CONTENT

Preface **9**
William Didden

A BRIEF OVERVIEW OF HUMAN GENETIC VARIATION **13**
Andrea Novelletto and Bianca Maria Ciminelli
Introduction 13
SNPs 14
STRs 17
SV 21
Representing the geographic arrangement of diversity 25
Discussion 27

HUMAN MITOCHONDRIAL DNA AND ITS MUTATIONs **33**
Markéta Tesařová and Jiří Zeman
Introduction 33
Mitochondria and their function 34
Mitochondrial genome 35
Specifics of mitochondrial genetics 37
Mitochondrial disorders 40

THE INTERPLAY BETWEEN THE HUMAN MICROBIOME AND HUMAN GENETICS **49**
Juraj Bosák, David Šmajs
Introduction 49
Human genetics, diet, and the human microbiome 50
Diseases of the gastrointestinal system and the human microbiome 51
Metabolic diseases and the human microbiome 55
Immune disorders and the human microbiome 57
Cardiovascular disorders and the human microbiome 60
Lung disorders and the human microbiome 61

ADDICTION GENOMICS **65**
Ondřej Šeda
Introduction 65
Genetic component of addiction 66
Cigarette Smoking 68
Alcohol 69
Cannabis 70
Stimulants 71
Opioids 71
Outlook 72

DEEP LEARNING IN GENETICS AND PROTEOMICS, INCLUDING THEIR GOAL, NETWORK STRUCTURES, AND RESULTS **75**
Xianglilan Zhang, Xuemeng Zhang, Ondřej Šeda
Introduction to Deep Learning 77
Deep Learning in Genomics 77
Deep Learning in Proteomics 82

HUMAN GENOME PROJECTS
From the HGP to 1K, 10K and 100K and others 87
Radim Brdička