Contents

Preface to the first edition 7 Preface to the third edition 7 Acknowledgements 8 List of abbreviations 9

Part 1 Overview

1 The place of genetics in medicine 12

Part 2 The Mendelian approach

- 2 Pedigree drawing 14
- 3 Mendel's laws 16
- 4 Principles of autosomal dominant inheritance and pharmacogenetics 19
- 5 Autosomal dominant inheritance, clinical examples 22
- 6 Autosomal recessive inheritance, principles 25
- 7 Consanguinity and major disabling autosomal recessive conditions 28
- 8 Autosomal recessive inheritance, life-threatening conditions 31
- 9 Aspects of dominance 34
- 10 X-linked and Y-linked inheritance 36
- 11 X-linked inheritance, clinical examples 38
- 12 Mitochondrial inheritance 40
- 13 Risk assessment in Mendelian conditions 42

Part 3 Basic cell biology

- 14 The cell 44
- 15 The chromosomes 46
- 16 The cell cycle 48
- 17 Biochemistry of the cell cycle 50
- 18 Gametogenesis 52

Part 4 Basic molecular biology

- 19 DNA structure 54
- 20 DNA replication 56
- 21 The structure of genes 58
- 22 Production of messenger RNA 60
- 23 Non-coding RNA 62
- 24 Protein synthesis 64

Part 5 Genetic variation

- 25 Types of genetic alterations 66
- 26 Mutagenesis and DNA repair 68
- 27 Genomic imprinting 70
- 28 Dynamic mutation 73
- 29 Normal polymorphism 76
- 30 Allele frequency 79

Part 6 Organization of the human genome

- 31 Genetic linkage and genetic association 82
- 32 Physical gene mapping 84

- 33 Gene identification 86
- 34 Clinical application of linkage and association 88

ENT I PRESIDENCE PRODUCTIONS OF THE PROPERTY O

Part 7 Cytogenetics

- 35 Chromosome analysis 90
- 36 Autosomal aneuploidies 92
- 37 Sex chromosome aneuploidies 94
- 38 Chromosome structural abnormalities 96
- 39 Chromosome structural abnormalities, clinical examples 98
- 40 Contiguous-gene and single-gene syndromes 102

Part 8 Embryology and congenital abnormalities

- 41 Human embryology in outline 106
- 42 Body patterning 108
- 43 Sexual differentiation 110
- 44 Abnormalities of sex determination 112
- 45 Congenital abnormalities, pre-embryonic, embryonic and of intrinsic causation 114
- 46 Congenital abnormalities arising at the fetal stage 117
- 47 Development of the heart 120
- 48 Cardiac abnormalities 122
- 49 Facial development and dysmorphology 124

Part 9 Multifactorial inheritance and twin studies

- 50 Principles of multifactorial disease 127
- 51 Multifactorial disease in children 130
- 52 Common disorders of adult life 133
- 53 Twin studies 136

Part 10 Cancer

- 54 The signal transduction cascade 138
- 55 The eight hallmarks of cancer 140
- 56 Familial cancers 142
- 57 Genomic approaches to cancer management 144

Part 11 Biochemical genetics

- 58 Disorders of amino acid metabolism 146
- 59 Disorders of carbohydrate metabolism 149
- 60 Metal transport, lipid metabolism and amino acid catabolism defects 152
- 61 Disorders of porphyrin and purine metabolism and the urea/ornithine cycle 156
- 62 Lysosomal, glycogen storage and peroxisomal diseases 160
- 63 Biochemical diagnosis 165

Part 12 Immunogenetics

- 64 Immunogenetics, cellular and molecular aspects 168
- 65 Genetic disorders of the immune system 170
- 66 Autoimmunity, HLA and transplantation 173

Part 13 Molecular diagnosis

- 67 DNA hybridization-based analysis systems 176
- 68 DNA sequencing 179
- 69 The polymerase chain reaction 182
- 70 DNA profiling 184

Part 14 Genetic counselling, disease management, ethical and social issues

71 Reproductive genetic counselling 186

72 Prenatal sampling 188

- 73 Avoidance and prevention of disease 191
- 74 Management of genetic disease 194
- 75 Ethical and social issues in clinical genetics 197

Self-assessment case studies: questions 200 Self-assessment case studies: answers 205

Glossary 214

Appendix 1: the human karyotype 219

Appendix 2: information sources and resources 220

SE rempiritude . . .

Index 222