

Contents

ABSTRACT	1
SOMMARIO	3
GENERAL INTRODUCTION	5
The cell as a self-replicating molecular machine.....	6
Approaches and methods to study regulatory circuits.....	8
Bacterial growth and its molecular basis	9
Regulatory circuits of carbon and energy metabolism	11
Regulatory circuits of nitrogen and amino acid metabolism	15
Regulatory circuits of the expression machinery	18
Thesis outline	19
Figures.....	21
References	29
CHAPTER 1 REGULATION AND CONTROL OF METABOLIC FLUXES IN MICROBES: A LITERATURE REVIEW	37
Abstract.....	38
Introduction	39
Results.....	40
Conclusions	49
Acknowledgements	51
Figures.....	52
References	54

CHAPTER 2 DISSECTING SPECIFIC AND GLOBAL REGULATION OF GENE EXPRESSION	59
Abstract.....	60
Introduction	61
Material and Methods.....	63
Results.....	65
Discussion	74
Supplementary material.....	77
Acknowledgements.....	77
Tables.....	78
Figures.....	79
References	84
CHAPTER 3 SYSTEMATIC IDENTIFICATION OF TRANSCRIPTION FACTORS AND METABOLITES THAT REGULATE FLUXES IN <i>E. COLI</i> CENTRAL METABOLISM	87
Abstract.....	88
Introduction	89
Material and Methods.....	92
Results.....	98
Discussion	108
Acknowledgements.....	114
Tables.....	114
Figures.....	115
References	123

**CHAPTER 4| QUANTITATIVE REVERSE-ENGINEERING OF TRANSCRIPTIONAL
CIRCUITS CONTROLLING METABOLISM AND THE EXPRESSION MACHINERY. 127**

Abstract.....	128
Introduction	129
Material and Methods.....	131
Results.....	134
Discussion	142
Figures.....	145
References	152
CONCLUSIONS AND OUTLOOK.....	155
Conclusions	156
Outlook	158
Figures.....	161
ACKNOWLEDGEMENTS	163
CURRICULUM VITAE.....	165
PUBLICATIONS	167