

COMPARATIVE BIOCHEMISTRY

A Comprehensive Treatise

Edited by MARCEL FLORKIN
HOWARD S. MASON

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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.

MARCEL FLORKIN
Liège, Belgium

HOWARD S. MASON
Portland, Oregon

April, 1964

COMPARATIVE BIOCHEMISTRY

A Comprehensive Treatise

Volume I: Sources of Free Energy

An Introduction to Comparative Biochemistry

MARCEL FLORKIN 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

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Comparative Biochemistry of Glycolysis

ERNEST BUEDING AND EMMANUEL FARBER

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

H. CHANTRENNE

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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

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FREDA BROWN AND W. D. STEIN

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J. SHAW

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PETER BERNFELD

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W. SANDERMANN

Terpenoids: Metabolism
W. SANDERMANN

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A. GEDEON MATOLTSY

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M. G. M. PRYOR

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K. M. RUDALL

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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*

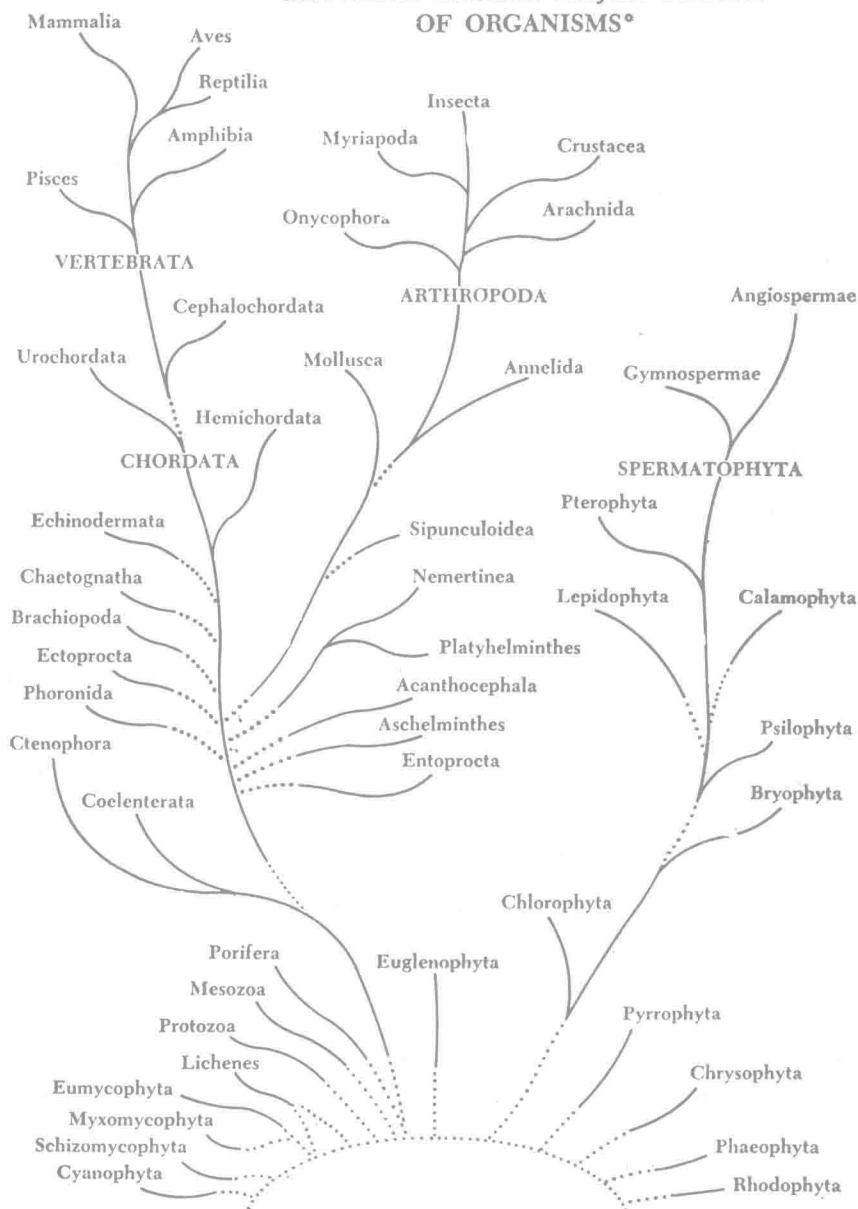


CHART II: ANIMAL KINGDOM

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	} Acoelomates	}	}	
Nemertinea (nemertine worms)	500				
Aschelminthes ^a	7,000	} Pseudocoelomates			
Acanthocephala ^a					
Entoprocta ^b	3,000	} Protostomia			
Ectoprocta ^b (moss animals)					
Phoronida	15				
Brachiopoda (lamp shells)	120				
Mollusca (mollusks)	70,000				
Sipunculoidea	—				
Annelida ^c (segmented worms)	6,500	} Schizocoela	} Bilateria		
Arthropoda (arthropods)	750,000				
Chaetognatha (arrow worms)	30			} Enterocoela	
Echinodermata (echinoderms)	5,000				
Hemichordata	60,000	} Enterocoela		} Deuterostomia	
Chordata (including vertebrates)					

^a Includes Rotifera, Gastrotricha, Kinorhyncha, Nematoda, Nematomorpha, Priapulidea. Formerly called Nemathelminthes.

^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	Algae		
Chlorophyta (green algae)	5,700			
Pyrrophyta (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	Thallophyta		
Schizomycophyta ^a (bacteria)	1,300 ^e			
Myxomycophyta (slime molds)	430			
Eumycophyta (true fungi)	74,000			
Lichenes (lichens)	15,500	Fungi		Cryptogamia
Bryophyta (mosses and liverworts)	23,800			
Psilophyta ^b (whisk ferns)	3	Psilopsida		
Calamophyta ^b (horsetails)	30	Sphenopsida		
Lepidophyta ^b (lycopods)	1,300	Lycopsida	Tracheophyta	
Pterophyta ^{b, c} (ferns)	10,000	Pteropsida		
Spermatophyta (seed plants)	201,000			Phanerogamia

^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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CHAPTER 1

Expressions of the Pentose Phosphate Cycle*

N. G. PON

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