# Contents

1 Life Through Ages: An Overview ........................................... 1
   References ........................................................................... 5

2 Sponges ............................................................................. 7
  2.1 Introduction ..................................................................... 7
  2.2 Structural Features ...................................................... 9
      2.2.1 Ascon Type ......................................................... 9
      2.2.2 Syon Type .......................................................... 9
      2.2.3 Leucon Type (or Rhagon Type) .............................. 12
  2.3 Cell Terminology ......................................................... 12
  2.4 Skeleton ................................................................. 13
      2.4.1 Spicules .............................................................. 13
      2.4.2 Spicule Size and Nomenclature ............................. 15
  2.5 Classification ............................................................ 16
      2.5.1 Class Calcarea Bowerbank (Calcispongia or Calcareous Sponges) .............. 18
      2.5.2 Class Demospongea Sollas ................................. 22
      2.5.3 Class Hexactinellida Schmidt (Hyalosponges or “Glass Sponges”) .......... 25
      2.5.4 Class Sclerospongiae ......................................... 27
      2.5.5 Archaeocyatha .................................................. 28
   References ........................................................................... 29

3 Cephalopods .................................................................... 31
  3.1 Introduction ................................................................... 31
  3.2 General Morphology .................................................... 39
  3.3 Modifications of the Shell ............................................. 42
      3.3.1 Apertural Modifications ......................................... 42
      3.3.2 Constrictions and Growth Lines ............................ 45
      3.3.3 Phragmocone ....................................................... 46
      3.3.4 Shell Shape ......................................................... 55
      3.3.5 Shell Outline ....................................................... 56
3.3.6 Shell Form .................................. 58
3.3.7 Whorl ...................................... 60
3.3.8 Types of Whorl Section ....................... 62
3.3.9 Types of Venter .............................. 62
3.3.10 Ornamentation ............................... 64
3.4 Size of a Cephalopod Shell ....................... 71
3.5 Classification .................................... 73
3.6 Geological History ............................... 73
3.7 Distribution Through Time ........................ 77
  3.7.1 Subclass Nautiloidea ......................... 77
  3.7.2 Order Endocerida (485–430 Ma) ............... 80
  3.7.3 Order Actinocerida (480–312 Ma) .............. 82
  3.7.4 Order Bactritida (418.1–260.5 Ma) .......... 83
  3.7.5 Subclass Ammonoidea (479–66 Ma) ............ 84
  3.7.6 Subclass Coleoidea (410 Ma to Recent) ....... 91
References ............................................. 101

4 Pelecypoda ............................................. 103
  4.1 Introduction ..................................... 103
  4.2 Basic Morphology ................................ 103
  4.3 Terminology ...................................... 104
    4.3.1 General Shell Morphological Terms ........... 104
    4.3.2 Shell Form .................................. 108
    4.3.3 Shell Ornamentation .......................... 108
    4.3.4 Umbo/Beak Position .......................... 112
    4.3.5 Shell Structure .............................. 112
    4.3.6 Dentition .................................... 114
    4.3.7 Ligament ..................................... 116
    4.3.8 Muscle Scars ............................... 118
    4.3.9 Gills ....................................... 119
  4.4 Classification .................................... 119
  4.5 Geological History ............................... 119
References ............................................. 134

5 Trilobites ............................................. 137
  5.1 Introduction ..................................... 137
  5.2 Shell ........................................... 138
  5.3 Terminology ...................................... 146
    5.3.1 Cephalon .................................... 146
    5.3.2 Thorax ....................................... 153
    5.3.3 Pygidium ..................................... 154
  5.4 Growth Stages .................................... 155
  5.5 Enrolment ....................................... 157
  5.6 Classification .................................... 159
5.7 Geological History and Distribution .................................. 159
References .......................................................... 172

6 Echinoids .......................................................... 175
6.1 Introduction .................................................. 175
6.2 General Morphology ........................................ 176
6.3 Orientation of Echinoids ...................................... 186
6.4 Irregular Echinoids ........................................... 186
  6.4.1 Holocryptoids ........................................ 190
  6.4.2 Cassiduloida ........................................... 190
  6.4.3 Clypeasteroids ......................................... 190
  6.4.4 Spatangoids ............................................ 191
6.5 The Echinoderm-Backbone Connection ...................... 191
6.6 Terminology ................................................ 192
6.7 Classification ................................................ 198
  6.7.1 Class Asteroidea (Sea Stars; Starfishes) ............ 199
  6.7.2 Class Ophiuroidea (the Brittle Stars) ............... 199
  6.7.3 Classes Holothuroidea and Concentricycloidea (Sea
        Cucumbers and Sea Daisies) .......................... 200
  6.7.4 Echiurostes ........................................... 200
  6.7.5 Class Crinoidea (Sea Lilies and Feather Stars;
        Crinoids) .............................................. 201
  6.7.6 Class Blastioidea (Blastoids) ........................ 201
  6.7.7 Eocrinoids ............................................ 202
  6.7.8 Class Paracrinoidea (Allied to Crinoids) .......... 202
  6.7.9 Carpoids .............................................. 202
6.8 Geological History .......................................... 203
References .......................................................... 209

7 Graptolites ...................................................... 211
7.1 Introduction ................................................ 211
7.2 General Morphology ......................................... 211
7.3 Taxonomic Relationships of Graptolites .................... 217
  7.3.1 Chordates ............................................. 217
  7.3.2 Hemichordates ....................................... 218
7.4 Classification ................................................ 218
7.5 Geological History .......................................... 218
References .......................................................... 226

8 Brachiopods ...................................................... 229
8.1 Introduction ................................................ 229
8.2 The Shell .................................................. 231
8.3 Terminology ................................................ 241
  8.3.1 General Terms ...................................... 241
  8.3.2 Shell Features ...................................... 242
Fundamentals of Invertebrate Palaeontology
Macrofossils
Jain, S.
2017, XI, 405 p. 209 illus., Hardcover
ISBN: 978-81-322-3656-6