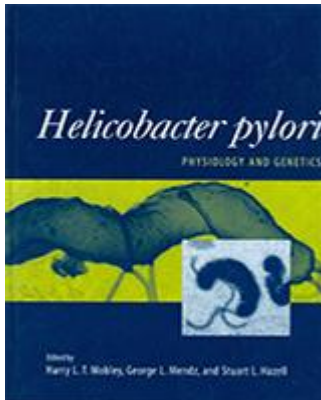


Bookshelf ID: NBK2408PMID: 21290711



## ***Helicobacter pylori***

### **Physiology and Genetics**

Edited by Harry LT Mobley, George L Mendz, and Stuart L Hazell.

#### [Editor Information](#)

Washington (DC): [ASM Press](#); 2001.

ISBN-10: 1-55581-213-9

- [Copyright Notice](#)
- [Cite this Page](#)

### **Excerpt**

While important findings about the physiology and genetics of *H. pylori* are summarized in this volume, it also includes sections on epidemiology, bacteriology, bacterial virulence and pathogenic mechanisms, pathogenesis in the host, diagnosis and treatment, animal models, and other *Helicobacter* species.

### **Contents**

- [Contributors](#)
- [Preface](#)
- [Acknowledgments](#)
- [Part I. Introduction](#)
  - [Chapter 1. Overview](#)

Harry L. T. Mobley, George L. Mendz, and Stuart L. Hazell.
  - [Chapter 2. Epidemiology of Infection](#)

Hazel M. Mitchell.

    - [Prevalence of Infection](#)

- [Expand All](#)
- [Collapse All](#)

- Natural History of Infection
- Conclusion
- References
- Chapter 3. One Hundred Years of Discovery and Rediscovery of *Helicobacter pylori* and Its Association with Peptic Ulcer Disease
  - Barry J. Marshall.
    - Spiral Bacteria
    - Epidemic Gastritis with Hypochlorhydria
    - The Origin of Gastric Urease
    - Bismuth Salts for Gastric Disease
    - Synthesis: Warren and Marshall 1979–84
    - Questions for the Future
    - References
- Part II. Bacteriology
  - Chapter 4. Basic Bacteriology and Culture
    - Lief Percival Andersen and Torkel Wadström.
      - Campylobacteriaceae
      - The Genus *Helicobacter*
      - References
  - Chapter 5. Taxonomy of the *Helicobacter* Genus
    - Jay V. Solnick and Peter Vandamme.
      - Introduction
      - Description of the Genus *Helicobacter*
      - Methods for the Differentiation of *Helicobacter* Species
      - Validated and Candidate *Helicobacter* Species
      - Identification of Novel *Helicobacter* Species
      - Conclusions
      - Acknowledgment
      - References
  - Chapter 6. Morphology and Ultrastructure
    - Jani O'Rourke and Günter Bode.
      - Morphology of *Helicobacter pylori*
      - Conclusion
      - References
  - Chapter 7. Cell Envelope

Paul W. O'Toole and Marguerite Clyne.

- Peptidoglycan
  - Fatty Acid and Lipid Composition of *H. pylori*
  - Lipopolysaccharide
  - Surface Localization of Cytoplasmic Proteins
  - Outer Membrane Proteins of *H. pylori*
  - Conclusions
  - Acknowledgments
  - References
- Chapter 8. Molecular Structure, Biosynthesis, and Pathogenic Roles of Lipopolysaccharides

Anthony P. Moran.

- General Architecture of LPS
  - Future Outlook
  - Acknowledgments
  - References
- Chapter 9. Vacuolating Cytotoxin

John C. Atherton, Timothy L. Cover, Emanuele Papini, and John L. Telford.

- The *vacA* Gene
- References

- Part III. Energy Metabolism and Synthetic Pathways

- Chapter 10. Microaerobic Physiology: Aerobic Respiration, Anaerobic Respiration, and Carbon Dioxide Metabolism

David J. Kelly, Nicky J. Hughes, and Robert K. Poole.

- Modes of Energy Transduction
- Aerobic Electron Transport in *H. pylori*
- Anaerobic Electron Transport in *H. pylori*
- Microaerophily versus Oxidative Stress
- The CO<sub>2</sub> Enigma
- Concluding Remarks
- Acknowledgments
- References

- Chapter 11. Nitrogen Metabolism

Hilde De Reuse and Stéphane Skouloubris.

- Nitrogen Sources for *Helicobacter pylori*

- Nitrogen Assimilation
- Urea Cycle and Arginase
- Two Paralogous Amidases
- Conclusions
- References
- Chapter 12. The Citric Acid Cycle and Fatty Acid Biosynthesis
  - David J. Kelly and Nicky J. Hughes.
    - Diversity and Multiple Roles of the Citric Acid Cycle in Prokaryotes
    - The CAC in *H. pylori*
    - Fatty Acid Biosynthesis in *H. pylori*
    - Acknowledgments
    - References
- Chapter 13. Nucleotide Metabolism
  - George L. Mendz.
    - Pyrimidine Ribonucleotides
    - Purine Nucleotides
    - Biosynthesis of Deoxyribonucleotides
    - Conclusions
    - References
- Chapter 14. Biosynthetic Pathways Related to Cell Structure and Function
  - Partha Krishnamurthy, Suhas H. Phadnis, Cindy R. DeLoney, Raoul S. Rosenthal, and Bruce E. Dunn.
    - Bacterial Peptidoglycans
    - Biosynthetic Pathway of Peptidoglycan Formation
    - Conclusions
    - References
- Chapter 15. Evasion of the Toxic Effects of Oxygen
  - Stuart L. Hazell, Andrew G. Harris, and Mark A. Trend.
    - Oxygen as a Toxic Species
    - Gene Regulation and Repair Mechanisms
    - Conclusion
    - References
- Part IV. Physiology and Molecular Biology
  - Chapter 16. Urease
    - Harry L. T. Mobley.

- Enzymology
- Protein Structure
- Genetics
- Physiology
- Pathogenesis
- Detection of *H. pylori* using Urease
- Typing Systems Based on Urease Genes
- Urease in Vaccines
- Acknowledgment
- References
- Chapter 17. Ion Metabolism and Transport
  - Arnoud H. M. van Vliet, Stefan Bereswill, and Johannes G. Kusters.
  - Ion Homeostasis
  - Ion Metabolism
  - Ion Transport
  - Conclusions
  - Acknowledgments
  - References
- Chapter 18. Metabolite Transport
  - Brendan P. Burns and George L. Mendz.
  - Glucose Transport
  - Fumarate Transport
  - Arginine Transport
  - Urea Transport
  - Nucleotide Transport
  - Nickel Transport
  - Iron Transport
  - Copper Transport
  - Novel Drug Transporter Systems
  - Metabolite Transport and Total Genome Analysis
  - Conclusions
  - References
- Chapter 19. Protein Export
  - Dag Ilver, Rino Rappuoli, and John L. Telford.

- The General Secretory Pathway
- Sec-independent Export
- Less Conventional Mechanisms for Protein Export
- References
- Chapter 20. Alternative Mechanisms of Protein Release
  - Steven R. Blanke and Dan Ye.
    - Type IV Secretion: Adaptation of Conjugative Cellular Machinery
    - Bacterial Autolysis: An "Altruistic" Mechanism for *H. pylori* Adaptation within a Hostile Environment?
    - Outer Membrane Vesicles: Bundling Cell Envelope Proteins for Delivery?
    - Conclusions
    - Acknowledgments
    - References
- Chapter 21. Motility, Chemotaxis, and Flagella
  - Gunther Spohn and Vincenzo Scarlato.
    - The Flagella
    - Chemotaxis
    - Perspectives
    - Acknowledgments
    - References
- Chapter 22. Natural Transformation, Recombination, and Repair
  - Wolfgang Fischer, Dirk Hofreuter, and Rainer Haas.
    - Natural Transformation Competence
    - Genes Involved in DNA Uptake
    - Recombination
    - DNA Repair
    - References
- Chapter 23. Chromosomal Replication, Plasmid Replication, and Cell Division
  - Hiroaki Takeuchi and Teruko Nakazawa.
    - Chromosomal Replication
    - Plasmid Replication
    - Cell Division
    - Summary and Perspectives
    - References

- Chapter 24. Restriction and Modification Systems
  - John P. Donahue and Richard M. Peek Jr.
    - Classification of R-M Systems
    - Conclusion
    - Acknowledgments
    - References
- Chapter 25. Regulation of Urease for Acid Habitation
  - George Sachs, David R. Scott, David L. Weeks, Marina Rektorscheck, and Klaus Melchers.
    - Acid Resistance
    - The Mechanism of Urel
    - Conclusions
    - References
- Chapter 26. Transcription and Translation
  - Sanjib Bhattacharyya, Mae F. Go, Bruce E. Dunn, and Suhas H. Phadnis.
    - Transcription
    - Translation
    - Summary
    - References
- Part V. Genetics
  - Chapter 27. The Genome
    - Richard A. Alm and Brian Noonan.
      - Comparative Analysis of the *H. pylori* Genomes
      - Genome of *H. pylori* Compared with Other Sequenced Microbial Genomes
      - Functional Genomes and Understanding the Host-Pathogen Interaction
      - Future Considerations
      - Acknowledgments
      - References
  - Chapter 28. Genetic Exchange
    - Dawn A. Israel.
      - Transformation
      - Conjugation
      - Transduction

- Barriers to Genetic Exchange
- Conclusion
- Acknowledgments
- References
- Chapter 29. Gene Regulation
  - Nicolette de Vries, Arnoud H.M. van Vliet, and Johannes G. Kusters.
  - Gene Regulation in response to Environmental Factors
  - Regulation of Motility and Chemotaxis
  - Phase Variation
  - Other Regulatory Systems
  - Conclusions
  - Acknowledgments
  - References
- Chapter 30. Mutagenesis
  - Agnès Labigne and Peter J. Jenks.
  - Introduction to Mutagenesis
  - Spontaneous Mutagenesis of *H. pylori*
  - Induced Mutagenesis for *H. pylori* Genetics
  - Acknowledgment
  - References
- Chapter 31. The *cag* Pathogenicity Island
  - Markus Stein, Rino Rappuoli, and Antonello Covacci.
  - The *cag* Pathogenicity Island of *H. pylori*
  - Type IV Secretion Systems and Their Functions
  - Pathogenic Functions of the *cag* Pathogenicity Island
  - Conclusions
  - Acknowledgments
  - References
- Chapter 32. Population Genetics
  - Sebastian Suerbaum and Mark Achtman.
  - Bacterial Population Genetics
  - Genetic Heterogeneity of *H. pylori*
  - Evidence for Recombination in *H. pylori*
  - Geographic Variation in *H. pylori*



- Do *H. pylori* Genotypes Reflect Human Migrations?
- Microevolution during Chronic Colonization
- Acknowledgments
- References
- Chapter 33. Heterogeneity and Subtyping
  - Robert J. Owen, Diane E. Taylor, Ge Wang, and Leen-Jan van Doorn.
  - Introduction
  - Genotyping Based on Multiple Sites throughout the Genome and on Plasmids—Macrodiversity Analysis
  - Genotyping Based on Known Loci—Microdiversity Analysis
  - Mechanisms of Genetic Variation in Relation to Genotyping
  - Conclusions
  - References
- Part VI. Bacterial Virulence and Pathogenic Mechanisms
  - Chapter 34. Adherence and Colonization
    - Traci L. Testerman, David J. McGee, and Harry L. T. Mobley.
    - Adherence
    - Bacterial Adhesins and Receptors
    - Adherence Antagonists
    - Does Invasion into Host Cells Occur?
    - Interactions of *H. pylori* with Phagocytic Cells
    - Colonization
    - Conclusions
    - References
  - Chapter 35. Lipopolysaccharide Lewis Antigens
    - Ben J. Appelmelk and Christina M. J. E. Vandenbroucke-Grauls.
    - Phase Variation in *H. pylori* LPS
    - The Biological Role of *H. pylori* Lewis Antigen Mimicry
    - *H. pylori* Lewis Antigens as Adhesins
    - References
  - Chapter 36. Gastric Autoimmunity
    - Mathijs P. Bergman, Gerhard Faller, Mario M. D'Elis, Gianfranco Del Prete, Christina M. J. E. Vandenbroucke-Grauls, and Ben J. Appelmelk.
    - *H. pylori* Infection induces Autoantibodies to Gastric Mucosal Antigens

- AIG/PA and Experimental Autoimmune Gastritis
- Gastric T-Cell and Cytokine Responses in *H. pylori* Infection
- Gastric Epithelial Cells during *H. pylori* Infection
- A Model for the Pathogenesis of *H. pylori*-associated Antigastric Autoimmunity
- References
- Chapter 37. Vaccines
  - Jacques Pappo, Steven Czinn, and John Nedrud.
  - The Immune Response against *Helicobacter pylori*. Implications for Vaccination
  - Preventive and Therapeutic Vaccines
  - Mechanisms of Immune Protection
  - Clinical Trials
  - References
- Part VII. Pathogenesis in the Host, Diagnosis, and Treatment
  - Chapter 38. Pathology of Gastritis and Peptic Ulceration
    - Michael F. Dixon.
    - General Features of *H. pylori* Gastritis
    - Patterns of *H. pylori* Gastritis
    - Duodenal Ulceration
    - Gastric Ulceration
    - Conclusion
    - References
  - Chapter 39. Host Inflammatory Response to Infection
    - Jide Wang, Thomas G. Blanchard, and Peter B. Ernst.
    - The Interactions between *H. pylori* and the Host Regulate Colonization and Pathogenicity
    - The Role of the Host Response in the Pathogenesis of Gastroduodenal Disease
    - Summary
    - References
  - Chapter 40. Gastric Cancer
    - Masahiro Asaka, Antonia R. Sepulveda, Toshiro Sugiyama, and David Y. Graham.
    - Epidemiological Evaluation of the Relationship between *H. pylori* Infection and Gastric Cancer
    - Molecular Pathogenesis of *H. pylori* and Gastric Cancer

- Development of Gastric Cancer in *H. pylori*-infected Animals
- Genetic Alterations in Gastric Carcinogenesis
- Perspective
- References
- Chapter 41. Markers of Infection
  - David Y. Graham and Waqar A. Qureshi.
    - Laboratory Abnormalities
    - Markers Based on *H. pylori* Enzymes
    - Markers Based on Anti-*H. pylori* Antibodies
    - Markers Based on the Presence of *H. pylori* Antigens
    - Markers Based on the Presence of the Bacterium
    - References
- Chapter 42. Antibiotic Susceptibility and Resistance
  - Francis Mégraud, Stuart Hazell, and Youri Glupczynski.
    - 5-Nitroimidazole Activity and Mechanism of Resistance
    - Macrolide Activity and Mechanisms of Resistance
    - Resistance to  $\beta$ -Lactams
    - Resistance to Other Antibiotics
    - Antimicrobial Susceptibility Testing
    - Genomics and Drug Discovery
    - References
- Part VIII. Animal Models and Other *Helicobacter* Species
  - Chapter 43. Enterohepatic *Helicobacter* Species
    - David B. Schauer.
      - *Helicobacter hepaticus*
      - *Helicobacter cinaedi* and *Helicobacter fennelliae*
      - *Helicobacter canis*
      - *Helicobacter pametensis* and *Helicobacter pullorum*
      - Other Urease-negative *Helicobacter* Species from Mice and Hamsters
      - *H. muridarum*
      - "*Helicobacter rappini*"
      - *H. bilis*
      - *H. trogonum*
      - *Helicobacter aurati*

- Enterohepatic *Helicobacter* Species in Human Liver Disease
- References
- Chapter 44. Other Gastric Helicobacters and Spiral Organisms
  - Stephen J. Danon and Adrian Lee.
    - History
    - The Ecology of the Gastric Helicobacters
    - References
- Chapter 45. In Vivo Modeling of *Helicobacter*-associated Gastrointestinal Diseases
  - Richard L. Ferrero and James G. Fox.
    - *Helicobacter* Colonization of Animal Hosts
    - Bacterial Host Specificity and Gastric Inflammation
    - Factors Mediating Helicobacter-induced Inflammation and Tissue Damage
    - Carcinogenesis
    - Applications of *Helicobacter* Infection Models
    - Conclusions
    - Acknowledgments
    - References
- Chapter 46. In Vivo Adaptation to the Host
  - Richard L. Ferrero and Peter J. Jenks.
    - In Vitro versus In Vivo
    - Mechanisms of Adaptation to the Host
    - Selection in the Host
    - Conclusions and Perspectives
    - Acknowledgment
    - References