

# Contents

Preface	ix
Acknowledgements	xi
<b>1 Before Entering the Pharmacology Laboratory</b>	<b>1</b>
1.1 Safety and Risk Assessment	1
1.2 The Laboratory Record Book	3
1.3 Use of Animals in Practical Pharmacology	4
1.4 Experimental Design	5
1.5 Units, Dilutions and Logarithms	7
1.5.1 Units of Mass	8
1.5.2 Units, Concentrations and Logarithms	8
1.5.3 Dilutions	9
1.5.4 Logarithms	10
1.6 Essential Statistics	12
1.6.1 Continuous Data – <i>t</i> -test, ANOVA, Non-parametric Tests and Regression	12
1.6.2 Discontinuous Data – $\chi^2$ and Fisher's Exact Test	21
References	25
<b>2 Basic Pharmacological Principles</b>	<b>27</b>
2.1 Drug–Receptor Interaction	27
2.1.1 Agonists	27
2.1.2 Antagonists	30
2.1.3 Receptor Classification	36
2.2 Bioassays	37
2.2.1 Single-point Assays	38

2.2.2	Bracketing Assays, Three-point or 2×1 Assays	38
2.2.3	Multi-point Assays, Such As Four-point or 2×2 Assays	39
	References	40
<b>3</b>	<b>Isolated Tissues and Organs</b>	<b>43</b>
3.1	Equipment for <i>In Vitro</i> Experiments	44
3.2	Organ Baths	45
3.3	Physiological Salt Solutions	46
3.4	Transducers	47
3.5	Recording Equipment and Software	49
3.6	Dosing	50
3.7	Electrically Stimulated Preparations	52
3.8	Fault-Finding of <i>In Vitro</i> Isolated Tissue Preparations	53
	References	54
<b>4</b>	<b>Smooth Muscle Preparations</b>	<b>55</b>
4.1	Gastrointestinal Smooth Muscle Preparations	55
4.2	Guinea Pig Isolated Ileum	56
4.2.1	Concentration–Response Curves for Cholinesterases	57
4.2.2	Selective Antagonism	59
4.2.3	Specificity of Blood Cholinesterases	62
4.2.4	Quantification of the Potency of an Antagonist	64
4.2.5	Bioassays	67
4.2.6	Calcium Channel Blockers	73
4.2.7	Field-stimulated Guinea Pig Isolated Ileum	76
4.3	Rabbit Isolated Jejunum and the Finkleman Preparation	78
4.3.1	Adrenoceptor Sub-types	79
4.4	Isolated Tracheal Rings	80
4.5	Isolated Vas Deferens	82
	Questions on Isolated Tissue Preparations	83
	Answers to Problems	87
	References	92
<b>5</b>	<b>Cardiovascular Preparations</b>	<b>93</b>
5.1	Isolated Perfused Heart Preparations	94
5.1.1	The Langendorff Preparation	95
5.1.2	Cardiac Interactions of Anti-asthma Drugs	98
5.1.3	The Rat Isolated Auricle Preparation	99

CONTENTS	vii
5.2 Thoracic Aorta Preparation	102
5.2.1 Drugs Regulating Nitric Oxide-mediated Relaxation	104
References	105
<b>6 Skeletal Muscle</b>	<b>107</b>
6.1 Types of Skeletal Muscle	107
6.2 Multiply-Innervated Skeletal Muscle Preparations	108
6.2.1 Agonists and Antagonists Acting on the Frog Rectus Abdominis	109
6.2.2 Action of Anticholinesterases on the Dorsal Muscle of the Leech	111
6.3 Focally Innervated Skeletal Muscle Preparations	116
6.3.1 The Frog Gastrocnemius Muscle–Sciatic Nerve Preparation	119
References	120
<b>7 Isolated Cells</b>	<b>121</b>
7.1 Freshly Isolated and Cultured Cells	121
7.1.1 Advantages of Isolated Cells	121
7.1.2 Cultured Cells	122
7.1.3 Cell Counting	122
7.2 Platelets	125
7.2.1 Inhibition of Aggregation by Nitric Oxide Donors	127
7.3 Neutrophils	131
7.3.1 Measurement of NADPH Cytochrome <i>c</i> Reductase	132
7.3.2 Measurement of Intracellular [Ca <sup>2+</sup> ]	134
References	139
<b>8 Biochemical Pharmacology</b>	<b>141</b>
8.1 Pharmacological Applications of Common Biochemical Techniques	141
8.2 Enzyme Inhibitors	142
8.3 Acetylcholinesterase Inhibitors	143
8.4 Monoamine Oxidase Inhibitors	145
8.4.1 Sub-cellular Distribution of MAO Activity	146
8.4.2 Specificity of MAO Inhibitors for Isoenzymes	149
8.5 Thrombin Inhibitors	151
8.6 ATPase Inhibitors	155
References	158

<b>9 Complementary Methods for Teaching Practical Pharmacology</b>	<b>161</b>
9.1 The Comparative Merits of Available Methods	161
9.2 Interpretation of Experimental Data	162
9.2.1 Behavioural Experiments	162
9.2.2 Analysis of Metabolites of 5-hydroxytryptamine	166
9.2.3 Radioligand Binding	167
Answers to Questions	171
References	176
<b>10 Communicating Results</b>	<b>177</b>
10.1 Preliminary Reports	177
10.1.1 Tables	178
10.1.2 Graphs	178
10.1.3 Bar Graphs	179
10.1.4 Preliminary Conclusions	179
10.2 Poster Presentations	180
10.3 Oral Presentations	181
10.4 Project Reports	183
10.5 Pharmacological Literature	184
10.6 How to Cite Scientific Information Sources	187
10.7 Plagiarism	188
References	188
<b>Appendix 1: Molecular Weights of Commonly Used Drugs</b>	<b>189</b>
<b>Appendix 2: Useful Resources for Practical Pharmacology</b>	<b>191</b>
<b>Index</b>	<b>193</b>