

CONTENTS

FOREWORD	xi
-----------------	-----------

PREFACE	xiii
----------------	-------------

ABOUT THE AUTHOR	xix
-------------------------	------------

CHAPTER 1	HISTORICAL PERSPECTIVES	1
------------------	--------------------------------	----------

- 1.1. Introduction to Proteomics / 3
- 1.2. Proteome and Proteomics / 7
- 1.3. Genetics of Proteins / 9
- 1.4. Molecular Biology of Genes and Proteins / 20
- 1.5. Protein Chemistry Before Proteomics / 24
- References / 34
- Further Reading / 37

CHAPTER 2	PROTEOMICS – RELATION TO GENOMICS, BIOINFORMATICS	39
------------------	--	-----------

- 2.1. Genomics / 40
- 2.2. Bioinformatics and Computational Biology / 57
- References / 58
- Further Reading / 59

CHAPTER 3	METHODOLOGY FOR SEPARATION AND IDENTIFICATION OF PROTEINS AND THEIR INTERACTIONS	61
3.1.	Separation of Proteins Via a Multidimensional Approach / 61	
3.2.	Determination of the Primary Structure of Proteins / 70	
3.3.	Determination of the 3D Structure of a Protein / 83	
3.4.	Determination of the Amount of Proteins / 86	
3.5.	Structural and Functional Proteomics / 89	
	References / 99	
	Further Reading / 101	
CHAPTER 4	PROTEOMICS OF PROTEIN MODIFICATIONS	103
4.1.	Phosphorylation and Phosphoproteomics / 104	
4.2.	Glycosylation and Glycoproteomics / 107	
4.3.	Ubiquitination and Ubiquitinomics / 110	
4.4.	Miscellaneous Modifications of Proteins / 112	
	References / 113	
	Further Reading / 113	
CHAPTER 5	PROTEOMICS OF PROTEIN-PROTEIN INTERACTIONS/INTERACTOMES	115
5.1.	Protein-Protein Interactions (PPI) in Vivo / 116	
5.2.	Analysis of Protein Interactions in Vitro / 118	
5.3.	Analysis of Protein Interactions in Silico / 124	
5.4.	Synthetic Genetic Methods to Determine Protein Interactions / 125	
5.5.	Interactomes / 125	
5.6.	Evolution and Conservation of Interactomes / 132	
5.7.	Interactomes and the Complexity of Organisms: It is the Number of Interactomes that Matters in Understanding the Complexity of an Organism and not the Number of Genes / 133	
5.8.	Interaction of Proteins with Small Molecules / 133	

References /	134
Further Reading /	134

CHAPTER 6 APPLICATIONS OF PROTEOMICS I: PROTEOMICS, HUMAN DISEASE, AND MEDICINE 137

6.1. Diseasome /	139
6.2. Medical Proteomics /	139
6.3. Clinical Proteomics /	148
6.4. Metaproteomics and Human Health /	153
6.5. Proteomics in Biotechnology and Industry of Drug Production /	154
6.6. Metaproteomics of Microbial Fermentation /	155
6.7. Beef Industry /	158
6.8. Bioterrorism and Biodefense /	158
References /	159
Further Reading /	160

CHAPTER 7 PROTEOMICS — FUTURE DEVELOPMENTS 163

7.1. Technical Scope of Proteomics—Beyond Protein Identification /	163
7.2. Scientific Scope of Proteomics—Control of Epigenesis /	165
7.3. Medical Scope of Proteomics /	166
7.4. Proteomics, Energy Production, and Bioremediation /	169
7.5. Proteomics and Biodefense /	170
References /	170
Further Reading /	170

INDEX 171