

ADVANCES IN ENZYMOLOGY
AND RELATED AREAS OF MOLECULAR BIOLOGY

Founded by F. F. NORD

Edited by ALTON MEISTER

VOLUME 50

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**CORNELL UNIVERSITY MEDICAL COLLEGE
NEW YORK, NEW YORK**

VOLUME 50

1979

AN INTERSCIENCE® PUBLICATION

JOHN WILEY & SONS
New York • Chichester • Brisbane • Toronto

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Library of Congress Catalogue Card Number: 41-9213

ISBN 0-471-05309-0

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

PREFACE TO VOLUME 50

It seems appropriate to comment on the publication of the fiftieth volume in this series. The first volume of *Advances in Enzymology* appeared in 1941 under the editorship of Friedrich F. Nörd, who transplanted its predecessor, *Ergebnisse der Enzymforschung* (first published in 1932 in Leipzig) to the United States. This series has flourished since its inception; it has been fortunate in obtaining outstanding chapters by eminent authors, and the volumes have been warmly received by its readers. The study of enzymes has indeed been a moving force in the growth of biological knowledge, and enzymology continues to serve crucially in a broad range of disciplines.

It is perhaps instructive and certainly interesting to review the contents of the earlier volumes of *Advances in Enzymology*, which are given at the beginning of this volume. Even a brief inspection of the titles and authors gives one some feeling about the history and extraordinary development of biochemistry. The authors have included many of the pioneers in biochemistry and enzymology, and the chapters cover a broad range of topics. With the tremendous increase in scientific activity in recent years and the accompanying burgeoning scientific literature, many scientists and students have depended on authoritative and informative reviews to achieve a coherent picture of a particular field. *Advances in Enzymology* has provided a number of comprehensive reviews that serve this purpose and also has endeavored to provide chapters by outstanding scientists that emphasize their own thinking and accomplishments and thus serve as models of scientific exploration.

I wish to express my thanks and appreciation to those who have contributed chapters. It is gratifying to find that *Advances in Enzymology* continues to be widely read throughout the world; indeed, more than half of the copies are distributed outside the United States and the authorship of the chapters continues to be international. I also wish to express my appreciation to the publisher for continued encouragement and advice.

ALTON MEISTER

New York, New York
April 1979

ADVANCES IN ENZYMOLOGY
A LIST OF THE CHAPTERS THAT HAVE
APPEARED IN VOLUMES 1-50
(1941-1979)

VOLUME 1

1941

Protein Structure
 Physikalisch-chemische Gesichtspunkte zum Problem
 der Virusaktivität
 The Specificity of Proteinases
 Metabolic Generation and Utilization of Phosphate
 Bond Energy
 The Chemical Nature of Catalase
 Enzymes and Trace Substances
 Photosynthesis, Facts and Interpretations
 The Bacterial Photosyntheses and Their Importance
 for the General Problem of Photosynthesis
 Untersuchung enzymatischer Prozesse in der lebenden
 Pflanze
 Die Verdauung bei den niederen Vertebraten

Henry B. Bull
Luise Holzapfel
Max Bergmann
and Joseph S. Fruton

Fritz Lipmann
James B. Sumner
D. E. Green
J. Franck and H. Gaffron

C. B. Van Niel

A. L. Kurssanov
H. J. Vonk

VOLUME 2

1942

Bacterial Viruses (Bacteriophages)
 The Kinetics of Hydrolytic Enzymes and Their
 Bearing on Methods for Measuring Enzyme
 Activity
 A Classification of Proteolytic Enzymes
 The Enzymatic Properties of Peptidases

 Diamin-Oxydase
 The Chemistry of Tea-Fermentation
 Heterotrophic Assimilation of Carbon Dioxide

Max Delbrück

Donald D. Van Slyke
Max Bergmann
Marvin J. Johnson
and Julius Berger
E. Albert Zeller
E. A. Houghion Roberts
C. H. Werkman
and H. G. Wood

Atmung Gärung und die sich daran beteiligenden
Enzyme von *Aspergillus*

Cellulose Decomposition by Microorganisms

A Unified Hypothesis of the Reciprocal Integration of
Carbohydrate and Fat Catabolism

Vitamin K, Its Chemistry and Physiology

The Adrenal Cortical Hormones

Hiroshi Tamiya

*A. G. Norman
and W. H. Fuller*

Edgar J. Witzemann

Henrik Dam

J. J. Pfaffner

VOLUME 3

1943

Chromosomes and Nucleoproteins

Effects of Temperature on Enzyme Kinetics

X-Rays and the Stoichiometry of the Proteins

The Chemistry of Glycogen

Verdoperoxidase

Mechanisms of Carbohydrate Metabolism. An Essay
on Comparative Biochemistry

The Intermediary Stages in the Biological Oxidation of
Carbohydrate

The Chemistry and Biochemistry of Pantothenic Acid

The Chemistry and Biochemistry of Biotin

Recent Progress in Tumor Enzymology

The Role of Microorganisms and Enzymes in Wine
Making

A. E. Mirsky

Irwin W. Sizer

W. T. Astbury

Kurt H. Meyer

Kjell Agner

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H. A. Krebs

Roger J. Williams

Klaus Hofmann

Jesse P. Greenstein

W. V. Cruess

VOLUME 4

1944

The Chemical Formulation of Gene Structure and
Gene Action

Specificity, Classification, and Mechanism of Action of
the Glycosidases

The Transamination Reaction

Tyrosinase

Gramicidin, Tyrocidine, and Tyrothricin

Biological Energy Transformations and the Cancer
Problem

The Influence of Hormones on Enzymatic Reactions

Addison Gulick

William Ward Pigman

Robert M. Herbst

J. M. Nelson

and C. R. Dawson

Rollin D. Hotchkiss

V. R. Potter

H. Jensen and

Leon E. Tenenbaum

The Absorption Spectra of Vitamins, Hormones, and
Enzymes

Wallace R. Brode

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1945

Physical and Chemical Properties of Tomato Bushy
Stunt Virus and the Strains of Tobacco Mosaic
Virus

N. W. Pirie

The Coagulation of Blood

Erwin Chargaff

The Amino Acid Decarboxylases of Mammalian
Tissue

H. Blaschko

Alcoholic Fermentation of the Oligosaccharides
Pyruvate Metabolism

J. Leibowitz and S. Hestrin

Recent Progress in the Biochemistry of Fusaria

Elmer Stoltz

F. F. Nord

and Robert P. Mull

Enzymatic Reactions Involving Nicotinamide and Its
Related Compounds

F. Schlenk

Some Enzyme Reactions on Sulfur Compounds

C. V. Smythe

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1946

The Bacterial Amino Acid Decarboxylases

Ernest F. Gale

Enzyme Problems in Relation to Chemotherapy,
"Adaptation," Mutations, Resistance, and
Immunity

M. G. Sevag

Biological Antagonisms between Structurally Related
Compounds

D. W. Woolley

Adenosinetriphosphatase Properties of Myosin

V. A. Engelhardt

States of Altered Metabolism in Diseases of Muscle
Acetyl Phosphate

Charles L. Hoagland

Microbial Assimilations

Fritz Lipmann

Chemical Changes in the Harvested Tobacco Leaf.

C. E. Clifton

Part I. Chemical and Enzymic Conversions during
the Curing Process

The Actions of the Amylases

Walter G. Frankenburg

The Amylases of Wheat and Their Significance in
Milling and Baking Technology

R.H. Hopkins

Tocopherol Interrelationships

W. F. Geddes

K. C. D. Hickman

and P. L. Harris

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1947

Permeability and Enzyme Reactions
 The Properties of Protoplasm with Special Reference
 to the Influence of Enzymic Reactions
 Recent Views on Asymmetric Synthesis and Related
 Processes
 Some Applications of Radioactive Indicators in
 Turnover Studies
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 Interrelations in Microorganisms between Growth and
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 Antibacterial Substances from Fungi and Green Plants
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 Recent Progress in Industrial Fermentation

*S. C. Brooks**William Seifriz**Patrick D. Ritchie**G. Hevesy**Hugo Theorell**S. Granick and H. Gilder**Claude Fromageot**Henry McIlwain**Frederick Kavanagh**Otto Schales**F. M. Hildebrandt*

VOLUME 8

1948

Functioning of the Cytoplasm
 Quantitative Studies on Complement
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 Antifatty-Liver Factor of the Pancreas—Present Status
 Alkaloid Biogenesis
 Certain Aspects of the Microbiological Degradation of
 Cellulose
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*Ludwik Monné**Michael Heidelberger
and Manfred M. Mayer**Jesse P. Greenstein**I. L. Chaikoff
and C. Entenman**Ray F. Dawson**F. F. Nord and J. C. Vitucci**A. Kleinzeller**F. L. Breusch**Sune Bergström
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VOLUME 9

1949

Some Aspects of Reversible Step Reactions
 Kinetics of Biological Reactions with Special Reference
 to Enzymic Processes
 Photochemistry of Enzymes, Proteins, and Viruses
 The Nature of Viruses

 The Mechanism of Fertilization in Metazoa
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 Nitrogen Metabolism of Higher Plants
 Chemistry and Enzymology of Nucleic Acids
 Pathways of Acid Formation in *Aspergillus niger* and
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 Principles of Enzymic Histo- and Cytochemistry
 Enzyme Activity in Frozen Vegetable Tissue
 Industrial Biosyntheses. Part I. Fats

*L. Michaelis**A. E. Stearn**A. Douglas McLaren**Max A. Lauffer W. C. Price
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1950

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 Tryptophanase-Tryptophan Reaction
 Phosphatase Alcaline

 Synthesis of Disaccharides with Bacterial Enzymes

 Some Aspects of Streptomycin and Other *Streptomyces*
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 Probleme des Citronensäurecyklus
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*Tage Astrup**Frank C. Happold**Jean Roche et**Nguyen-Van Thoi**W. Z. Hassid**and M. Doudoroff**Norman G. Brink**and Karl Folkers**C. Martius und F. Lynen**Theodor Bersin**Walter G. Frankenburg**Claude E. Zobell*

VOLUME 11

1951

The Nature of Entropy and Its Role in Biochemical Processes

Herbert Gutfreund

Reactions at Interfaces in Relation to Biological Problems

*J. F. Danielli
and J. T. Davies*

Chlorophyll Fluorescence and Photosynthesis

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E. S. Guzman Barron

Pectic Enzymes

*Hans Lineweaver and
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Enzymic Synthesis of Polysaccharides: A Biological Type of Polymerization

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The Biological Transformations of Starch

Stanley Peat

Chemical Investigations on Alliin, the Specific Principle of Garlic

*Arthur Stoll
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Some Problems of Pathological Wilting in Plants

Ernst Gäumann

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1951

Oxidoreduction in Chloroplasts

Robert Hill

Mechanisms of Fixation of Carbon Dioxide by Heterotrophs and Autotrophs

*Merton F. Utter and
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Enzyme-Substrate Compounds

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The Specificity of Certain Peptidases

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The Enzymic Hydrolysis and Synthesis of Acetylcholine

*David Nachmansohn
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The Present Status of Starch Chemistry

*Kurt H. Meyer
and G. C. Gibbons*

Enzymes of Starch Degradation and Synthesis

Peter Bernfeld

Biological Methylation

Frederick Challenger

Reaction of Borate with Substances of Biological Interest

Charles A. Zittle

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1953

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 Pantethine and Related Forms of the *Lactobacillus
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 Metabolism of Phenylalanine and Tyrosine
 Oxidation of Proteins by Tyrosinase and Peroxidase
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1954

The Mechanism of Enzymic Oxidoreduction
 Thermodynamique des Réactions Immunologiques
 Chemistry, Metabolism, and Scope of Action of the
 Pyridine Nucleotide Coenzymes

Alternate Pathways of Glucose and Fructose
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1955

The Structure of Coenzyme A
 Coagulation of the Blood
 Comparative Biochemistry of the Phenolase Complex
 Transamination
 Intermediates in Amino Acid Biosynthesis
 Structural and Functional Aspects of Myosin
 Beta-Glucuronidase
 The Chemistry of the Cell Nucleus

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1956

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 The Respiratory Chain and Oxidative
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Nature and Function of Metalloflavoproteins

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Metabolic Aspects of Chemical Genetics

Ribonucleic Acids and Virus Multiplication

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1957

Cytochrome in Higher Plants

Newer Knowledge of Succinic Dehydrogenase

*E. F. Hartree
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Mechanism of the Toxicity of the Active Constituent of
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Deoxyribonucleoprotein, a Genetic Material

*Rudolph A. Peters
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Pyrophosphorylases and Phosphorylases in
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Le rôle biosynthétique du cycle des acides
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Reaction Paths in the Respiration of the Higher Plants

The Chemistry and Function of Lipoic Acid

Lignification

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1957

Enzymic Aspects of Photosynthesis

*Wolf Vishniac
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Mechanisms of Oxygen Metabolism

Aktivierung von Aminosäuren

The Properties of Papain

Les voies principales de l'assimilation et dissimulation
de l'azote chez les animaux

*Theodor Wieland und
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*J. R. Kimmel
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Possible Relation between Optical Activity and Aging
Kinetics and Equilibria in the Liver Alcohol
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The Roles of Imidazole in Biological Systems

Uridinediphospho Galactose: Metabolism,
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Neuraminidase: Its Substrate and Mode of Action

The Constitution of the Respiratory Chain in Animal
Tissues

Enzymology of the Plastids

Enzymic Transformations of Steroids by
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The Mechanism of H_2 Hydrolysis by Cholinesterase and
Related Enzymes

The Biosynthesis of Dicarboxylic Amino Acids and
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Pectic Substances and Pectic Enzymes

Antibiotics and Plant Diseases

Werner Kuhn

*Hugo Theorell
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and W. D. Stein*

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Alfred Gottschalk*

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N. M. Sissakian*

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*D. R. Davies
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*W. L. Kretovich
H. Deuel and E. Stutz
Fred W. Tanner, Jr.,
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VOLUME 21

1959

Mitochondrial Metabolism

Electron Transport and Oxidative Phosphorylation

Mechanism of Metal Ion Activation of Enzyme

Durch Metall-Ionen Katalysierte Vorgänge,
Vornehmlich im Bereich der Seltenen Erdmetalle

*Walter C. Schneider
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*Bo G. Malmström and
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*Eugen Bamann und
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Enzymic Reactions in the Synthesis of the Purines

The Enzymic Synthesis of Pyrimidines

The Biosynthesis and Function of Carotenoid
Pigments

Folic Acid Coenzymes and One-Carbon Metabolism

*John M. Buchanan and
Standish C. Hartman
Peter Reichard*

*T. W. Goodwin
F. M. Huennekens
and M. J. Osborn*

VOLUME 22

1960

Genetically Controlled Differences in Enzyme Activity

The Active Site and Enzyme Action

The Induced Synthesis of Proteins

The Synthesis of Nucleotide Coenzymes

The Synthesis and Hydrolysis of Sulfate Esters

The Biochemistry of Sulfonium Compounds

The Biosynthesis of Cholesterol

Coenzyme Binding

Säulenchromatographie von Enzymen

*J. R. S. Fincham
D. E. Koshland, Jr.
Harlyn O. Halvorson
J. Baddiley
and N. A. Hughes
Alexander B. Roy
Stanley K. Shapiro
and Fritz Schlenk
G. Popják and J. W.
Cornforth
Sidney Shifrin
and Nathan O. Kaplan
F. Turba*

VOLUME 23

1961

Possible Polypeptide Configurations of Proteins from
the Viewpoint of Internal Rotation Potential

Denaturation and Inactivation of Enzyme Proteins

Periodic Enzymic Reactions and Their Possible
Applications

Pancreatic Lipase

Collagenases and Elastases

Cytochromes of Group A and Their Prosthetic Groups

Mechanisms of Synthesis of Adenosine Triphosphate

The Metabolism of 2-Carbon Compounds by
Microorganisms

Discovery and Chemistry of Mevalonic Acid

*Sanichiro Mizushima and
Takehiko Shimanouchi
Kazuo Okunuki

J. A. Christiansen
P. Desnuelle
Ines Mandl
Rudolf Lemberg
Efraim Racker

H. L. Kornberg
and S. R. Elsdon
A. F. Wagner
and K. Folkers*

VOLUME 24

1962

Aspects of the Biosynthesis of Enzymes

Metabolism of Spermatozoa

Chemical Modifications of Proteins and Their
Significance in Enzymology, Immunochemistry, and
Related Subjects

Structure and Function of Ribonuclease

Molecular Properties and Transformations of
Glycogen Phosphorylase in Animal TissuesDistribution of Enzymes Between Subcellular
Fractions in Animal TissuesThe Effects of Ionizing Radiation on Enzymes
Identical and Analogous Peptide Structures in Proteins
Mechanisms Related to Enzyme Catalysis*H. Chantrenne**G. W. Salisbury
and J. R. Lodge**J. Sri Ram, M. Bier
and P. H. Maurer**Harold A. Scheraga
and John A. Rupley**Edwin G. Krebs and
Edmond H. Fischer**C. de Duve, R. Wattiaux
and P. Baudhuin**L. G. Augenstine**F. Šorm**F. H. Westheimer*

VOLUME 25

1963

Elementary Steps in Enzyme Reactions (as Studied by
Relaxation Spectrometry)

Photosynthesis: Energetics and Related Topics

The Chemistry of Light Emission

The Prevalence and Significance of the Product
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Coenzyme Q (Ubiquinone)

Multiple Formen von Enzymen.

Biochemical Basis for Ethionine Effects on Tissues
Biological MethylationRecent Developments in the Biochemistry of Amino
Sugars

The Mechanism of Cacao Curing

*Manfred Eigen
and Gordon G. Hammes**J. A. Bassham**W. D. McElroy
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Gerhard Pfeleiderer**Jakob A. Stekol**David M. Greenberg**Roger W. Jeanloz**W. G. C. Forsyth
and V. C. Quesnel*

VOLUME 26

1964

Phytochrome and Its Control of Plant Growth and Development

Sugar Nucleotides and the Synthesis of Carbohydrates
Formation of the Secondary and Tertiary Structure of Enzymes

Die Wasserstoffübertragung mit Pyridinnucleotiden

Bagshaped Macromolecules—A New Outlook on Bacterial Cell Walls

Fortschritte auf dem Vitamin B₁₂-Gebiet

The Metabolism of Propionic Acid

*H. W. Siegelman
and S. B. Hendricks
Victor Ginsburg*

*F. B. Straub
H. Sund, H. Diekmann
und K. Wallenfels*

*W. Weidel and H. Pelzer
K. Bernhauer, O. Müller
und F. Wagner
Yoshito Kaziro
and Severo Ochoa*

VOLUME 27

1965

Mechanism of Enzyme Action—An Approach through the Study of Slow Reactions

Extrinsic Cotton Effects and the Mechanism of Enzyme Action

Contributions of EPR Spectroscopy to Our Knowledge of Oxidative Enzymes

Chemie und Biochemie des Disulfidaustausches
Enzymology of the Nucleus

The Chemical Basis of Mutation

The Origin of Life and the Origin of Enzymes

Experimental Approaches to the Origin of Life Problem

Inhibition of Folate Biosynthesis and Function as a Basis for Chemotherapy

The Mechanisms of Microbial Oxidations of Petroleum Hydrocarbons

Kunio Yagi

*David D. Ulmer
and Bert L. Vallee*

Helmut Beinert and Graham Palmer

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