Methods in Enzymology

Volume 71

Lipids

Part C

EDITED BY
John M. Lowenstein

Methods in Enzymology

Volume 71

Lipids

Part C

EDITED BY

John M. Lowenstein

DEPARTMENT OF BIOCHEMISTRY BRANDEIS UNIVERSITY WALTHAM, MASSACHUSETTS

1981



ACADEMIC PRESS

A Subsidiary of Harcourt Brace Jovanovich, Publishers

New York London Toronto Sydney San Francisco

COPYRIGHT © 1981, BY ACADEMIC PRESS, INC. ALL RIGHTS RESERVED.

NO PART OF THIS PUBLICATION MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPY, RECORDING, OR ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM THE PUBLISHER.

ACADEMIC PRESS, INC. 111 Fifth Avenue, New York, New York 10003

United Kingdom Edition published by ACADEMIC PRESS, INC. (LONDON) LTD. 24/28 Oval Road, London NW1 7DX

_ibrary of Congress Cataloging in Publication Data Main entry under title:

Lipids.

(Methods in enzymology, v. 14, 35)
Includes bibliographical references.
l. Lipids. I. Lowenstein, John M., Date ed.
II. Series: Methods in enzymology, v. 14 [etc.].
[DNLM: l. Lipids. Wl ME9615K v. 14, etc.]
QP601.M49 vol. 14, etc. 574.19'25s 77-26907
ISBN 0-12-181971-X (v. 71) [574.19'247]

PRINTED IN THE UNITED STATES OF AMERICA

Contributors to Volume 71

Article numbers are in parentheses following the names of contributors.

Affiliations listed are current.

- V. P. AGRAWAL (50), Department of Chemistry, Tribhuvan University, Kirtipur Kathmandu, Nepal
- FAZAL AHMAD (2), Papanicolaou Cancer Research Institute, Miami, Florida 33101
- PATRICIA M. AHMAD (2), Papanicolaou Cancer Research Institute, Miami, Florida 33101
- Bernard Axelrod (53), Department of Biochemistry, Purdue University, West Lafayette, Indiana 47907
- TERRY A. BAKER (55), Lipid Metabolism Laboratory, William S. Middleton Memorial Veterans Hospital, Madison, Wisconsin 53705
- CLINTON E. BALLOU (29), Department of Biochemistry, University of California, Berkeley, California 94720
- C. J. BEDORD (27), Syntex Corporation, 3401 Hillview Avenue, Palo Alto, California 94304
- Per Belfrage (74, 75), Department of Physiological Chemistry, University of Lund, S-220 07 Lund, Sweden
- WILLIAM R. BENSCH (56), Lilly Research Laboratories, Indianapolis, Indiana 46206
- ROLF KRISTIAN BERGE (28), Laboratory of Clinical Biochemistry, University of Bergen, 5016 Haukeland Sykehus, Norway
- BRADLEY BERGER (58), University of Chicago Medical School, Chicago, Illinois 60612
- JOHN T. BERNERT, JR. (30), United States Department of Health, Education and Welfare, Center for Disease Control, Atlanta, Georgia 30333
- L. L. BIEBER (42), Department of Biochemistry, Michigan State University, East Lansing, Michigan 48824

- JUDITH F. BINSTOCK (49), Department of Chemistry, Manhattan College, Riverdale, New York 10471
- HOWARD L. BROCKMAN (72), The Hormel Institute, University of Minnesota, Austin, Minnesota 55912
- J. S. BUCKNER (13), Metabolism and Radiation Research Laboratory, Fargo, North Dakota 58102
- THOMAS M. CHEESBROUGH (53), Department of Biochemistry, Purdue University, West Lafayette, Indiana 47907
- PATRICK C. CHOY (68), Department of Biochemistry, University of Manitoba, Winnipeg, Manitoba R3E OW3, Canada
- PHILIP COHEN (3), Biochemistry Department, Dundee University, Dundee DDI 4HN, Scotland
- ROBERT S. CONWAY (51), Department of Microbiology, Emory University, Atlanta, Georgia 30322
- R. C. COTTRELL (80), The British Industrial Biological Research Association, Carshalton, Surrey SM5 4DS, England
- JOHN E. CRONAN, JR. (18, 21, 41), Department of Microbiology, University of Illinois, Urbana, Illinois 61801
- WILLIAM C. DEAL, JR. (10), Department of Biochemistry, Michigan State University, East Lansing, Michigan 48824
- RAYMOND A. DEEMS (81), Department of Chemistry, University of California, San Diego, La Jolla, California 92093
- EDWARD A. DENNIS (81), Department of Chemistry, University of California, San Diego, La Jolla, California 92093
- RAYMOND DILS (26), Department of Physiology & Biochemistry, University of Reading, Whiteknights, Reading RG6 2AJ, England

- Peter F. Dodds (11), Department of Chemistry, Georgetown University, Washington, D.C. 20057
- Yukio Doi (87), Burnsides Research Laboratory, Department of Food Sciences, University of Illinois, Urbana, Illinois 61801
- WILLIAM DOWHAN (65, 66), Department of Biochemistry and Molecular Biology, University of Texas Medical School, Houston, Texas 77025
- ROGER F. DRONG (36), Lipid Metabolism Laboratory, William S. Middleton Memorial Veterans Hospital, Madison, Wisconsin 53705, and Department of Physiological Chemistry, University of Wisconsin, Madison, Wisconsin 53706
- RICHARD E. DUGAN (55), Lipid Metabolism Laboratory, William S. Middleton Memorial Veterans Hospital, Madison, Wisconsin 53705
- PAUL C. ENGEL (43), Department of Biochemistry, University of Sheffield, Sheffield S10 2TN, England
- MARY LOU ERNST-FONBERG (8, 22), Department of Biochemistry, College of Medicine, East Tennessee State University, Johnson City, Tennessee 37601
- R. RAY FALL (91, 92), Department of Chemistry, University of Colorado, Boulder, Colorado 80309
- MIKAEL FARSTAD (28), Laboratory of Clinical Biochemistry, University of Bergen, 5016 Haukeland Sykehus, Norway
- JIM C. FONG (47), Department of Psychiatry, New York University Medical Center, New York, New York 10016
- RICHARD FRANSON (78), Department of Biochemistry, Medical College of Virginia, Richmond, Virginia 23219
- GUDRUN FREDRIKSON (74), Department of Physiological Chemistry, University of Lund, S-220 07 Lund, Sweden
- EUGENE P. FRENKEL (38), Department of Internal Medicine, Evelyn L. Overton Hematology-Oncology Research Labora-

- tory, University of Texas Health Science Center at Dallas, Southwestern Medical School, Dallas, Texas 75235, and Veterans Administration Medical Center, Dallas, Texas 75216
- Jeanie Frye (78), Life Sciences Division, Meloy Laboratories Inc., 6715 Electronic Drive, Springfield, Virginia 22151
- LINDA L. GALLO (77), Department of Biochemistry, George Washington University, Washington, D.C. 20037
- R. E. GARCIA (88), Department of Biochemistry, University of California, Riverside, California 92521
- SHIMON GATT (60), Laboratory of Neurochemistry, Department of Biochemistry, The Hebrew University-Hadassah Medical School, Jerusalem, Israel
- J. G. GAVILANES (17), Department of Biochemistry, Faculty of Sciences, Complutensis University, Madrid 3, Spain
- JAMES L. GAYLOR (32), Department of Biochemistry, University of Missouri, Columbia, Missouri 65212
- DAVID M. GIBSON (57), Department of Biochemistry, Indiana University School of Medicine, Indianapolis, Indiana 46223
- TAMAR GOLDFLAM (19), Department of Pharmacology, Case Western Reserve University, Cleveland, Ohio 44106
- ALAN G. GOODRIDGE (19), Department of Pharmacology, Case Western Reserve University, Cleveland, Ohio 44106
- HARRY GRIFFIN (78), Agricultural Research Council, Poultry Research Centre, Edinburgh EH9 3JS, Scotland
- MICHAEL J. GRIFFITH (37), Dental Research Center, The University of North Carolina, Chapel Hill, North Carolina 27514
- DENNIS W. GROGAN (18), Department of Microbiology, University of Illinois, Urbana, Illinois 61801
- INGER GRUNNET (26), Institute of Biochemistry, University of Odense, DK-5230 Odense M, Denmark

- PAUL S. GUY (3), Biochemistry Department, Dundee University, Dundee DD1 4HN, Scotland
- CAROLE L. HALL (45, 46), School of Chemistry, Georgia Institute of Technology, Atlanta, Georgia 30332
- D. GRAHAME HARDIE (3), Biochemistry Department, Dundee University, Dundee DD1 4HN, Scotland
- TAKASHI HASHIMOTO (1), Department of Biochemistry, Shinshu University Faculty of Medicine, Asahi, Matsumoto 390, Japan
- EDWARD HAWROT (67), Department of Pharmacology, Yale University School of Medicine, New Haven, Connecticut 06510
- Takashi Hirabayashi (65), Central Research Institute, Suntory Limited, Osaka, Japan
- Kohei Hosaka (39, 40, 61), Department of Biochemistry, Gunma University School of Medicine, Showa-cho, Maebashi 371, Japan
- ANTHONY H. C. HUANG (93), Department of Biology, University of South Carolina, Columbia, South Carolina 29208
- HIROH İKEZAWA (84), Faculty of Pharmaceutical Sciences, Nagoya City University, 3-1 Tanabedori, Mizuhoku, Nagoya 467, Japan
- THOMAS S. INGEBRITSEN (57), Biochemistry Department, Medical Sciences Institute, Dundee University, Dundee DD1 4HN, Scotland
- ROBERT A. JENIK (12), Lipid Metabolism Laboratory, William S. Middleton Memorial Veterans Hospital, Madison, Wisconsin 53705, and the Department of Physiological Chemistry, University of Wisconsin, Madison, Wisconsin 53706
- DEAN P. JONES (32), Department of Biochemistry, Emory University School of Medicine, Atlanta, Georgia 30322
- VASUDEV C. JOSHI (31), Marrs McLean Department of Biochemistry, Baylor College of Medicine, Houston, Texas 77030

- Tatsuyuki Kamiryo (5, 39), Department of Medical Chemistry, Kyoto University Faculty of Medicine, Yoshida, Sakyo-ku, Kyoto 606, Japan
- J. N. KANFER (70, 86), Department of Biochemistry, Faculty of Medicine, University of Manitoba, Winnipeg, Manitoba R3E OW3, Canada
- HIDEO KANOH (62), Department of Biochemistry, Niigata University School of Medicine, Niigata 951, Japan
- SARVAGYA S. KATIYAR (36), Department of Physiological Chemistry, University of Wisconsin, Madison, Wisconsin 53706
- AKIHIKO KAWAGUCHI (15, 16), Institute of Applied Microbiology, The University of Tokyo, Bunkyo-ku, Tokyo 113, Japan
- JOHN C. KHOO (73), Department of Medicine, Division of Metabolic Disease, University of California, San Diego, La Jolla, California 92093
- I. C. Kim (10), Department of Biochemistry, Michigan State University, East Lansing, Michigan 48824
- YU SAM KIM (20), Department of Biochemistry, College of Medicine, Yonsei University, Seoul, Korea
- RICHARD L. KITCHENS (38), Department of Internal Medicine, Evelyn L. Overton Hematology-Oncology Research Laboratory, University of Texas Health Science Center at Dallas, Southwestern Medical School, Dallas, Texas 75235, and Veterans Administration Medical Center, Dallas, Texas 75216
- DON A. KLEINSEK (55), Department of Physiological Chemistry, University of Wisconsin, Madison, Wisconsin 53706
- JENS KNUDSEN (26), Institute of Biochemistry, University of Odense, DK-5230 Odense M, Denmark
- P. E. KOLATTUKUDY (13, 20, 27, 33, 50, 76), Institute of Biological Chemistry and Biochemistry/Biophysics Program, Washington State University, Pullman, Washington 99164

- RUTH KRAMER (79), 51 Park Street, Brookline, Massachusetts 02146
- Soma Kumar (11), Department of Chemistry, Georgetown University, Washington, D.C. 20057
- SIMO LAAKSO (53), Department of Biochemistry, University of Turku, SF-20500 Tyrku 50, Finland
- J. D. LARSON (33), Institute of Biological Chemistry, Washington State University, Pullman, Washington 99164
- TIMOTHY LARSON (66), Fachbereich Biologie, University of Konstonz, Konstonz, Federal Republic of Germany
- EDWARD P. LAU (92), Department of Chemistry, University of Colorado, Boulder, Colorado 80309
- CLIVE LITTLE (83), Institute of Medical Biology, University of Tromso, N-9001 Tromso, Norway
- FRANK A. LORNITZO (36), Lipid Metabolism Laboratory, William S. Middleton Memorial Veterans Hospital, Madison, Wisconsin 53705
- MARTIN G. LOW (85), Department of Biophysics, Medical College of Virginia, Virginia Commonwealth University, Richmond, Virginia 23298
- FEODOR LYNEN* (90), Max-Planck Institut für Biochemie, 8033 Martinsried, Federal Republic of Germany
- Tom McKeon (23, 34), Department of Vegetable Crops, University of California, Davis, California 95616
- I. B. Maiti (76), Department of Microbiology, Sherbrooke University, Sherbrooke, Quebec JIH 5N4, Canada
- Paul Mandel (60), Centre de Neurochimie du CNRS, Université Louis Pasteur, Strasbourg, France
- M. A. K. MARKWELL (42), Molecular Biology Institute, University of California-Los Angeles, Los Angeles, California 90024
 - * Deceased.

- HARUKO MEYER (7), Department of Microbiology, College of Medicine, State University of New York, Upstate Medical Center, Syracuse, New York 13210
- Franz Meyer (7), Department of Microbiology, College of Medicine, State University of New York, Upstate Medical Center, Syracuse, New York 13210
- YOSHINOBU MIKI (61), Department of Medical Chemistry, Kyoto University Faculty of Medicine, Yoshida, Sakyo-ku, Kyoto 606, Japan
- CRAIG MILLER (78), Department of Biochemistry, Bowman Gray School of Medicine, Winston-Salem, North Carolina 27103
- MASAYOSHI MISHINA (5, 39), Department of Medical Chemistry, Kyoto University Faculty of Medicine, Yoshida, Sakyo-ku, Kyoto 606, Japan
- T. MIURA (70), The National Institute for Environmental Studies, Yatabe-machi, Tsukuba-gun, Ibaraki Prefecture, Japan
- T. S. Moore, Jr. (71), Department of Botany, University of Wyoming, Laramie, Wyoming 82071
- ROBERT A. MOREAU (93), Department of Biochemistry and Biophysics, University of California, Davis, California 95616
- SIDNEY M. MORRIS, JR. (19), Department of Pharmacology, Case Western Reserve University, Cleveland, Ohio 44106
- J. B. MUDD (88), Department of Biochemistry, University of California, Riverside, California 92521
- A. M. MUNICIO (17), Department of Biochemistry, Faculty of Sciences, Complutensis University, Madrid 3, Spain
- SHIGETADA NAKANISHI (1), Department of Medical Chemistry, Kyoto University Faculty of Medicine, Yoshida, Sakyo-ku, Kyoto 606, Japan
- NENAD M. NESKOVIC (60), Centre de Neurochimie du CNRS, Université Louis Pasteur, Strasbourg, France

- GARY NEUDAHL (10), Department of Biochemistry, Michigan State University, East Lansing, Michigan 48824
- NIELS C. NIELSEN (6), USDA-SEA, Agronomy Department, Purdue University, West Lafayette, Indiana 47907
- JUN-ICHI NIKAWA (1), Department of Biochemistry, Gunma University School of Medicine, Showa-cho, Maebashi 371, Japan
- NILS ÖSTEN NILSSON (74), Department of Physiological Chemistry, University of Lund, S-220 07 Lund, Sweden
- SUKANYA NIMMANNIT (54), Department of Biochemistry, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok 5, Thailand
- Toshiro Nishida (87), Burnsides Research Laboratory, Department of Food Science, University of Illinois, Urbana, Illinois 61801
- JONATHAN S. NISHIMURA (37), Department of Biochemistry, The University of Texas Health Science Center at San Antonio, San Antonio, Texas 78284
- SHOSAKU NUMA (1, 5, 39, 40, 61, 64), Department of Medical Chemistry, Kyoto University Faculty of Medicine, Yoshida, Sakyo-ku, Kyoto 606, Japan
- HIDEO OGIWARA (1), Department of Biochemistry, Gunma University School of Medicine, Showa-cho, Maebashi 371, Japan
- KIMIYOSHI OHNO (62), Department of Biochemistry, Sapporo Medical College, Chuo-Ku, West-17, South-1, Sapporo 060, Japan
- A. Ohsaka (82), The Second Department of Bacteriology, National Institute of Health, 10-35 Kamiosaki-2-Chome, Shinagawaku, Tokyo 141, Japan
- SHIGENOBU OKUDA (15, 16), Institute of Applied Microbiology, The University of Tokyo, Bunkyo-ku, Tokyo 113, Japan

- SATOSHI ŌMURA (15), School of Pharmaceutical Science, Kitasato University, Minato-ku, Tokyo 108, Japan
- STEVEN D. PELECH (68), Department of Biochemistry, University of British Columbia, Vancouver, British Columbia V6T 1W5, Canada
- DAVID O. PETERSON (14), Department of Biochemistry and Biophysics, University of California, San Francisco, California 94143
- REGINA PIETRUSZKO (89), Center of Alcohol Studies and Department of Biochemistry, Rutgers University, New Brunswick, New Jersey 08903
- MICHAEL R. POLLARD (35), Biochemistry Department, Dundee University, Dundee DDI 4HN, Scotland
- JOHN W. PORTER (12, 36, 54, 55), Lipid Metabolism Laboratory, William S. Middleton Memorial Veterans Hospital, Madison, Wisconsin 53705, and the Department of Physiological Chemistry, University of Wisconsin, Madison, Wisconsin 53706
- A. J. POULOSE (13, 20, 27), Institute of Biological Chemistry, Washington State University, Pullman, Washington 99164
- M. RENUKA PRASAD (31), Department of Biological Chemistry, University of Illinois Medical Center, Chicago, Illinois 60612
- R. E. Purdy (76), Environmental Sciences, Chesapeake Bay Program, 2083 West Street, Annapolis, Maryland 21401
- NILOFER QURESHI (54), Mycobacteriology Laboratory, William S. Middleton Memorial Veterans Hospital, Madison, Wisconsin 53705, and the Institute for Enzyme Research, University of Wisconsin, Madison, Wisconsin 53706
- R. HANUMANTHA RAO (78), Department of Chemistry, Rust College, Holly Springs, Mississippi 38635
- SAMUEL M. RAPOPORT (52), Institut für Physiologische und Biologische Chemie, Humboldt Universität, DDR-1040 Berlin, German Democratic Republic

- CHARLES O. ROCK (21, 41), Department of Biochemistry, St. Jude Children's Research Hospital, Memphis, Tennessee 38101
- VICTOR W. RODWELL (56), Department of Biochemistry, Purdue University, West Lafayette, Indiana 47907
- LINDA ROGERS (27, 33), Institute of Biological Chemistry, Washington State University, Pullman, Washington 99164
- Daniel A. K. Roncari (9), Institute of Medical Science and Department of Medicine, Toronto Western Hospital, University of Toronto, Toronto M5S 1A8, Canada
- TANKRED SCHEWE (52), Institut für Physiologische und Biologische Chemie, Humboldt Universität, DDR-1040 Berlin, German Democratic Republic
- ULRICH SCHIELE (90), Hormon Chemie München GmbH, 8 Munich 45, Federal Republic of Germany
- WOLFGANG J. SCHNEIDER (69), Department of Molecular Genetics, University of Texas Health Science Center, Dallas, Texas 75235
- ANN W. SCHONGALLA (22), College of Medicine, Cornell University, New York, New York 10021
- Horst Schulz (47, 48, 49), Department of Chemistry, City College of the City University of New York, New York, New York 10031
- Yousuke Seyama (16), Department of Biochemistry, Faculty of Medicine, The University of Tokyo, Bunkyo-ku, Tokyo 113, Japan
- Patricia Sisson (78), Department of Biochemistry, Bowman Gray School of Medicine, Winston-Salem, North Carolina 27103
- STUART SMITH (24, 25), Bruce Lyon Memorial Research Laboratory, Children's Hospital Medical Center of Northern California, Oakland, California 94609
- MARTIN D. SNIDER (63), Center for Cancer Research and Department of Biology,

- Massachusetts Institute of Technology, Cambridge, Massachusetts 02139
- HOWARD SPRECHER (30), Department of Physiological Chemistry, Ohio State University, Columbus, Ohio 43210
- K. SREEKRISHNA (31), Department of Biochemistry, University of Kentucky College of Medicine, Lexington, Kentucky 40506
- HAROLD STAACK (48), American Minitor Company, Indianapolis, Indiana 46268
- Daniel Steinberg (73), Department of Medicine, Division of Metabolic Disease, University of California, San Diego, La Jolla, California 92093
- PETER STRÅLFORS (74), Department of Physiological Chemistry, University of Lund, S-220 07 Lund, Sweden
- PAUL K. STUMPF (23, 34), Department of Biochemistry and Biophysics; University of California, Davis, California 95616
- T. Sugahara (82), The Second Department of Bacteriology, National Institute of Health, 10-35 Kamiosaki-2-Chome, Shinagawa-ku, Tokyo 141, Japan
- MANFRED SUMPER (4), Institut für Biochemie, Genetik und Mikrobiologie, Lehrstuhl Biochemie, Universität Regensburg, 8400 Regensburg, Federal Republic of Germany
- Ryo Taguchi (84), Faculty of Pharmaceutical Sciences, Nagoya City University, 3-1 Tanabedori, Mizuhoku, Nagoya 467, Japan
- T. Takahashi (82), Department of Microbiology, Hoshi College of Pharmacy, Ebara-2-Chome, Shinagawa-ku, Tokyo 142, Japan
- T. Taki (70, 86), Department of Biochemistry, Shizuoka College of Pharmacy, 2-2-1, Oshika, Shizuoka-Shi 422, Japan
- TADASHI TANABE (1), Department of Biochemistry, National Cardiovascular Center Research Institute, Fujishiro-dai, Suita 565, Japan

- TAKAO TANAKA (40), Third Division, Department of Internal Medicine, Osaka Medical College, Daigaku-cho, Takatsuki 569, Japan
- FREDERICK R. TAYLOR (18), Department of Microbiology, Oregon State University, Corvallis, Oregon 97331
- COLIN THORPE (44), Department of Chemistry, University of Delaware, Newark, Delaware 19711
- HIROSHI TOMODA (15), Institute of Applied Microbiology, The University of Tokyo, Bunkyo-ku, Tokyo 113, Japan
- HANS TORNQVIST (75), Department of Clinical Chemistry, University of Lund, Malmö General Hospital, S-214 01 Malmö, Sweden
- DENNIS E. VANCE (68, 69), Department of Biochemistry, University of British Columbia, Vancouver, British Columbia V6T, 1W5, Canada
- H. VAN DEN BOSCH (59), Laboratory of Biochemistry, State University of Utrecht, 3508 TB Utrecht, The Netherlands
- G. P. H. VAN HEUSDEN (59), Laboratory of Biochemistry, State University of Utrecht, 3508 TB Utrecht, The Netherlands
- G. M. VIANEN (59), Laboratory of Biochemistry, State University of Utrecht, 3508 TB Utrecht, The Netherlands
- Moseley Waite (78), Department of Biochemistry, Bowman Gray School of Medicine, Winston-Salem, North Carolina 27103
- THERESA A. WALKER (22), Department of Biology, Yale University, New Haven, Connecticut 06520

- ROBERT M. WATERSON (51), Department of Microbiology, Emory University, Atlanta, Georgia 30322
- RAINER WIESNER (52), Institut für Physiologische und Biologische Chemie, Humboldt Universität, DDR-1040 Berlin, German Democratic Republic
- JACK S. WOLPERT (8), Department of Biochemistry, College of Medicine, East Tennessee State University, Johnson City, Tennessee 37601
- WILLIAM I. WOOD (14), Laboratory of Molecular Biology, National Institute of Arthritis, Metabolism and Digestive Diseases, National Institutes of Health, Bethesda, Maryland 20205
- KENICHI K. YABUSAKI (29), Hana Biologics Inc., 1400 53rd Street, Emeryville, California 94608
- TAMIO YAMAKAWA (16), Department of Biochemistry, Faculty of Medicine, The University of Tokyo, Bunkyo-ku, Tokyo 113, Japan
- SATOSHI YAMASHITA (61, 64), Department of Biochemistry, Gunma University School of Medicine, Showa-cho, Maebashi 371, Japan
- TAKASHI YONETANI (89), Department of Biochemistry and Biophysics, University of Pennsylvania, Philadelphia, Pennsylvania 19174
- NANCY L. YOUNG (58), Department of Medicine, Cornell University Medical College, New York, New York 10021
- PETER ZAHLER (79), Institute of Biochemistry, University of Berne, 3012 Berne, Switzerland

Preface

Let me haue men about me, that are fat Sleek-headed men, and such as sleep a'nights Julius Caesar Act I, Scene II*

Fat people are no longer the preferred stereotype of placidity and health, and sleep is a somewhat overestimated commodity. Fat books, on the other hand, proliferate. A single volume was planned originally to cover recent developments in the biochemistry of lipids. It would have been too obese for comfort, so it was decided to divide the book into two volumes. If only obesity could be controlled so easily in the real world!

Volume 71 deals with enzymes while Volume 72 covers methods useful to the lipid biochemist. Each section starts with a list of related articles previously published in the *Methods in Enzymology* series. In general, the enzymes included have been purified highly. A notable exception are enzymes of lipid metabolism from plants, a number of which are included even though they have only been purified partially. It is hoped that their inclusion will provide a stimulus to their isolation in homogeneous form.

The borderline between fatty acid and sterol metabolism has been set at β -hydroxy- β -methylglutaryl-CoA. The inclusion of some enzymes may strike the reader as odd, but there was in each case good reason. For example, 3-methylcrotonyl-CoA carboxylase is included because of its relation to acetyl-CoA carboxylase and its ability to carboxylate free biotin, a valuable property for understanding acetyl-CoA carboxylase.

I welcome suggestions for future volumes. Please do not hesitate to draw my attention to errors of omission or commission.

JOHN M. LOWENSTEIN

^{*} H. M. Furness, Jr. (ed.). (1913). J. B. Lippincott Co., Philadelphia and London, p. 45.

METHODS IN ENZYMOLOGY

EDITED BY

Sidney P. Colowick and Nathan O. Kaplan

VANDERBILT UNIVERSITY
SCHOOL OF MEDICINE
NASHVILLE, TENNESSEE

DEPARTMENT OF CHEMISTRY UNIVERSITY OF CALIFORNIA AT SAN DIEGO LA JOLLA, CALIFORNIA

- I. Preparation and Assay of Enzymes
- II. Preparation and Assay of Enzymes
- III. Preparation and Assay of Substrates
- IV. Special Techniques for the Enzymologist
- V. Preparation and Assay of Enzymes
- VI. Preparation and Assay of Enzymes (Continued)
 Preparation and Assay of Substrates
 Special Techniques
- VII. Cumulative Subject Index

METHODS IN ENZYMOLOGY

EDITORS-IN-CHIEF

Sidney P. Colowick Nathan O. Kaplan

VOLUME VIII. Complex Carbohydrates

Edited by ELIZABETH F. NEUFELD AND VICTOR GINSBURG

VOLUME IX. Carbohydrate Metabolism *Edited by WILLIS A. WOOD*

VOLUME X. Oxidation and Phosphorylation

Edited by RONALD W. ESTABROOK AND MAYNARD E. PULLMAN

VOLUME XI. Enzyme Structure Edited by C. H. W. HIRS

VOLUME XII. Nucleic Acids (Parts A and B)

Edited by LAWRENCE GROSSMAN AND KIVIE MOLDAVE

VOLUME XIII. Citric Acid Cycle Edited by J. M. LOWENSTEIN

VOLUME XIV. Lipids

Edited by J. M. LOWENSTEIN

VOLUME XV. Steroids and Terpenoids

Edited by RAYMOND B. CLAYTON

VOLUME XVI. Fast Reactions

Edited by Kenneth Kustin

VOLUME XVII. Metabolism of Amino Acids and Amines (Parts A and B) Edited by Herbert Tabor and Celia White Tabor

VOLUME XVIII. Vitamins and Coenzymes (Parts A, B, and C)

Edited by Donald B. McCormick and Lemuel D. Wright

VOLUME XIX. Proteolytic Enzymes

Edited by Gertrude E. Perlmann and Laszlo Lorand

VOLUME XX. Nucleic Acids and Protein Synthesis (Part C) Edited by KIVIE MOLDAVE AND LAWRENCE GROSSMAN

VOLUME XXI. Nucleic Acids (Part D)

Edited by LAWRENCE GROSSMAN AND KIVIE MOLDAVE

VOLUME XXII. Enzyme Purification and Related Techniques Edited by WILLIAM B. JAKOBY

VOLUME XXIII. Photosynthesis (Part A) Edited by ANTHONY SAN PIETRO

VOLUME XXIV. Photosynthesis and Nitrogen Fixation (Part B) Edited by Anthony San Pietro

VOLUME XXV. Enzyme Structure (Part B) Edited by C. H. W. HIRS AND SERGE N. TIMASHEFF

VOLUME XXVI. Enzyme Structure (Part C) Edited by C. H. W. HIRS AND SERGE N. TIMASHEFF

VOLUME XXVII. Enzyme Structure (Part D)

Edited by C. H. W. HIRS AND SERGE N. TIMASHEFF

VOLUME XXVIII. Complex Carbohydrates (Part B) Edited by VICTOR GINSBURG

VOLUME XXIX. Nucleic Acids and Protein Synthesis (Part E) Edited by LAWRENCE GROSSMAN AND KIVIE MOLDAVE

VOLUME XXX. Nucleic Acids and Protein Synthesis (Part F) Edited by KIVIE MOLDAVE AND LAWRENCE GROSSMAN

VOLUME XXXI. Biomembranes (Part A)

Edited by Sidney Fleischer and Lester Packer

VOLUME XXXII. Biomembranes (Part B)

Edited by Sidney Fleischer and Lester Packer

VOLUME XXXIII. Cumulative Subject Index Volumes I-XXX Edited by Martha G. Dennis and Edward A. Dennis

VOLUME XXXIV. Affinity Techniques (Enzyme Purification: Part B) Edited by WILLIAM B. JAKOBY AND MEIR WILCHEK

VOLUME XXXV. Lipids (Part B) Edited by JOHN M. LOWENSTEIN

VOLUME XXXVI. Hormone Action (Part A: Steroid Hormones) Edited by BERT W. O'MALLEY AND JOEL G. HARDMAN

VOLUME XXXVII. Hormone Action (Part B: Peptide Hormones) Edited by BERT W. O'MALLEY AND JOEL G. HARDMAN

VOLUME XXXVIII. Hormone Action (Part C: Cyclic Nucleotides) Edited by JOEL G. HARDMAN AND BERT W. O'MALLEY

VOLUME XXXIX. Hormone Action (Part D: Isolated Cells, Tissues, and Organ Systems)

Edited by Joel G. Hardman and Bert W. O'Malley

VOLUME XL. Hormone Action (Part E: Nuclear Structure and Function) Edited by BERT W. O'MALLEY AND JOEL G. HARDMAN

VOLUME XLI. Carbohydrate Metabolism (Part B) Edited by W. A. WOOD

VOLUME XLII. Carbohydrate Metabolism (Part C) Edited by W. A. WOOD

VOLUME XLIII. Antibiotics Edited by JOHN H. HASH

VOLUME XLIV. Immobilized Enzymes Edited by Klaus Mosbach

VOLUME XLV. Proteolytic Enzymes (Part B) Edited by LASZLO LORAND

VOLUME XLVI. Affinity Labeling Edited by WILLIAM B. JAKOBY AND MEIR WILCHEK

VOLUME XLVII. Enzyme Structure (Part E)

Edited by C. H. W. HIRS AND SERGE N. TIMASHEFF

VOLUME XLVIII. Enzyme Structure (Part F)
Edited by C. H. W. HIRS AND SERGE N. TIMASHEFF

VOLUME XLIX. Enzyme Structure (Part G)

Edited by C. H. W. HIRS AND SERGE N. TIMASHEFF

VOLUME L. Complex Carbohydrates (Part C) Edited by VICTOR GINSBURG

VOLUME LI. Purine and Pyrimidine Nucleotide Metabolism Edited by PATRICIA A. HOFFEE AND MARY ELLEN JONES

VOLUME LII. Biomembranes (Part C: Biological Oxidations)

Edited by Sidney Fleischer and Lester Packer

VOLUME LIII. Biomembranes (Part D: Biological Oxidations)

Edited by SIDNEY FLEISCHER AND LESTER PACKER

VOLUME LIV. Biomembranes (Part E: Biological Oxidations)

Edited by Sidney Fleischer and Lester Packer

VOLUME LV. Biomembranes (Part F: Bioenergetics) Edited by SIDNEY FLEISCHER AND LESTER PACKER

VOLUME LVI. Biomembranes (Part G: Bioenergetics)

Edited by SIDNEY FLEISCHER AND LESTER PACKER

VOLUME LVII. Bioluminescence and Chemiluminescence Edited by MARLENE A. DELUCA

VOLUME LVIII. Cell Culture

Edited by WILLIAM B. JAKOBY AND IRA H. PASTAN

VOLUME LIX. Nucleic Acids and Protein Synthesis (Part G): Edited by KIVIE MOLDAVE AND LAWRENCE GROSSMAN

VOLUME LX. Nucleic Acids and Protein Synthesis (Part H)

Edited by KIVIE MOLDAVE AND LAWRENCE GROSSMAN

VOLUME 61. Enzyme Structure (Part H)

Edited by C. H. W. HIRS AND SERGE N. TIMASHEFF

VOLUME 62. Vitamins and Coenzymes (Part D)

Edited by DONALD B. McCormick and Lemuel D. Wright

VOLUME 63. Enzyme Kinetics and Mechanisms (Part A: Initial Rate and Inhibitor Methods)

Edited by Daniel L. Purich

VOLUME 64. Enzyme Kinetics and Mechanisms (Part B: Isotopic Probes and Complex Enzyme Systems)

Edited by DANIEL L. PURICH

VOLUME 65. Nucleic Acids (Part I)

Edited by LAWRENCE GROSSMAN AND KIVIE MOLDAVE

VOLUME 66. Vitamins and Coenzymes (Part E)

Edited by DONALD B. McCormick and Lemuel D. Wright

VOLUME 67. Vitamins and Coenzymes (Part F)

Edited by DONALD B. McCormick and Lemuel D. Wright

VOLUME 68. Recombinant DNA Edited by RAY WU

VOLUME 69. Photosynthesis and Nitrogen Fixation (Part C) Edited by ANTHONY SAN PIETRO

VOLUME 70. Immunochemical Techniques (Part A)

Edited by Helen Van Vunakis and John J. Langone

VOLUME 71. Lipids (Part C) Edited by JOHN M. LOWENSTEIN

VOLUME 72. Lipids (Part D) (in preparation) Edited by JOHN M. LOWENSTEIN

VOLUME 73. Immunochemical Techniques (Part B) (in preparation) Edited by JOHN J. LANGONE AND HELEN VAN VUNAKIS

此为试读,需要完整PDF请访问: www.ertongbook.com