

COMPARATIVE BIOCHEMISTRY

A Comprehensive Treatise

Edited by MARCEL FLORKIN
HOWARD S. MASON

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Volume VII

SUPPLEMENTARY VOLUME

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COMPARATIVE BIOCHEMISTRY

A Comprehensive Treatise

- Volume I: Sources of Free Energy
- Volume II: Free Energy and Biological Function
- Volume III: Constituents of Life—Part A
- Volume IV: Constituents of Life—Part B
- Volume V: Constituents of Life—Part C
- Volume VI: Cells and Organisms
- Volume VII: Supplementary Volume

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PREFACE

The previous volumes of this treatise have been arranged to survey the field of comparative biochemistry within a comprehensive framework. The energetic aspect of living organisms was described in Volumes I and II. The composition of living organisms, and the transformations of the constituents were described in Volumes III to V. Volumes VI and VII are concerned primarily with comparative biochemistry at levels of organization higher than the molecular. The present volume includes, in addition, two chapters relating to molecular biochemistry which, for reasons beyond the control of the editors, could not be included in the appropriate volume. Volume VII also includes a comprehensive topical index to the whole treatise.

With this volume we finish a task begun in 1955, the organizing and editing of a comprehensive treatise. The authors contributing to this treatise have pioneered in difficult areas of biochemistry and have helped to produce a work which we believe to be of enduring value whatever the future shape of the field. Once again, we wish to record our gratitude to our publisher, Academic Press, and its staff, for exceedingly competent professional assistance throughout the preparation of the treatise.

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April, 1964

COMPARATIVE BIOCHEMISTRY

A Comprehensive Treatise

Volume I: Sources of Free Energy

An Introduction to Comparative Biochemistry

MARCEL FLORKIJ AND HOWARD S. MASON

Thermodynamics of Living Systems

HENRY EYRING, RICHARD P. BOYCE, AND JOHN D. SPIKES

Comparative Mechanisms for Fatty Acid Oxidation

P. K. STUMPF AND G. A. BARBER

Phosphoric Acid Anhydrides and Other Energy-Rich Compounds

F. M. HUENNEKENS AND H. R. WHITELEY

Onium Compounds and Their Biological Significance

G. L. CANTONI

Phototropism and Phototaxis

KENNETH V. THIMANN AND GEORGE M. CURRY

The Distribution and Evolution of Visual Systems

GEORGE WALD

Aerobic and Anaerobic Reactions of Inorganic Substances

CLAUDE FROMAGEOT AND JACQUES C. SENEZ

Comparative Biochemistry of Glycolysis

ERNEST BUEDING AND EMMANUEL FARBER

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ERIC E. CONN

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MARY BELLE ALLEN

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M. R. ATKINSON AND R. K. MORTON

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LUIS F. LELOIR, CARLOS E. CARDINI, AND ENRICO CABIB

Comparative Biochemistry of Free Energy Utilization for the Biosynthesis of Peptides and Proteins

H. CHANTRENNE

Ammonia Metabolism and Urea Biosynthesis

PHILIP P. COHEN AND GEORGE W. BROWN, JR.

Muscular Contraction

S. V. PERRY

Other Mechanisms Producing Movements

HARTMUT HOFFMANN-BERLING

Active Transport

B. ANDERSEN AND H. H. USSING

Balance of Water, Electrolytes, and Nonelectrolytes

FREDA BROWN AND W. D. STEIN

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J. SHAW

Nerve Conduction and Electrical Discharge

MICHAEL A. GEREBTZOFF AND ERNEST SCHOFFENIELS

Bioluminescence

E. NEWTON HARVEY

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WERNER BERGMANN

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JAMES K. GRANT

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a Species Character

G. A. D. HASLEWOOD

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JOHN C. DITTMER

The Metabolism of Phospholipids

R. M. C. DAWSON

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D. J. BELL

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PETER BERNFELD

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VERNON H. CHELDELIN, CHIH H. WANG, AND TSOO E. KING

Terpenoids: Structure and Distribution

W. SANDERMANN

Terpenoids: Metabolism

W. SANDERMANN

Quinones: Structure and Distribution

R. H. THOMSON

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R. H. THOMSON

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T. L. V. ULBRICHT

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The Biochemistry of Lignin Formation

F. F. NORD AND WALTER J. SCHUBERT

Nucleic Acids

GEORGE BRAWERMAN AND HERMAN S. SHAPIRO

Protein Molecules: Intraspecific and Interspecific Variations

ALAN VEGOTSKY AND SIDNEY W. FOX

Metabolism of Aromatic Amino Acids

L. M. HENDERSON, R. K. GHOLSON, AND C. E. DALGLIESH

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A. GEDEON MATOLTSY

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M. G. M. PRYOR

Silk and Other Cocoon Proteins

K. M. RUDALL

Blood Coagulation

CHARLES GRÉGOIRE AND HENRY J. TAGNON

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THOMAS PETER BENNETT AND EARL FRIEDEN

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C. RIMINGTON AND G. Y. KENNEDY

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C. LIORET AND A. MOYSE

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JEROME GROSS

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E. C. WASSINK

Halides

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BARBARA E. WRIGHT

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ALLAN C. WILSON AND ARTHUR B. PARDEE

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ERNEST BEERSTECHEER, JR.

Biochemistry of Insect Metamorphosis

P. KARLSON AND C. E. SEKERIS

Hormones in Invertebrates

MANFRED GABE, PETER KARLSON, AND JEAN ROCHE

Protein Hormones in Vertebrates

ROGER ACHER

Comparative Biochemistry of Digestive Mechanisms

H. J. VONK

Comparative Biochemistry of Detoxification

J. N. SMITH

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* Most of the names refer to phyla, except in a few cases where some of the smaller taxonomic groups are shown. Capitalized names written across lines are groups including all forms above the name.

NOTE: Charts I, II, and III were prepared by Helen A. Stafford, Reed College, Portland, Oregon. For further information see "A Guide to the Nomenclature and Classification of Organisms," by Dr. Stafford, in Vol. I of this treatise.

CHART I
HYPOTHETICAL PHYLOGENETIC RELATIONSHIPS
BETWEEN EXTANT MAJOR GROUPS
OF ORGANISMS*

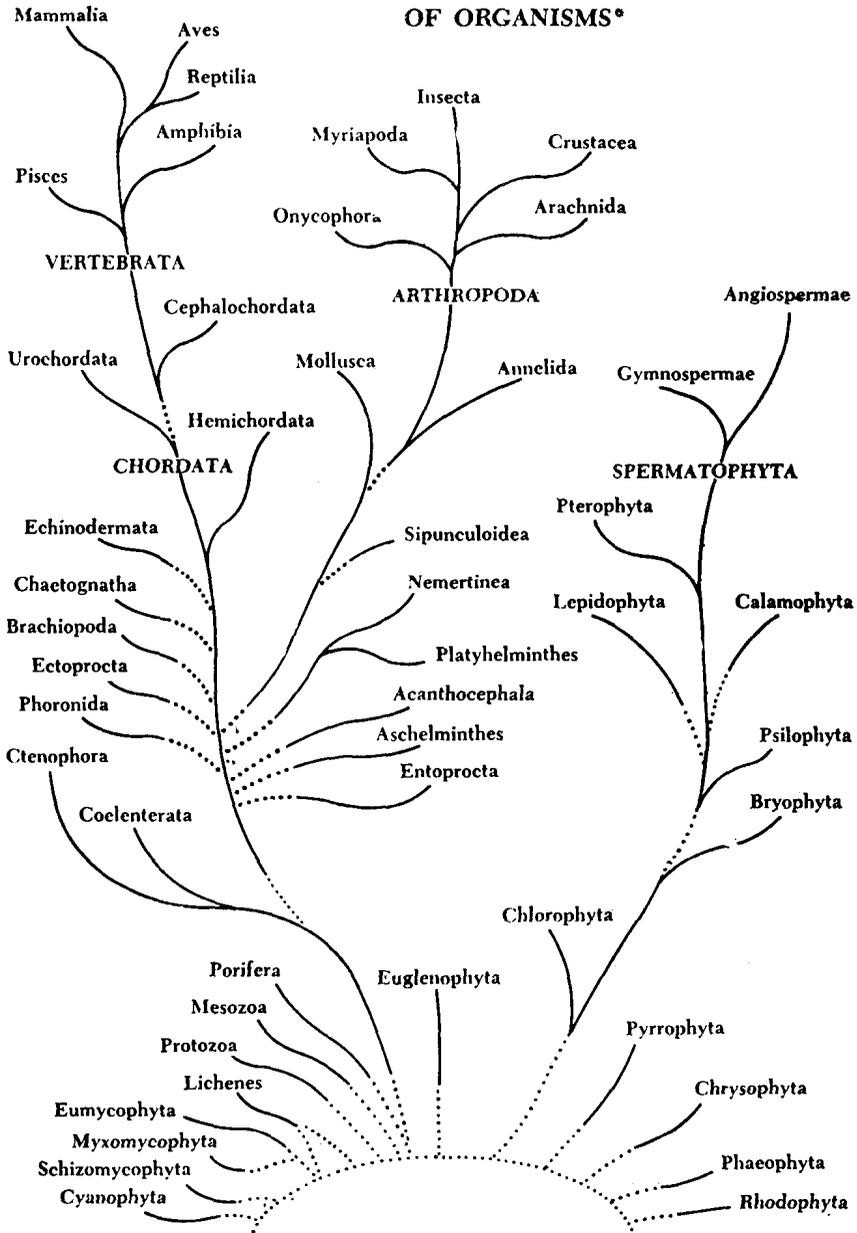


CHART II: ANIMAL KINGDOM

Divisions	Estimated Number of Species ^d	Taxonomic Classifications
Protozoa (acellular animals)	15,000	
Mesozoa	—	
Porifera (sponges)	5,000	
Coelenterata (coelenterates)	10,000	} Radiata
Ctenophora (comb jellies)	100	
Platyhelminthes (flat worms)	6,000	
Nemertinea (nemertine worms)	500	} Acoelomates
Aschelminthes ^a	7,000	
Acanthocephala ^a		} Pseudocoelomates
Entoprocta ^b	3,000	
Ectoprocta ^b (moss animals)		} Protostomia
Phoronida	15	
Brachiopoda (lamp shells)	120	} Schizocoela
Mollusca (mollusks)	70,000	
Sipunculoidea	—	} Eucoelomates
Annelida ^c (segmented worms)	6,500	
Arthropoda (arthropods)	750,000	} Enterocoela
Chaetognatha (arrow worms)	30	
Echinodermata (echinoderms)	5,000	} Deuterostomia
Hemichordata		
Chordata (including vertebrates)	60,000	

^a Includes Rotifera, Gastrotricha, Kinorhyncha, Nematoda, Nematomorpha, Priapulioidea. Formerly called Nematelminthes.

^b Formerly in Bryozoa.

^c Includes Echiuroidea.

^d Taken from "Handbook of Biological Data" (4), p. 533.

CHART III: PLANT KINGDOM

Divisions	Estimated Number of Species ^d	Major Synonymous Terms
Euglenophyta (euglenoids)	340	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="font-size: 4em; margin-right: 10px;">}</div> <div style="text-align: center;"> <p>Algae</p> <p>Thallophyta</p> <p>Cryptogamia</p> <p>Fungi</p> <p>Bryophyta</p> <p>Tracheophyta</p> <p>Phanerogamia</p> </div> </div>
Chlorophyta (green algae)	5,700	
Pyrophyta (cryptomonads, dinoflagellates)	1,000	
Chrysophyta (yellow green algae, diatoms)	5,700	
Phaeophyta (brown algae)	900	
Rhodophyta (red algae)	2,500	
Cyanophyta ^a (blue-green algae)	1,400	
Schizomycophyta ^a (bacteria)	1,300 ^e	
Myxomycophyta (slime molds)	430	
Eumycophyta (true fungi)	74,000	
Lichenes (lichens)	15,500	
Bryophyta (mosses and liverworts)	23,800	
Psilophyta ^b (whisk ferns)	3	
Calamophyta ^b (horsetails)	30	
Lepidophyta ^b (lycopsods)	1,300	
Pterophyta ^{b, c} (ferns)	10,000	
Spermatophyta (seed plants)	201,000	

^a Sometimes grouped as Schizophyta.

^b Formerly classed as Pteridophyta.

^c Formerly classed as Filicineae in Pteropsida.

^d Taken from "Handbook of Biological Data" (4), p. 533.

^e There is much disagreement concerning designation of species here.

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