Report / *W.L. McKeegan*

Contributors to Part A

Camille N. Abboud [9]

Department of Medicine, University of Rochester School of Medicine, Rochester, NY 14642

Jan Andersson [579]

Biomedicum, University of Uppsala, Uppsala, Sweden

V. Anselstetter [387]

Department of Inner Medicine III, University of Ulm, Federal Republic of Germany

Kurt Ballmer [219]

Department of Biochemistry, Biocenter of the University of Basel, CH-4056 Basel, Switzerland

David Barnes [167]

Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA 15260

Samuel H. Barondes [29]

Department of Psychiatry, University of California, San Diego, La Jolla, CA 92093 and Veterans Administration Hospital, San Diego, CA 92161

R. Baserga [603]

Temple University, Philadelphia, PA 19140

Teresa K. Battin [339]

Department of Dermatology, University of North Carolina, Chapel Hill, NC 27514

Vann Bennett [339]

Department of Cell Biology and Anatomy, The Johns Hopkins School of Medicine, Baltimore, MD 21205

Eric C. Beyer [29]

Department of Psychiatry, University of California, San Diego, La Jolla, CA 92093 and Veterans Administration Hospital, San Diego, CA 92161

Florence Boegel [265]

Department of Medicine, Montefiore Hospital, University of Pittsburgh School of Medicine, Pittsburgh, PA 15213

Charles W. Boone [592]

National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

Ralph A. Bradshaw [193,549]

Department of Biological Chemistry, Washington University School of Medicine, St. Louis, MO 63110

James K. Brennan [9]

Department of Medicine, University of Rochester School of Medicine, Rochester, NY 14642

Robert F. Brooks [593,603]

Cell Proliferation Laboratory, Imperial Cancer Research Fund Laboratories, London WC2A 3PX, England

The bold face number in brackets following each contributor's name is the opening page number of that contributor's article.

Max M. Burger [219]

Department of Biochemistry, Biocenter of the University of Basel, CH-4056 Basel, Switzerland

Peter G. Burk [153]

Albert Einstein College of Medicine, Montefiore Hospital and Medical Center, Bronx, NY 10467

E.C. Butcher [461]

Laboratory of Experimental Oncology, Stanford University School of Medicine, Stanford, CA 94305

C.E. Butterfield [353]

The Children's Hospital Medical Center, Harvard Medical School, Boston, MA 02114

Darrell H. Carney [119]

Department of Human Biological Chemistry and Genetics, University of Texas Medical Branch, Galveston, TX 77550

Graham Carpenter [557]

Departments of Biochemistry and Medicine (Dermatology), Vanderbilt University School of Medicine, Nashville, TN 37232

Paul V. Cherington [495]

Laboratory of Tumor Biology, Sidney Farber Cancer Institute, and Department of Pharmacology, Harvard Medical School, Boston, MA 02115

Peter R. Clements [523]

Department of Physiological Chemistry, The Johns Hopkins University School of Medicine, Baltimore, MD 21205

Stanley Cohen [557]

Department of Biochemistry, Vanderbilt University School of Medicine, Nashville, TN 37232

Stanley N. Cohen [549]

Departments of Genetics and Medicine, Stanford University School of Medicine, Stanford, CA 94305

Dennis D. Cunningham [373]

Department of Microbiology, College of Medicine, University of California, Irvine, CA 92717

Peter F. Davies [21]

Departments of Pathology, Peter Bent Brigham Hospital and Harvard Medical School, Boston, MA 02115

Joseph E. De Larco [445]

Laboratory of Viral Carcinogenesis, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

John F. DiPersio [9]

Department of Medicine, University of Rochester School of Medicine, Rochester, NY 14642

Hannah Friedman Elson [225]

Department of Biology, University of California, San Diego, La Jolla, CA 92093

A.A. Fauser [365]

Institute of Medical Science, University of Toronto, Toronto, Ontario, Canada M4X 1K9

J. Folkman [353]

The Children's Hospital Medical Center, Harvard Medical School, Boston, MA 02114

C. Fred Fox [283,303]

Molecular Biology Institute, University of California, Los Angeles, CA 90024

Charlotte Fryling [445]

Laboratory of Viral Carcinogenesis, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

Robert C. Gallo [39]

Laboratory for Tumor Cell Biology, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

Steven Gillis [513]

Fred Hutchinson Cancer Research Center, Seattle, WA 98104

Eugene Goldwasser [487]

Department of Biochemistry, University of Chicago, Chicago, IL 60637

Michael G. Goodman [87]

Department of Immunopathology, Scripps Clinic and Research Foundation, La Jolla, CA 92037

D. Gospodarowicz [53]

Cancer Research Institute and the Department of Medicine, University of California Medical Center, San Francisco, CA 94143

Victor B. Hatcher [153]

Albert Einstein College of Medicine, Montefiore Hospital and Medical Center, Bronx, NY 10467

W. Heit [387]

Department of Inner Medicine III, University of Ulm, Federal Republic of Germany

H.R. Herschman [543]

University of California, Los Angeles, CA 90024

Cecilia Hofmann [325]

Department of Biochemistry, University of Chicago, Chicago, IL 60637

N. Hollander [461]

Laboratory of Experimental Oncology, Stanford University School of Medicine, Stanford, CA 94305

Robert W. Holley [1]

Molecular Biology Laboratory, The Salk Institute for Biological Studies, San Diego, CA 92138

Joanne S. Ingwall [225]

Department of Medicine, University of California, San Diego, La Jolla, CA 92093

L. Jerabek [461]

Laboratory of Experimental Oncology, Stanford University School of Medicine, Stanford, CA 94305

Tae H. Ji [325]

Department of Biochemistry, University of Wyoming, Laramie, WY 82071

Patricia A. Johnson [445]

Laboratory of Viral Carcinogenesis, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

G.A. King [241,611]

Division of Biology, City of Hope Research Institute, Duarte, CA 91010

George L. King [411]

Section on Cellular and Molecular Physiology, Diabetes Branch, National Institute of

Arthritis, Metabolism and Digestive Diseases, National Institutes of Health, Bethesda, MD 20205

Lloyd King, Jr. [557]

Department of Medicine (Dermatology), Vanderbilt University School of Medicine, and Veterans Administration Hospital, Nashville, TN 37232

Jan Klein [573]

Abteilung Immungenetik, Max-Planck-Institut für Biologie, 7400 Tübingen, Federal Republic of Germany

R.R. Klevecz [241,611]

Division of Biology, City of Hope Research Institute, Duarte, CA 91010

Daniel J. Knauer [395]

School of Life Sciences, University of Nebraska, Lincoln, NE 68583

Alfred B. Knight [411]

Section on Biochemistry of Cell Regulation, Laboratory of Biochemical Pharmacology, National Institute of Arthritis, Metabolism and Digestive Diseases, National Institutes of Health, Bethesda, MD 20205

B. Kubanek [387]

Department of Transfusion Medicine, University of Ulm, Federal Republic of Germany

Lawrence B. Lachman [109]

Department of Microbiology and Immunology, Duke University Medical Center, Durham, NC 27710

M. Daniel Lane [523]

Department of Physiological Chemistry, The Johns Hopkins University School of Medicine, Baltimore, MD 21205

Waldemar Lernhardt [579]

Basel Institute for Immunology, CH-4058 Basel, Switzerland

Marshall A. Lichtman [9]

Department of Radiation Biology and Biophysics, University of Rochester School of Medicine, Rochester, NY 14642

Peter S. Linsley [283,303]

Molecular Biology Institute, University of California, Los Angeles, CA 90024

Don McClure [167]

Department of Biology, University of California, San Diego, La Jolla, CA 92093

M.S. McGrath [461]

Laboratory of Experimental Oncology, Stanford University School of Medicine, Stanford, CA 94305

Thomas H. Marshall [255]

Laboratory of Viral Carcinogenesis, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

R.G. Martin [141]

National Institutes of Health, Bethesda, MD 20205

Estela E. Medrano [495]

Laboratory of Tumor Biology, Sidney Farber Cancer Institute, and Department of Pharmacology, Harvard Medical School, Boston, MA 02115

Fritz Melchers [579]

Basel Institute for Immunology, CH-4058 Basel, Switzerland

H.A. Messner [365]

Ontario Cancer Institute, Department of Medicine, and Institute of Medical Science,
University of Toronto, Toronto, Ontario, Canada M4X 1K9

Donald Metcalf [473]

Cancer Research Unit, Walter and Eliza Hall Institute of Medical Research, Royal
Melbourne Hospital, Victoria 3050, Australia

Richard S. Metzgar [109]

Department of Microbiology and Immunology, Duke University Medical Center,
Durham, NC 27710

James W. Mier [39]

Laboratory for Tumor Cell Biology, National Cancer Institute, National Institutes of
Health, Bethesda, MD 20205

Bonnie Miller [325]

Department of Biochemistry, University of Chicago, Chicago, IL 60637

Diane Mochizuki [513]

Department of Microbiology, University of California, Irvine, CA 92717

Edward L. Morgan [131,211]

Department of Immunopathology, Scripps Clinic and Research Foundation, La Jolla,
CA 92037

Alan C. Moses [411]

Endocrine Section, Metabolism Branch, National Cancer Institute, National Institutes of
Health, Bethesda, MD 20205

Martin Moss [373]

Department of Microbiology, College of Medicine, University of California, Irvine, CA 92717

S. Peter Nissley [411,507]

Endocrine Section, Metabolism Branch, National Cancer Institute, National Institutes of
Health, Bethesda, MD 20205

Edward J. O'Keefe [339]

Department of Dermatology, University of North Carolina, Chapel Hill, NC 27514

Ellen E. Van Obberghen-Schilling [411]

Section on Biochemistry of Cell Regulation, Laboratory of Biochemical Pharmacology,
National Institute of Arthritis, Metabolism and Digestive Diseases, National Institutes of
Health, Bethesda, MD 20205

Martin S. Oberman [153]

Albert Einstein College of Medicine, Montefiore Hospital and Medical Center, Bronx,
NY 10467

Frances L. Owen [185]

Department of Pathology and Cancer Research Center, Tufts University School of
Medicine, Boston, MA 02111

Stella O. Page [109]

Department of Microbiology and Immunology, Duke University Medical Center,
Durham, NC 27710

A.B. Pardee [495,604]

Laboratory of Tumor Biology, Sidney Farber Cancer Institute, and Department of
Pharmacology, Harvard Medical School, Boston, MA 02115

C.W. Parker [511]

Department of Microbiology, University of California, Irvine, CA 92717

J.F. Perdue [543,569]

Lady Davis Institute for Medical Research, Montreal, Quebec, Canada H3T 1E2

Loren Pickart [99]

Virginia Mason Research Center, Seattle, WA 98101

Giuseppe Pigoli [265]

Department of Medicine, Montefiore Hospital, University of Pittsburgh School of Medicine, Pittsburgh, PA 15213

E. Pillemer [461]

Laboratory of Experimental Oncology, Stanford University School of Medicine, Stanford, CA 94305

W.J. Pledger [141,507]

University of North Carolina, Chapel Hill, NC 27514

U.R. Rapp [255]

Laboratory of Viral Carcinogenesis, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

Matthew M. Rechler [411]

Section on Biochemistry of Cell Regulation, Laboratory of Biochemical Pharmacology, National Institute of Arthritis, Metabolism and Digestive Diseases, National Institutes of Health, Bethesda, MD 20205

Brent C. Reed [523]

Department of Physiological Chemistry, The Johns Hopkins University School of Medicine, Baltimore, MD 21205

I.N. Rich [387]

Department of Transfusion Medicine, University of Ulm, Federal Republic of Germany

D. Rifkin [569]

New York University Medical School, New York, NY 10016

Joyce A. Romanus [411]

Section on Biochemistry of Cell Regulation, Laboratory of Biochemical Pharmacology, National Institute of Arthritis, Metabolism and Digestive Diseases, National Institutes of Health, Bethesda, MD 20205

Russell Ross [503]

University of Washington School of Medicine, Seattle, WA 98195

Thomas F. Roth [315,549]

Department of Biological Sciences, University of Maryland, Baltimore County, Catonsville, MD 21228

R.V. Rouse [461]

Laboratory of Experimental Oncology, Stanford University School of Medicine, Stanford, CA 94305

Jeffrey S. Rubin [193]

Department of Biological Chemistry, Washington University School of Medicine, St. Louis, MO 63110

Francis W. Ruscetti [39]

Laboratory for Tumor Cell Biology, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

Gordon Sato [167]

Department of Biology, University of California, San Diego, La Jolla, CA 92093

N. Savion [53]

Cancer Research Institute and the Department of Medicine, University of California Medical Center, San Francisco, CA 94143

C.D. Scher [141]

Harvard Medical School, Boston, MA 02115

Max H. Schreier [579]

Basel Institute for Immunology, CH-4058 Basel, Switzerland

R.G. Scollay [461]

Laboratory of Experimental Oncology, Stanford University School of Medicine, Stanford, CA 94305

Ginette Serrero [167]

Department of Biology, University of California, San Diego, La Jolla, CA 92093

Richard K. Shaddock [265]

Department of Medicine, Montefiore Hospital, University of Pittsburgh School of Medicine, Pittsburgh, PA 15213

Patricia A. Short [411]

Endocrine Section, Metabolism Branch, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

R.M. Shymko [241,611]

Division of Radiation Oncology, City of Hope Medical Center, Duarte, CA 91010

Gary L. Smith [395]

School of Life Sciences, University of Nebraska, Lincoln, NE 68583

Michael B. Sporn [445]

Laboratory of Chemoprevention, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

Donald F. Steiner [326]

Department of Biochemistry, University of Chicago, Chicago, IL 60637

S.K. Stevens [461]

Laboratory of Experimental Oncology, Stanford University School of Medicine, Stanford, CA 94305

C.D. Stiles [141]

Harvard Medical School, Boston, MA 02115

Marilyn L. Thoman [131]

Department of Immunopathology, Scripps Clinic and Research Foundation, La Jolla, CA 92037

George J. Todaro [445]

Laboratory of Viral Carcinogenesis, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

Grace Tsien [153]

Albert Einstein College of Medicine, Montefiore Hospital and Medical Center, Bronx, NY 10467

R.W. Tucker [141,353,589]

The Johns Hopkins Oncology Center, Baltimore, MD 21205

I. Vlodavsky [53]

Cancer Research Institute and the Department of Medicine, University of California Medical Center, San Francisco, CA 94143

Fred W. Wagner [395]

School of Life Sciences, and Laboratory of Agricultural Biochemistry, University of Nebraska, Lincoln, NE 68583

Abdul Waheed [265]

Department of Medicine, Montefiore Hospital, University of Pittsburgh School of Medicine, Pittsburgh, PA 15213

James Watson [511,513]

Department of Microbiology, University of California, Irvine, CA 92717

William O. Weigle [87,131,211]

Department of Immunopathology, Scripps Clinic and Research Foundation, La Jolla, CA 92037

I.L. Weissman [461]

Laboratory of Experimental Oncology, Stanford University School of Medicine, Stanford, CA 94305

Dorothee Wernet [573]

Abteilung Immungenetik, Max-Planck-Institute für Biologie, 7400 Tübingen, Federal Republic of Germany

Robert M. White [411]

Endocrine Section, Metabolism Branch, National Cancer Institute, National Institutes of Health, Bethesda, MD 20205

Richard Wolfe [167]

Roche Institute of Molecular Biology, Nutley, NJ 07110

John W. Woods [315]

Department of Biological Sciences, University of Maryland Baltimore County, Catonsville, MD 21228

E. Zanjani [387]

Department of Medicine, Veterans Administration Medical Center, University of Minnesota, Minneapolis, MN 55417