Contents

| List of | plates | ix |
|---------|--|----------|
| List of | figures | xiii |
| List of | tables | xvii |
| Preface | | xix |
| Acknow | vledgements | xxi |
| 1 T | he scope of forensic entomology | 1 |
| 1. | 1 Forensic entomology in urban contexts | 1 |
| 1. | 2 Stored product infestation and forensic entomology | 2 |
| 1. | 3 Forensic entomology in the medico-legal context | 3 |
| 1. | The instory of forensic entomology Professional associations for forensic entomologists | 9 |
| 1. | 6 The UK regulator for forensic science | 10 |
| 1. | 7 Web addresses of relevant organisations | 11 |
| 2 F | prensic entomology, DNA and entomotoxicology | 12 |
| 2. | 1 Preparation of specimens for molecular analysis | 15 |
| 2. | 2 Methods of analysis and sources of information | 16 |
| 2. | 3 Alternative methods | 20 |
| 2. | 4 Validity of methodologies | 21 |
| 2. | 5 The use of other molecular means of insect species determination | 23 |
| 2. | Forensic applications of arthropod behaviour for chemical analysis | 24 27 |
| 3 Ir | sects and decomposition | 29 |
| 3. | 1 Indicators of 'time of death' | 29 |
| 3. | 2 Stages of decomposition of a body | 30 |
| 3. | 3 Volatiles released from the body during decomposition | 36 |
| 3. | 4 Decomposition in specific circumstances | 38 |

| CONTENTS | |
|----------|--|
| | |

| 4 | Identifying flies that are important in forensic entomology | 42 |
|---|---|-----|
| | 4.1 What is a fly and how do I spot one? | 48 |
| | 4.2 The fly lifecycle | 53 |
| | 4.3 Forensically important families of flies | 60 |
| | 4.4 Members of other orders that have forensic relevance in aquatic cases | 73 |
| | 4.5 Review technique: larval spiracles or mouthparts – preparation of | 75 |
| | whole slide mounts | 15 |
| 5 | Key for the identification of European and Mediterranean | |
| | blowflies (Diptera, Calliphoridae) of medical and veterinary | |
| | importance – adult flies | 77 |
| | 5.1 Introduction | 77 |
| | 5.2 Key | 80 |
| 6 | Identifying beetles that are important in forensic entomology | 82 |
| | 6.1 What do beetles look like? | 82 |
| | 6.2 The life stages of the beetles | 87 |
| | 6.3 Selected forensically relevant families of beetles | 88 |
| | 6.4 Features used in identifying forensically important beetle families | 89 |
| | 6.5 Identification of beetle families using DNA | 97 |
| | 6.6 Key to selected forensically relevant families in the order Coleoptera | 98 |
| 7 | Sampling at the crime scene | 101 |
| | 7.1 Entomological equipment to sample from a corpse | 101 |
| | 7.2 Catching adult flying insects at the crime scene | 104 |
| | 7.3 The sampling strategy for the body | 106 |
| | 7.4 Sampling at aquatic crime scenes | 108 |
| | 7.5 Obtaining meteorological data at the crime scene | 109 |
| 8 | Rearing insects and other laboratory investigations | 111 |
| | 8.1 Transporting entomological evidence to the laboratory | 111 |
| | 8.2 Laboratory conditions for fly rearing | 112 |
| | 8.3 Methods of maintaining and rearing insects – terrestrial species | 113 |
| | 8.4 Dietary requirements of insects reared in the laboratory | 116 |
| | 8.5 Beelle rearing in the laboratory | 117 |
| | 8.0 Methods of maintaining aquatic species | 119 |
| 9 | Calculating the post mortem interval | 121 |
| | 9.1 Working out the base temperature | 123 |
| | 9.2 Accumulated degree data | 124 |
| | 9.3 Calculation of accumulated degree hours (or days) from crime-scene data | 127 |
| | 9.4 Sources of error | 128 |
| | 9.5 Use of farval growth in length to determine post mortem interval | 120 |
| | (isomegaten diagrams and isomorphen diagrams) | 130 |
| | 7.0 Calculating the post mortem interval using succession | 132 |

vi

| | | CONTENTS | vii |
|-----|-------------------|--|-------------------|
| | 9.7 9.8 9.9 | The effects of hymenopteran parasitoids on post mortem interval determination Review technique: interpretation of data from a crime scene case study Further reading | 137 137 138 |
| 10 | Ecol | ogy of forensically important flies | 139 |
| | 10.1 | Ecological relationships of some forensically relevant families | 140 |
| | 10.2 | Specific family features | 144 |
| | 10.3 | Fly infestation of the living | 151 |
| | 10.4 | Flies influencing the crime scene | 154 |
| 11 | The | ecology of some forensically relevant beetles | 156 |
| | 11.1 | Ecology of carrion beetles (Silphidae) | 157 |
| | 11.2 | Ecology of skin, hide, and larder beetles (Dermestidae) | 159 |
| | 11.3 | Ecology of clown beetles (Histeridae) | 163 |
| | 11.4 | Ecology of chequered or bone beetles (Cleridae) | 164 |
| | 11.5 | Ecology of rove beetles (Staphylinidae) | 165 |
| | 11.6 | The ecology of dung beetles and related families | 166 |
| | 11./ | Ecology of ground beetles (Carabidae) | 168 |
| 12 | Inve | stigations in an aquatic environment | 169 |
| | 12.1 | Decomposition and submergence in water | 170 |
| | 12.2 | The nature of the water bodies in which submergence may take place | 176 |
| | 12.3 | Methods of establishing time since corpse submergence – | |
| | | indicator species | 179 |
| | 12.4 | Attractants to the corpse | 182 |
| | 12.5 | Methods of culturing aquatic insects | 182 |
| | 12.6 | Algae an alternative source of determining time since submergence | 182 |
| 13 | The | forensic entomologist in court | 184 |
| | 13.1 | The expert's report | 185 |
| | 13.2 | The content of the expert's report | 187 |
| | 13.3 | The forensic expert in the courtroom | 194 |
| | 13.4 | Communicating entomological facts in court | 195 |
| | 13.5 | Physical evidence: its continuity and integrity | 195 |
| | 13.6 | The code of practice for experts | 196 |
| | 13.7 | Use of single joint experts | 198 |
| | 13.8 | Practical assignment – writing an expert report using the post | 100 |
| | 12.0 | Further reading on response in court | 198 |
| | 13.9 | Web site addresses | 190 |
| | 15.10 | J web site addresses | 199 |
| Арр | Appendices | | |
| Glo | Glossary | | 205 |
| Ref | erence | es | 216 |
| Ind | Index | | 241 |