

Contents

<i>Preface</i>	ix
<i>Abbreviations</i>	xi

SECTION 1. Getting Oriented

Chapter 1. General Lab Organization and Procedures	3
The Big Picture	4
Laboratory Personnel	5
Lab Routines	7
What to Expect the First Week	10
What to Do the First Week	12
What Not to Do the First Week	12
Survival Through Common Sense and Courtesy	14
Nonnegotiable Safety Rules	17
Resources	19
Chapter 2. Laboratory Setup and Equipment	21
Lay of the Land	22
Using the Equipment	37
How to Buy New Equipment	39
Resources	41
Chapter 3. Getting Started and Staying Organized	43
Setting Up a Functional Lab Bench	44
Setting Up a Command Center	57
Resources	66

SECTION 2. Plotting a Course

Chapter 4. How To Set Up an Experiment	69
Philosophical Considerations	69
Planning an Experiment	71
Interpreting Results	83
Resources	87

Chapter 5. Laboratory Notebooks	89
Type and Format	89
Content	92
Maintenance	93
Ethics	97
Resources	99

Chapter 6. Presenting Yourself and Your Data	101
Communication Tips	101
Oral Presentations	110
Written Presentations	121
Resources	126

SECTION 3. Navigating

Chapter 7. Making Reagents and Buffers	131
Determining What You Need	132
Calculating What You Need	139
Weighing and Mixing	149
Measuring pH	153
Sterilizing Solutions	158
Storing Buffers and Solutions	162
Resources	163

Chapter 8. Storage and Disposal	165
Emergency Storage	165
Storing Reagents	167
Aliquoting	172
Refrigerators and Freezers	174
Discarding Lab Waste	177
Resources	185

Chapter 9. Working without Contamination	187
When to Use Sterile Technique	187
Sterile Technique	188
Protecting the Investigator	199
Sterile Technique in the Class II Biosafety Cabinet	200
Resources	205

Chapter 10. Eukaryotic Cell Culture	207
Types of Cultures and Cell Lines	207
Observing Cells	211
Obtaining Cells	213
Cell Maintenance	217

Freezing and Storage of Cells	230
Contamination	233
CO ₂ Incubators and Tanks	238
Resources	245
Chapter 11. Bacteria	247
Setting Up	247
Working Rules	249
Obtaining Bacteria	250
Growth and Maintenance	251
Antibiotics	256
Reviving Cultures	258
Obtaining Isolated Colonies	260
Counting Bacteria	265
Storage	274
Freezing Bacteria	275
Contamination	276
Resources	277
Chapter 12. DNA, RNA, and Protein	279
Molecular Biology Tips	279
DNA	280
Introducing DNA into Cells and Microorganisms	294
RNA	296
Protein	299
Resources	310
Chapter 13. Radioactivity	313
Properties of Radioactive Elements	314
How to Obtain Radioisotopes	315
Doing Radioactive Experiments	320
Experimental Detection of Radiation	329
Storage	338
Disposal	339
Alternatives to Radioactivity	342
Resources	345
Chapter 14. Centrifugation	347
Background	347
Working Rules	355
How to Spin	357
Gradients	369
Centrifuge and Rotor Maintenance	371
Resources	373

Chapter 15. Electrophoresis	375
Basic Rules	375
Generalities	376
Specifics	382
Transferring Gel Contents to Membranes	399
Resources	402
 Chapter 16. Microscopy	 405
Background	405
Using the Light Microscope	411
Slides and Stains	419
Photography	422
Fluorescence Microscopy	427
Shared Instrument Facilities	430
Resources	431
 <i>Glossary</i>	 433
<i>Index</i>	455