CONTENTS

Preface to the second edition xiii
Preface to the first edition xvii
List of abbreviations xix

1 Introduction 1

2 Techniques 7
   Routes of drug administration
   Systemic administration
   Local administration
   Electrophysiological methods
   Biochemical and histochemical techniques

PERIPHERAL NERVOUS SYSTEM 14

3 Neuromuscular junction 14
   Techniques
   Synaptic transmission
   The acetylcholine receptor
   Activation of the receptor
   Sites of drug action at the neuromuscular junction
   Prejunctional drug action
   Postjunctional drug action
   Pharmacological characterisation of neuromuscular blocking agents
   Myaesthenia gravis
   Denervation supersensitivity

4 Autonomic nervous system 43
   Neurotransmitters
   Drug action in the autonomic nervous system
   Ganglionic sites of action
The structure and function of sympathetic nerves
The metabolism of catecholamines
The uptake and storage of catecholamines
Receptors for noradrenaline
Membrane and intracellular consequences of
adrenoceptor activation
Directly and indirectly acting sympathomimetic
amines
Inhibition of uptake mechanisms
Miscellaneous drug actions
The importance of uptake mechanisms in the
actions of some adrenergic neurone blocking
drugs
Other antihypertensive drugs
Denervation supersensitivity
Cholinergic transmission at autonomic post-
ganglionic nerve endings
Muscarinic receptors
Cholinesterase inhibitors

CENTRAL NERVOUS SYSTEM

5 Central neurotransmitters and
neuromodulators
Acetylcholine
Amino acids
Catecholamines and 5-hydroxytryptamine
Polypeptides

6 The blood-brain barrier
The nature of the blood-brain barrier
Factors affecting rate of transfer of substances
to and from the brain
Developmental aspects
Neurotoxicity
Summary

7 General anaesthetics
Types of general anaesthetic
Gaseous anaesthetics
Contents

Volatile anaesthetics
Soluble (intravenous) anaesthetics
Mechanisms of anaesthesia
Physico-chemical theories
Difficulties with physico-chemical theories
Localisation of the effects of anaesthetics on neurones
Pre- and postsynaptic effects
Differential effects on excitatory neurotransmitters
Effects on presynaptic inhibition
Selective effects upon different areas of the brain and on spinal reflexes
Conclusions
Tolerance to anaesthetics

8 Pain and analgesia 118
Peripheral pain mechanisms
Peripheral nerve fibres
Activation of pain receptors and mediators
The action of aspirin
The action of capsaicin
Central pain pathways
Processing in the spinal cord
Morphine-like analgesics
Structure of morphine-like drugs
Actions of morphine-like drugs
The opiate receptor
Localisation of the receptor
Endogenous ligands for opiate receptors
Analgesia and opioid peptides
Multiple receptors for opioid peptides
Involvement of opioid peptides in pain
Sites of opiate action
Descending control and analgesia
Cellular actions of opiates
Tolerance to opiates

9 Drug interactions with inhibitory amino acids 144
Convulsants
Anxiety-reduction and sedative-hypnotics
Contents

Treatment
Alzheimer’s disease

Selected reading 217
Index 225