Contents

1. Introduction and Examination of Tissues **1**

Examination of tissues 3

2. Fixation and Fixatives **12**

Chemical fixation 18
Classification of fixatives 24
Secondary fixation 32
Physical methods of fixation 33
Choice of a fixative 35
Special fixation of organs and tissues 36

3. Tissue Processing and Embedding **41**

Labeling of specimens 41
Selection of tissue (bit taking) 42
Transference of labeled tissues 43
Tissue processing 43
Stages of tissue processing 45
Types of tissue processing 58
Embedding (casting or 'blocking') 60
Tissue microarray 68

4. Decalcification **71**

Bone specimens 71
Techniques for demonstration of bone 73
Decalcification 74
Processing decalcified bone 82

Undecalcified bone section 83
Softening of hard tissues 86

5. Microtomy and Section Cutting 87
Microtomy 87
Microtome knives 90
Trimming the block 101
Cutting/sectioning technique 102

6. Frozen Section and Cryostat 115
Frozen section 115
Cryostat 118

7. Theoretical Aspects of Staining 123
Dyes 125
Theory of staining 127
Terminology in staining 136

8. Hematoxylins and Eosin 141
Hematoxylin 141
Alum hematoxylins 142
Iron hematoxylins 147
Tungsten hematoxylins 150
Other hematoxylins 152
Cytoplasmic stains 152
Hematoxylin and eosin stain (H & E) 152
Quality control in routine H & E staining 153

9. Staining Procedure and Mounting 155
Staining procedure 156
Mountants 158
Mounting of paraffin section 163
Routine staining procedures 166
Technical problems and solutions in H & E staining 169
Filing of tissue blocks and slides 173

Destaining and restaining 174
Errors in histopathology 175

10. Demonstration of Carbohydrates 176
Demonstration of carbohydrates 182
Alcian blue technique 190
Methods of demonstration of mucin 195
Lectins and immunohistochemistry 198

11. Pigments and Minerals 200
Hematogenous endogenous pigments 201
Non-hematogenous endogenous pigments 205
Artefact pigments 211
Exogenous pigments and minerals 213

12. Staining for Amyloid 215
Amyloid 215
Demonstration of amyloid 215

13. Connective Tissues Stains 219
Extracellular matrices 219
Cells of the connective tissue 223
Stains for collagen 223
Stains for reticular fibers 230
Stain's for elastic tissue fibers 237
Fibrin and fibrinoid 245

14. Stains for Lipids 246
Fat stains and the Sudan dyes 247

15. Stains for Microorganisms 250
Detection and identification of bacteria 251
Techniques for mycobacteria 253
Helicobacter 258
Spirochete 259
Identification of fungi 260
Practical application of histochemical stains 265

16. Immunohistochemistry **267**
Immunohistochemical methods 269
Unmasking of antigen sites 274
Immunohistochemistry in practice 277
Quality control in immunohistochemistry 279
Practical aspects of immunohistochemical staining 280

17. Automation in Histopathology **291**
Automation in histopathology 291

18. Museum Technique **299**
Museum technique 299
Mounting of museum specimens 303

19. Microscope **306**
Compound microscope 307
Magnification and illumination 311
Phase contrast microscopy 313
Polarized light microscopy 314
Immunofluorescence microscopy 316
Measuring with the microscope 317
Setting up the microscope illumination 320
Use, care and maintenance of microscope 321
Electron microscope 323
Confocal microscopy 324

20. Photography **325**
Photomicroscopy 325
Photography of gross specimens 326
Digital pathology and telepathology 327

21. Biological Waste and its Management **330**
Biomedical waste 330
Biomedical waste management 333
Occupational safety and health of healthcare workers 342

22. Total Quality Management **346**

Total quality management framework *346*
Quality laboratory processes *346*
Quality assurance *347*
Quality assessment *348*
Quality control *349*
Accreditation and certification *357*

Bibliography ***359***

Appendices ***361***

Index ***373***