

ESCHERICHIA COLI AND SALMONELLA TYPHIMURIUM

CELLULAR AND MOLECULAR BIOLOGY

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"Not everyone is mindful of it, but cell biologists have two cells of interest: the one they are studying and *Escherichia coli*."

—From the Introduction

More is known about *Escherichia coli* and its close relative *Salmonella typhimurium* than about any other organism. These bacteria are likely to become the first free-living cells to have all their genes and gene products identified, their metabolic and assembly processes elucidated, and their regulatory and coordinating devices understood. Their convenient properties have made them the popular choices for research in bacteriophage functions and genetics, enzymatic function and adaptation, genetic analysis, biosynthetic pathways, bacterial physiology,

and regulation of gene expression. The wealth of information from several decades of intensive study has never before been assembled to permit an assessment of current knowledge and facilitate future research.

Written by over 100 leading biologists under the guidance of an editorial board representing diverse scientific disciplines, this two-volume set presents a comprehensive synthesis of the entire body of current knowledge on *E. coli* and *S. typhimurium*.

This landmark publication should prove fascinating and extremely helpful to all investigators and students of the most fundamental biological questions in genetics, molecular biology, biochemistry, and microbial and cellular physiology and regulation.

CONDENSED CONTENTS

PART I. MOLECULAR ARCHITECTURE AND ASSEMBLY OF CELL PARTS:

Chemical composition, outer and cytoplasmic membranes, murein sacculus, periplasm and protein secretion, flagella, fimbriae, nucleoids, and ribosomes

PART II: METABOLISM AND GENERAL PHYSIOLOGY

- Class I Reactions: Generation of Precursor Metabolites and Energy
- Class II Reactions: Conversion of Precursor Metabolites to Small-Molecule Building Blocks
- Class III Reactions: Formation and Processing of Polymers
- Energy for Cell Activities: Motility and chemotaxis, ATP-coupled solute transport, osmotic-shock-sensitive transport, growth yield and energy distribution

PART III: GENOME AND GENETICS

- The Genome: Linkage maps, gene-protein index, genome organization;

selectable phenotypes, native insertion sequence elements

- Genome alterations: Mutagenesis, general and site-specific recombination, DNA repair, transposition and transposable elements, insertion maps
- Gene transfer techniques: Conjugation (F factor, Hfr strains, F⁺ strains, F- and R-prime factors); transduction (generalized and specialized); DNA transformation methods
- Mapping techniques and measurement of chromosome size
- Useful host and mutant strains/recombinant-DNA techniques

PART IV: REGULATION OF GENE EXPRESSION

- General Mechanisms: Transcription initiation and attenuation, transcript elongation/termination, translation initiation, proteolysis
- Multigene System: Regulons; carbon/

nitrogen utilization; phosphate regulation; heat shock, SOS, and stringent responses; ribosomes and tRNA; amino-acyl-tRNA synthetases/translation factors

- Operon Regulation: Historical; maltose regulon; lactose, tryptophan, L-arabinose, galactose, proline, and D-serine deaminase operons

PART V. GROWTH OF CELLS AND CULTURES:

Growth modulation of cell characteristics; effects of temperature, pH, water, and pressure; chromosome replication regulation; cell division; cell cycle synthetic activities; bacterial variability and individuality

PART VI: ECOLOGY, EVOLUTION, AND POPULATION STRUCTURE:

Colicins and Col plasmids, natural genetic structure/variation, enteric-bacteria evolutionary history

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Phosphate Metabolism and Cellular Regulation in Microorganisms

Editors: **Annamaria Torriani-Gorini**, *Massachusetts Institute of Technology, Cambridge, MA*; **Frank G. Rothman**, *Brown University, Providence, RI*; **Simon Silver**, *University of Illinois College of Medicine, Chicago, IL*; **Andrew Wright**, *Tufts University Medical School, Boston, MA*; and **Ezra Yagil**, *Tel Aviv University, Tel Aviv, Israel*

This important new volume presents the latest progress on DNA sequencing and analysis of phosphate transport systems, the Pho regulon and other regulons governing "global metabolism" in the cell, polyphosphates and their synthesis and degradation, and the export of proteins across the cell membrane. *Phosphate Metabolism and Cellular Regulation in Microorganisms* will be of interest to anyone investigating bacterial metabolism and molecular biology; it will also be of general interest to those with environmental concerns and interests in phosphate metabolism in higher organisms, both plants and animals. The work contains the proceedings of an international symposium held in Concarneau, France, June 1986.

CONDENSED CONTENTS

- I. Phosphate Regulation in *Escherichia coli* (5 chapters)
Pho regulon, alkaline phosphatase gene, PhoE protein, acid phosphatase
- II. Phosphate Regulation in Diverse Organisms (4 chapters)
Bacillus licheniformis, *Saccharomyces cerevisiae*
- III. Protein Secretion and Use of Alkaline Phosphatase (7 chapters)
E. coli: phosphate-binding-protein synthesis/export, phospholipids, foreign-protein secretion, *lamB* protein; alkaline phosphatase uses
- IV. Structure and Function of Alkaline Phosphatase (4 chapters)
Site-directed mutagenesis, crystal structure, multinuclear NMR analysis, *E. coli* isozyme
- V. Transport of Phosphate and Phosphorylated Compounds in *Escherichia coli* (7 chapters)
Pst system, Pit system, PhoE protein, glycerol 3-phosphate transport
- VI. Mechanisms and Energetics of Phosphate Transport in Other Organisms (4 chapters)
Pseudomonas aeruginosa outer membrane protein, sugar phosphate transport/anion exchange, solute/ion transport, *S. cerevisiae* phosphate uptake

- VII. Phosphate Reserves and Energy Storage: polyphosphates (5 chapters)
E. coli accumulation/metabolism, *Acinetobacter lwoffii* surface pool, *Propionibacterium shermanii* polyphosphate kinase and glucokinase, biosynthesis and transport in yeasts
- VIII. Phosphate Reserves and Energy Storage: Pyrophosphates (4 chapters)
NMR methanogen studies, inorganic pyrophosphate-supplied metabolic energy, *Rhodospirillum rubrum* energy conversion, pyrophosphate metabolism in plants
- IX. Global Regulatory Systems in Enteric Bacteria (6 chapters)
Carbon metabolism, nitrogen assimilation, stable-RNA transcription initiation, phosphorylated metabolites/alarmones, *E. coli* DNA damage/stress responses
- X. Historical Perspective: *E. coli* alkaline phosphatase gene-protein relationships

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STREPTOCOCCAL GENETICS

Edited by
JOSEPH J. FERRETTI
and
ROY CURTISS III

Streptococcal Genetics presents a compilation of the most recent work in this important area, featuring over sixty contributions from the leading workers in the field. There has been a dramatic increase in interest and activity on this subject over the past few years, as investigators from all disciplines have embraced the new approaches and tools that genetic studies afford.

This volume is divided into five major sections, each with an introduction presenting an overview and historical perspective for each of the topics. Useful appendixes give information on streptococcal cloning vectors, nucleotide sequences, and amino acids. An attractive volume for both new and established investigators. Based on the Second ASM Conference on Streptococcal Genetics, May 1986.

CONDENSED CONTENTS

- I. Gene Transfer (8 chapters)
Sex pheromones, plasmid-related conjugation, transposons and mutagenesis, cloning and restriction systems, genetic transformation.
- II. Antibiotic Resistance (10 chapters)
Resistance determinants, genes and products, conjugative transposons, natural genetic-information transfer, plasmid-borne resistance genes and products.
- III. Pathogenic Streptococci (23 chapters)

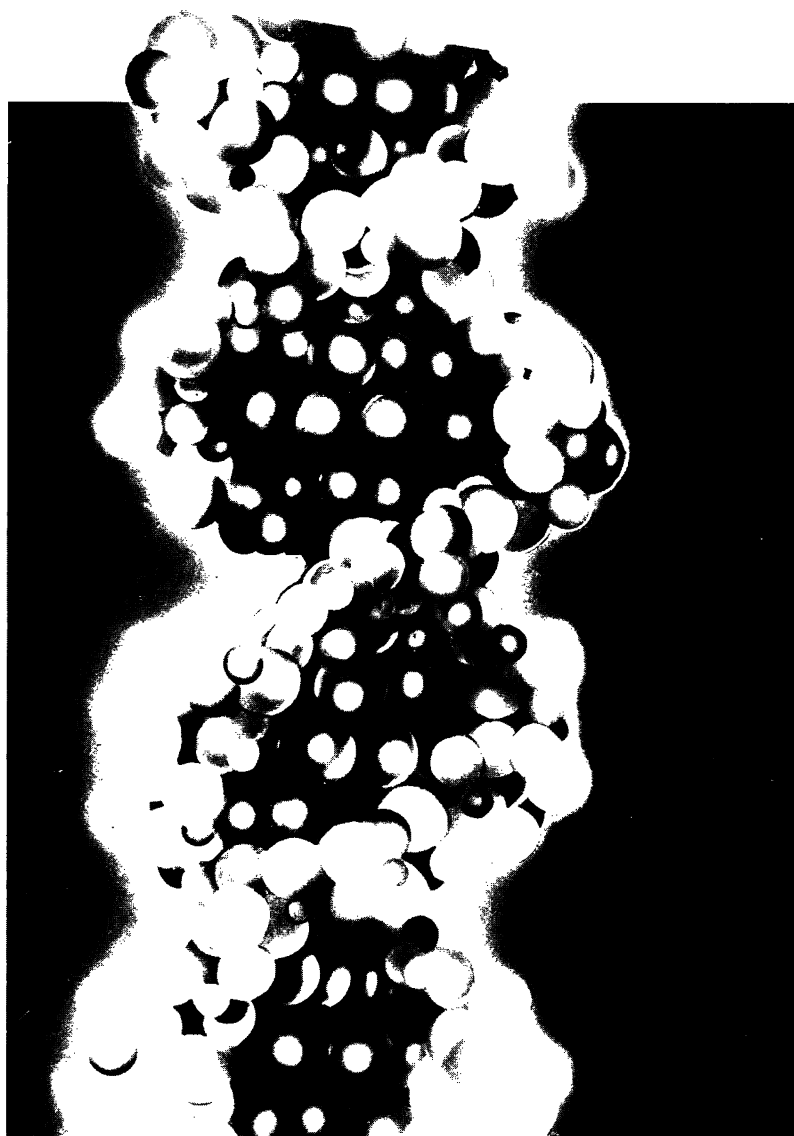
M proteins, immunoglobulin G receptor gene, human and animal isolates, homologous sequences and host specificity, DNA fingerprints, exotoxins, streptokinase and amidase, plasmid hemolysin/bacteriocin determinants, hemolysin production, virulence, surface protein, immunoglobulin A1 protease gene, competence control region.

- IV. Oral Streptococci (7 chapters)
Adhesion fimbriae structural gene, virulence components, glucosyltransferase gene and product, surface proteins and virulence, β -D-fructosidase.
- V. Lactic Acid Streptococci (8 chapters)
 β -Galactosidase gene and plasmids, transformation by electroporation, spheroplast transfection, Tn919, metabolic traits, plasmid-encoded structural genes, lactose metabolism, bacteriophages, bacteriophage insensitivity mechanisms.

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