

Contents

1 A general introduction to paleoreconstruction and stable isotopes	1
1.1 The aim of this thesis	3
1.2 Carbon isotopes	4
1.3 Oxygen isotopes.....	6
1.4 Strontium isotopes	8
1.5 Thesis outline.....	9
2 Taphonomy and paleopathology of the Late Cretaceous marine turtle <i>Allopleuron hofmanni</i>	11
2.1 Introduction	12
2.2 Collections.....	13
2.3 Relative frequencies of skeletal elements	13
2.4 Pathologies	15
2.5 Morphological abnormalities.....	17
2.6 Size distribution	19
2.7 Conclusions	21
3 Oxygen and carbon stable isotope records of marine vertebrates from the type Maastrichtian (Late Cretaceous)	23
3.1 Introduction	24
3.2 Materials and methods.....	24
3.2.1 Sample materials.....	24
3.2.2 Experimental methods	25
3.3 Results and discussion	27
3.3.1 Comparison to a modern dataset.....	32
3.3.2 Neosalachian $\delta^{18}\text{O}$ values.....	33
3.3.3 Paleotemperature calculation.....	34
3.3.4 Marine turtle $\delta^{18}\text{O}$ values.....	35
3.3.5 Neosalachian $\delta^{13}\text{C}$ values	36

3.3.6 Marine turtle $\delta^{13}\text{C}$ values	37
3.4 Conclusions	39
4 Tooth enamel stable isotopes of Holocene and Pleistocene fossil fauna reveal glacial and interglacial paleoenvironments of hominins in Indonesia.....	41
4.1 Introduction	42
4.2 Background	43
4.3 Materials and methods.....	45
4.4 Preservation of stable isotopes in tooth enamel.....	47
4.5 Stable isotope patterns in well-preserved tooth enamel from Sundaland.....	48
4.5.1 Hoekgrot.....	50
4.5.2 Wajak.....	50
4.5.3 Punung	51
4.5.4 Padang and Sibrambang.....	51
4.5.5 Trinil.....	51
4.5.6 Sangiran.....	52
4.6 Linking vegetation balance to climatic background.....	53
4.7 Stable isotope values in <i>Homo erectus</i> bone	54
4.8 Conclusions	56
Appendix A.....	59
Appendix B.....	67
5 Strontium isotopes as an indicator of habitat use in Pleistocene fossil faunas from Java, Indonesia.....	69
5.1 Introduction	70
5.2 Regional setting	71
5.3 Materials and methods.....	73
5.3.1 Isoscapes	73
5.3.2 Sr isotope analysis on faunal enamel	75
5.4 Results and discussion	77
5.4.1 Hoekgrot and Wajak.....	80
5.4.2 Punung	81
5.4.3 Trinil.....	82

5.4.4 Sangiran.....	85
5.4.5 Comparison with stable isotope data.....	86
5.5 Conclusions.....	88
Appendix.....	91
6 Synthesis.....	93
6.1 Diagenesis: an inevitable and ineradicable factor	94
6.1.1 Improving our diagenetic screening protocol	94
6.1.2 Expanding our repertoire of screening techniques.....	95
6.1.3 Chemical pre-treatment: towards an optimal approach	97
6.2 Valuable collections, valuable knowledge	99
6.2.1 Reducing sample size	99
6.2.2 On the importance of rigorous record keeping.....	101
6.3 Paleovegetation and climate dynamics	103
6.4 Ranging patterns and migration	106
6.5 Isotope ratios as determined by a complex interplay of processes.....	108
Summary.....	111
References	115
Acknowledgements.....	137
About the author.....	139
List of publications	141

