# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Figures</td>
<td>xi</td>
</tr>
<tr>
<td>List of Tables</td>
<td>xvii</td>
</tr>
<tr>
<td>List of Appendices</td>
<td>xxi</td>
</tr>
<tr>
<td>Prologue</td>
<td>xxiii</td>
</tr>
<tr>
<td><strong>1 The Research Problem</strong></td>
<td>1</td>
</tr>
<tr>
<td>Framing the Problem: Did Neandertals and Early Modern Humans Differ in Terms of Foraging Behaviors?</td>
<td>2</td>
</tr>
<tr>
<td>Organization of the Book</td>
<td>4</td>
</tr>
<tr>
<td><strong>2 Human Origins and the Problem of Neandertals</strong></td>
<td>5</td>
</tr>
<tr>
<td>Twentieth-Century Thought and the Emergence of the Replacement Model</td>
<td>5</td>
</tr>
<tr>
<td>Saint-Césaire and the Upper Paleolithic Neandertals</td>
<td>7</td>
</tr>
<tr>
<td>Current Issues in the Modern Human Origins Debate</td>
<td>10</td>
</tr>
<tr>
<td>Early Modern Human Fossils in Europe</td>
<td>10</td>
</tr>
<tr>
<td>Geographic Origin of the Aurignacian</td>
<td>11</td>
</tr>
<tr>
<td>Early Modern Human versus Neandertal Behaviors</td>
<td>12</td>
</tr>
<tr>
<td>Genetic Evidence for a Population Expansion</td>
<td>13</td>
</tr>
<tr>
<td>Formulation of a Test Applicable to Archaeological Remains</td>
<td>16</td>
</tr>
<tr>
<td>The Demic Expansion Hypothesis and Its Ecological Implications</td>
<td>16</td>
</tr>
<tr>
<td>Assumptions Underlying the Archaeological Test</td>
<td>18</td>
</tr>
<tr>
<td><strong>3 Foraging Theory and the Archaeological Record</strong></td>
<td>19</td>
</tr>
<tr>
<td>The Prey Choice Model</td>
<td>21</td>
</tr>
<tr>
<td>The Patch Choice Model</td>
<td>22</td>
</tr>
<tr>
<td>The Marginal Value Theorem</td>
<td>23</td>
</tr>
<tr>
<td>Central Place Foraging Models</td>
<td>25</td>
</tr>
<tr>
<td>Problems in Archaeological Applications</td>
<td>27</td>
</tr>
<tr>
<td>The Body Size Rule</td>
<td>27</td>
</tr>
<tr>
<td>Abundance Indices</td>
<td>37</td>
</tr>
<tr>
<td>Currency and Foraging Goals in Humans</td>
<td>38</td>
</tr>
<tr>
<td>Operationalizing the Test of the Intensification Hypothesis</td>
<td>39</td>
</tr>
<tr>
<td>A Problem of Equifinality: Climate as a Cause of Diet Widening</td>
<td>39</td>
</tr>
</tbody>
</table>
## Contents

- Faunal Implications with Respect to Prey Choice 41
- Prey Choice at the Individual Level 47
- Selection of Marrow and Bone Grease Elements 51
- Why Saint-Césaire? 51
- Summary of the Predictions 52

4 **Saint-Césaire** 54
- The Site Stratigraphy 57
- Morphology of the Deposit 60
- Chronology of the Occupations 61
- Human Remains 62
- Paleoecological Setting 63

5 **The Fauna** 65
- Samples and Methods 65
  - Estimating Abundance in the Faunal Samples 66
  - Refitting 69
  - Analysis of the Specimens 70
  - Statistical Methods 73
- Presentation of the Faunal Samples 73
- Taxonomic Composition of the Assemblages 75
- Bison or Aurochs? 77
- Other Faunal Remains 80
- Skeletal Part Representation at Saint-Césaire 83

6 **Taphonomy** 93
- The Chronological Grain at Saint-Césaire 93
- Recovery Methods 94
- Specimen Fragmentation 95
- Patterns of Preservation 98
  - Types of Damage 104
- Agents of Accumulation 105
  - Retouchers 108
  - Carnivores 110
- The Impact of Identification Filters on the Assemblages 113
  - Differential Identification of Skeletal Elements 113
  - Differential Identification of Long Bone Shafts 118
- Effects of Counting Methods on Head Representation 120
- Scalar Effects in Species Identification 122
- Burning 125
- Conclusions on Taphonomy 131

7 **Seasonality** 132
- Biology of the Main Ungulate Species at Saint-Césaire 132
  - Reindeer 132
  - Bison and Horse 133
# Contents

Synchrony of Birthing in Reindeer, Bison, and Horse 134  
Seasonality Patterns in Pleistocene Assemblages from France 135  
Methods Used at Saint-Césaire for Deriving Seasonality Data 137  
Dental Remains 137  
Antler Development and Cycle 139  
Bone Fusion 144  
Fetal Bones 145  
Incorporating Variation in Birth Synchrony in Fetal Age Estimates 145  
Seasons of Procurement in the Assemblages 146  
Conclusions on Seasonality Patterns at Saint-Césaire 159  

8 Transport Decisions and Currency Analysis 162  
Methodological Notes on the Study of Skeletal Representation 162  
Results of the Inter-Assemblage Rank-Order Correlations 164  
Selection of a Currency 166  
Transport Decisions in the Reindeer Assemblages 167  
Transport Decisions in the Bison Assemblages 170  
Transport Decisions in the Horse Assemblages 174  
Summary of the Currency Analysis 179  

9 Testing the Hypotheses 180  
Encounter Rates with High-Return Prey Taxa 181  
Bison Availability 181  
Horse Availability 181  
Age Structure Analysis 184  
Juvenile and Old Adult Representation in the Reindeer Assemblages 184  
Conclusions about Reindeer Age Structure 185  
Transport of Bison and Reindeer Parts 186  
Cranium Transport 186  
Digit Transport 190  
Long Bone Transport 192  
Conclusions on Transport Strategies 198  
Prey Choice at Saint-Césaire 200  
Exploitation of Fast Small-Sized Taxa in the Dry Land Patch 200  
Prey Choice in the Wetland and Freshwater Patches 206  
Intensity of Bone Processing 207  
Bone Grease Rendering 209  
Summary and Discussion 210  

10 Diet Breadth at the Regional Level 212  
Grotte du Renne (Arcy-sur-Cure) 212  
The Faunal Assemblages 213  
Transport Decisions 213  
Fast Small-Bodied Taxa 214  
Bone Processing 216  
Abri Pataud 218  

ix
**Contents**

The Faunal Assemblages 218  
Transport Decisions 218  
Fast Small-Bodied Taxa 219  
Bone Processing 221  
Summary of Diet Breadth in Western France 221  
Diet Breadth in Other Regions of Europe and Southwest Asia 221  
  The Northeastern Plains 224  
  Iberia 226  
  Mediterranean France 230  
  Italy 231  
  The Eastern Mediterranean 234  
Discussion 236  
Conclusions on Diet Breadth in Europe and Western Asia 242

11 An Alternative Look at the Middle to Upper Paleolithic Transition 247  
  How General Was the Shift toward Reindeer Dominance in the Early Aurignacian? 248  
  Results of the Reindeer Dominance Analysis 250  
  Revisiting Mellars’s Reindeer Specialization Hypothesis 250  
  The Relationship between Human Density and Mammal Species Diversity 253  
  Environmental Carrying Capacity in Late Pleistocene France 257  
  The Time Series 260  
    Reindeer Peaks and Millennial-Scale Climatic Events 263  
    The Early Upper Paleolithic “Anomaly” 267  
    Demographic and Genetic Implications 268

12 Concluding Thoughts 272

Appendices 275  
References 311  
Index 357