

Dorset Natural History and Archaeological Society  
Monograph Series: No. 22

This volume describes one of the most exciting and unexpected archaeological discoveries to have been made in Britain in recent years, that of a rare mass grave of executed vikings on Ridgeway Hill, Dorset. The skeletons, around 50 in total, were predominantly of young adult males all of whom had been decapitated: heads had been deposited in a pile at the southern edge of the grave, while the beheaded bodies had been apparently thrown in with little care. Since their recovery experts have undertaken forensic studies of the bones and have applied cutting edge techniques to elicit the most information possible, in order to understand who the individuals were and what circumstances led to their demise. It reveals an extraordinary story of the discovery of what is arguably the most dramatic physical evidence for violence in early medieval Britain ever encountered by archaeologists.



*'Given to the Ground'*

Louise Loe, Angela Boyle, Helen Webb and David Score

# *'Given to the Ground'*

## A Viking Age Mass Grave on Ridgeway Hill, Weymouth



Louise Loe, Angela Boyle,  
Helen Webb and David Score



DORSET NATURAL HISTORY &  
ARCHAEOLOGICAL SOCIETY



SKANSKA

Dorset County Council





# *‘Given to the Ground’*

## **A Viking Age Mass Grave on Ridgeway Hill, Weymouth**

by Louise Loe, Angela Boyle, Helen Webb and David Score

with contributions by

*Lesley Abrams, Edward Biddulph, Don Brothwell, Carolyn Chenery, Mike Donnelly,  
Jane Evans, Brendan Keely, Angela Lamb, Carol Lang, Róisín McCarthy,  
Rebecca Nicholson, Matthew Pickering, Ian Scott, Ruth Shaffrey,  
Hilary Sloane, Carlyn Stewart, Maria Raimonda Usai and Gareth Williams*

illustrations by

*Magdalena Wachnik, Julia Collins, Mark Gridley, Hannah Kennedy,  
Gary Jones and Georgina Slater*

Dorset Natural History and Archaeology Society Monograph Series: No. 22

2014

The publication of this volume has been generously funded by Dorset County Council

Edited and prepared for publication by Rebecca Nicholson

Proceedings of Dorset Natural History and Archaeological Society. Hon. Editor: Paul Lashmar

© Dorset Natural History and Archaeological Society and Oxford Archaeology 2014. All rights reserved

ISBN 978-0-900341-58-8

This book is one of a pair of monographs about the excavations along the route of the Weymouth Relief Road. The companion volume is '*Down to Weymouth Town by Ridgeway*': *Prehistoric, Roman and later sites along the Weymouth Relief Road* (L. Brown, C Hayden and D. Score), DNHAS Monograph Series 23 (2014)

Front cover: photograph of the mass grave during excavation

Back cover: a collection of images from the mass grave

Figure 1.1 contains Ordnance Survey data © Crown copyright and database right 2014

<http://www.ordnancesurvey.co.uk/docs/licences/os-opendata-licence.pdf>

contains Ordnance Survey data © Crown copyright 2014 Ordnance Survey 100005569

Figure 1.2 contains Ordnance Survey data © Crown copyright 2014 Ordnance Survey 100005569

Figure 1.3: commissioned by Dorset County Council copyright © Still Imaging

Figure 5.1 is a facial reconstruction of skull 3761 by Danielle Schumaker and Caroline Wilkinson, University of Dundee

Figures 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.12, and 5.13 © Trustees of the British Museum

Figures 5.11 and 5.14 © Gareth Williams

Figure 5.15 is an artist's reconstruction by Mark Gridley

Unless otherwise stated, all images are © Oxford Archaeology

Designed and typeset by Production Line, Oxford

Printed in Great Britain by Berforts Information Press, Eynsham, Oxford

Dorset County Museum, High West Street, Dorchester DT1 1XA

Oxford Archaeology, Janus House, Osney Mead, Oxford OX2 0ES

*Fame is hushed,  
the world's dignity withers up and shrivels  
as comes to every man now over middle-earth:  
age presses on him, his face grows pale,  
white-haired, he sorrows for his henchmen,  
sons of greatness given to the ground.*

Extract from the Anglo-Saxon poem,  
*The Seafarer*, translated by John Wain



# Contents

List of Figures .....	xi
List of Tables .....	xix
Summary .....	xx
Acknowledgements .....	xxiii

## Chapter 1: Introduction

BACKGROUND TO THE EXCAVATION .....	1
LOCATION, GEOLOGY AND TOPOGRAPHY .....	1
ARCHAEOLOGICAL BACKGROUND .....	1
Burial activity within the locality .....	4
<i>Prehistoric</i> .....	4
<i>Roman</i> .....	6
<i>Early medieval</i> .....	7
Execution cemeteries .....	8
Other comparable contexts .....	9
HISTORICAL BACKGROUND <i>by Lesley Abrams</i> .....	10
Introduction .....	10
Scandinavians overseas .....	10
Death and burial .....	13
The site .....	15
ARCHAEOLOGICAL WATCHING BRIEF AND EXCAVATION METHODOLOGY .....	16
CONTENTS AND LOCATION OF ARCHIVE .....	16
Archive contents .....	17
STRUCTURE OF THIS VOLUME .....	17

## Chapter 2: Archaeological Description

INTRODUCTION .....	19
THE GRAVE (GROUP NO. 3682) .....	19
THE SKULLS (GROUP NO. 3776) .....	26
THE INFRA-CRANIAL SKELETONS (GROUP NO. 3765) .....	27
Sequence of deposition .....	27
BODY POSITION AND ORIENTATION .....	35
THE DISARTICULATED BONES (CONTEXTS 3681 AND 3685) .....	37
FINDS .....	38
<i>Worked stone by Ruth Shaffrey</i> .....	38
<i>Metalwork by Ian Scott</i> .....	38
<i>Later prehistoric and Roman pottery by Edward Biddulph</i> .....	39
<i>Flint by Mike Donnelly</i> .....	40
<i>Animal bone by Rebecca Nicholson</i> .....	41
ORGANIC RESIDUE ANALYSIS OF SOILS FROM THE GRAVE <i>by Matthew Pickering,</i> <i>Carol Lang, Maria Raimonda Usai, Brendan Keely and Don Brothwell</i> .....	42
RADIOCARBON DATING .....	42

## Chapter 3: Analyses of the Human Skeletons

INTRODUCTION .....	45
METHODOLOGY .....	45
Recording peri-mortem trauma .....	46
Comparative analyses .....	48
RE-ASSOCIATION EXERCISE BETWEEN SKULLS AND SKELETONS <i>by Louise Loe,</i> <i>Helen Webb and Angela Boyle</i> .....	49
THE SKULLS <i>by Angela Boyle</i> .....	50
Quantification .....	50
Number of individuals .....	50
Preservation, completeness and element representation .....	50
Ancestry .....	53
Biological sex .....	53
Biological age .....	53
Dental attrition as an ageing method .....	53
Arachnoid granulations as an ageing method .....	57
Cranial suture closure as an ageing method .....	57
Epiphyseal fusion as an ageing method .....	57
Metric assessment .....	57
Non-metric assessment .....	59
Cranial and vertebral traits .....	59
Dental anomalies .....	59
Dental health .....	60
Caries .....	61
Calculus .....	61
Periapical cavities .....	61
Periodontal disease and ante-mortem tooth loss (AMTL) .....	61
Dental enamel hypoplasia .....	62
Abnormal dental attrition .....	62
Dental modification .....	63
Dental trauma .....	64
Ante-mortem pathology and trauma .....	67
Non-specific bone inflammation .....	67
Joint disease .....	67
Schmorl's nodes .....	68
Cribra orbitalia .....	68
Button or ivory osteoma .....	68
Peri-mortem trauma .....	71
Minimum number of injuries .....	71
Minimum number of elements affected .....	71
Location .....	71
Directionality .....	72
Sharp force trauma not directly associated with decapitation .....	72
Sharp force trauma associated with decapitation .....	77
Overall patterns of decapitation .....	80
THE INFRA-CRANIAL SKELETONS <i>by Louise Loe and Helen Webb</i> .....	81
Quantification .....	81
Re-association exercise .....	82

## Contents

Number of individuals.....	82
Preservation .....	82
Demography .....	83
Stature .....	84
Robusticity .....	85
<i>Indices</i> .....	85
<i>Muscle, tendon and ligament attachment sites</i> .....	86
Upper limb asymmetry and handedness .....	87
Non-metric traits .....	87
Ante-mortem pathology and trauma .....	89
<i>Congenital and developmental abnormalities</i> .....	89
<i>Metabolic conditions</i> .....	91
<i>Infection</i> .....	91
<i>Extra-spinal joint disease</i> .....	96
<i>Conditions of the spine</i> .....	97
<i>Circulatory disorders</i> .....	98
<i>Miscellaneous pathology</i> .....	99
<i>Trauma</i> .....	100
Peri-mortem trauma .....	105
<i>Sharp force trauma</i> .....	105
<i>Indirect peri-mortem trauma</i> .....	124
<i>Pseudo peri-mortem trauma</i> .....	125
THE DISARTICULATED BONES <i>by Helen Webb, Angela Boyle and Róisín McCarthy</i> .....	127
STABLE ISOTOPE ANALYSES <i>by Carolyn Chenery, Angela Lamb, Jane Evans, Hilary Sloane and     Carlyn Stewart</i> .....	128
OSTEOLOGICAL ANALYSIS OF THE HUMAN SKELETONS: SUMMARY RESULTS	
<i>by Louise Loe</i> .....	129
Number of individuals.....	129
Condition and taphonomy.....	130
Demography .....	130
Physical attributes, ante-mortem pathology and trauma .....	132
Peri-mortem trauma .....	132
 <b>Chapter 4: Catalogue of the Skeletons</b>	
INTRODUCTION .....	135
THE SKULLS <i>by Angela Boyle</i> .....	135
Skull 3686 .....	135
Skull 3692 .....	136
Skull 3693 .....	136
Skull 3694 .....	137
Skull 3695 .....	137
Skull 3696 .....	138
Skull 3704 .....	138
Skull 3705 .....	139
Skull 3706 .....	140
Skull 3707 .....	140
Skull 3708 .....	141
Skull 3709 .....	141



Skull 3710 .....	142
Skull 3711 .....	143
Skull 3712 .....	143
Skull 3720 .....	144
Skull 3721 .....	145
Skull 3722 .....	145
Skull 3723 .....	146
Skull 3724 .....	147
Skull 3725 .....	147
Skull 3726 .....	147
Skull 3728 .....	148
Skull 3729 .....	149
Skull 3730 .....	149
Skull 3731 .....	150
Skull 3732 .....	150
Skull 3733 .....	151
Skull 3734 .....	151
Skull 3735 .....	152
Skull 3736 .....	152
Skull 3737 .....	153
Skull 3738 .....	153
Skull 3739 .....	154
Skull 3740 .....	155
Skull 3741 .....	155
Skull 3742 .....	155
Skull 3743 .....	156
Skull 3744 .....	156
Skull 3746 .....	157
Skull 3747 .....	158
Skull 3748 .....	158
Skull 3749 .....	159
Skull 3750 .....	159
Skull 3751 .....	160
Skull 3752 .....	161
Skull 3757 .....	161
Skull 3758 .....	162
Skull 3759 .....	162
Skull 3760 .....	163
Skull 3761 .....	164
THE INFRA-CRANIAL SKELETONS <i>by Helen Webb</i> .....	164
Skeleton 3687 .....	164
Skeleton 3688 .....	165
Skeleton 3689 .....	165
Skeleton 3697 .....	166
Skeleton 3698 .....	167
Skeleton 3699 .....	167
Skeleton 3700 .....	168
Skeleton 3713 .....	168
Skeleton 3714 .....	169

## Contents

Skeleton 3715 .....	169
Skeleton 3716 .....	170
Skeleton 3719 .....	171
Skeleton 3753 .....	171
Skeleton 3754 .....	172
Skeleton 3755 .....	173
Skeleton 3756 .....	174
Skeleton 3762 .....	175
Skeleton 3763 .....	176
Skeleton 3764 .....	178
Skeleton 3767 .....	178
Skeleton 3768 .....	179
Skeleton 3769 .....	179
Skeleton 3770 .....	180
Skeleton 3771 .....	180
Skeleton 3772 .....	181
Skeleton 3773 .....	181
Skeleton 3774 .....	182
Skeleton 3775 .....	183
Skeleton 3777 .....	184
Skeleton 3778 .....	184
Skeleton 3779 .....	186
Skeleton 3780 .....	186
Skeleton 3781 .....	187
Skeleton 3782 .....	186
Skeleton 3783 (re-associated with 3766) .....	189
Skeleton 3784 .....	189
Skeleton 3785 .....	190
Skeleton 3786 .....	191
Skeleton 3787 .....	191
Skeleton 3788 .....	192
Skeleton 3789 .....	193
Skeleton 3790 .....	194
Skeleton 3791 .....	194
Skeleton 3792 (re-associated with 3797) .....	195
Skeleton 3793 .....	196
Skeleton 3794 .....	196
Skeleton 3795 .....	197
Skeleton 3796 .....	197
Skeleton 3798 .....	198
Skeleton 3799 .....	199
Skeleton 3800 .....	200
Skeleton 3801 .....	201
Skeleton 3802 .....	201
Skeleton 3803 .....	202
Skeleton 3804 .....	203
Skeleton 3805 (re-associated with 3807 and 3808) .....	204
Skeleton 3806 .....	205
Skeleton 3809 .....	206

Skeleton 3810 .....	206
Skeleton 3811 .....	208
Skeleton 3812 .....	209

## **Chapter 5: Discussion and Interpretation**

INTRODUCTION .....	211
WHO WERE THE PEOPLE BURIED IN THE GRAVE? .....	211
Origins .....	211
Physical attributes .....	211
Health status .....	213
WEAPONS AND ARMOUR <i>by Gareth Williams</i> .....	214
Bows .....	214
Spears .....	215
Axes .....	217
Swords .....	218
Seax .....	220
Armour .....	221
THE EXECUTION .....	224
Method of decapitation .....	224
PATTERNS OF DECAPITATION IN A BROADER ARCHAEOLOGICAL CONTEXT .....	227
NON-DECAPITATION RELATED INJURIES: SIGNIFICANCE AND INTERPRETATION .....	229
DISPOSAL OF THE BODIES .....	231
Method of burial .....	231
Missing skulls and <i>heafod stoccan?</i> .....	232
The location of the grave .....	233
CONCLUSIONS AND FURTHER WORK .....	233

## **Specialist Appendices**

APPENDIX 1 Organic Residue Analysis of Soils <i>by Matthew Pickering, Carol Lang, Maria Raimonda Usai, Brendan Keely and Don Brothwell</i> .....	237
APPENDIX 2 The Disarticulated Human Bone <i>by Helen Webb, Angela Boyle and Róisín McCarthy</i> .....	247
APPENDIX 3 Isotope Analysis of Individuals from the Ridgeway Hill Mass Grave <i>by Carolyn Chenery, Angela Lamb, Jane Evans, Hilary Sloane and Carlyn Stewart</i> .....	259
Bibliography .....	285
Index .....	301

# List of Figures

Fig. 1.1	Site location.....	2
Fig. 1.2	Overall plan of excavation and watching brief areas at Ridgeway Hill.....	3
Fig. 1.3	Aerial photographs showing the location of the mass grave.....	5
Fig. 1.4	The mass grave in relation to other burial activity and Roman quarry pits.....	6
Fig. 2.1	Working shot of the mass grave in the early stages of excavation.....	19
Fig. 2.2	Excavation working shot (most of the deposit exposed).....	20
Fig. 2.3	Detailed view of the mass grave during excavation.....	21
Fig. 2.4	Overall plan of the mass grave.....	22
Fig. 2.5	East facing section through the mass grave after removal of the human skeletal remains.....	23
Fig. 2.6	3D view of the mass grave.....	24
Fig. 2.7	The skulls.....	25
Fig. 2.8	Position of skulls.....	26
Fig. 2.9	Plan and photograph of fragmented skulls 3692, 3693, 3694, 3695 and 3696.....	26
Fig. 2.10	Isolated limbs and extremities.....	28
Fig. 2.11	Plan showing the possible earliest burials.....	29
Fig. 2.12	Plan showing skeletons that were probably deposited late in the sequence.....	34
Fig. 2.13	Orientation of skeletons.....	35
Fig. 2.14	Skeleton 3777, example of prone position.....	36
Fig. 2.15	Skeleton 3794, example of supine position.....	36
Fig. 2.16	Skeleton 3763, example of skeleton positioned on right side.....	37
Fig. 2.17	Skeleton 3809, example of skeleton positioned on left side.....	38
Fig. 2.18	Body position of skeletons.....	38
Fig. 2.19	Limestone balls recovered from the grave (context 3685).....	39
Fig. 2.20	Combined radiocarbon dates from skeletons 3698, 3804 and 3763.....	42
Fig. 3.1	Completeness of skulls.....	50
Fig. 3.2	Number of cranial elements present.....	51
Fig. 3.3	Number of cervical vertebrae present.....	51
Fig. 3.4	Number of vertebral elements present with skulls.....	51
Fig. 3.5	Bone surface condition of skulls (after McKinley 2004, 16).....	51
Fig. 3.6	Skull 3761.....	52
Fig. 3.7	Mortality profile of skulls.....	53
Fig. 3.8	Skull 3707, unusual mandibular wear.....	56
Fig. 3.9	Skull 3723, unusual maxillary wear.....	56
Fig. 3.10	Skull 3729, unusual mandibular wear.....	56
Fig. 3.11	Skull 3743, unusual maxillary wear.....	57
Fig. 3.12	Frequency of periodontal disease by grade.....	61
Fig. 3.13	Skull 3709, unusual mandibular wear.....	63
Fig. 3.14	Skull 3736, incised horizontal grooves on upper first incisors.....	63
Fig. 3.15	Skull 3705, notched upper left second incisor.....	64
Fig. 3.16	Skull 3709, first and second maxillary incisors with subtle notched appearance.....	64
Fig. 3.17	Skull 3710, polished wear facet on first left mandibular incisor.....	64
Fig. 3.18	Skull 3744, vertical groove on the crown of the upper left second maxillary incisor.....	64
Fig. 3.19	Skull 3722, notched upper right first incisor.....	64
Fig. 3.20	Skull 3709, sharp-force peri-mortem trauma to the right side and anterior of the mandible.....	66



Fig. 3.21	Skull 3709, upper right first and second molars with chipped surfaces. ....	66
Fig. 3.22	Skull 3711, sheared upper left first molar crown .....	66
Fig. 3.23	Skull 3712, sheared lower right second molar .....	66
Fig. 3.24	Skull 3744, horizontal cut through right mandible with fractured first molar .....	67
Fig. 3.25	Skull 3751, sheared upper right first premolar .....	67
Fig. 3.26	Distribution of peri-mortem sharp force trauma to the skull .....	70
Fig. 3.27	Cranial elements with peri-mortem trauma .....	71
Fig. 3.28	Skull 3693, sharp-force peri-mortem cut mark on left side of frontal bone .....	73
Fig. 3.29	Skull 3704, sharp-force peri-mortem cut on the left parietal .....	74
Fig. 3.30	Skull 3736, fully penetrating sharp force wound on the right frontal bone, just anterior to the coronal suture .....	74
Fig. 3.31	Skull 3738, large sharp force scoop lesion on the left parietal bone (wound 1) .....	75
Fig. 3.32	Skull 3738, linear (wounds 2 and 3) and egg-shaped (wound 4) glancing blow on the right parietal bone. ....	76
Fig. 3.33	Skull 3759, peri-mortem sharp-force defect on the posterior right parietal bone resulting from the removal of a roundel of bone .....	77
Fig. 3.34	Skull 3728, sharp-force peri-mortem trauma to right mastoid process. ....	78
Fig. 3.35	Skulls 3711, sharp-force peri-mortem trauma to mandible with similar lesions to those described by Berg (2008) .....	78
Fig. 3.36	Skulls 3750, sharp-force peri-mortem trauma to mandible .....	78
Fig. 3.37	Skulls 3759, sharp-force peri-mortem trauma to mandible .....	79
Fig. 3.38	Skull 3742, sharp-force peri-mortem trauma on posterior body of C2. ....	79
Fig. 3.39	Skull 3742, multiple cuts to the axis .....	79
Fig. 3.40	Skull 3743, incision on anterior body of C2. ....	79
Fig. 3.41	Number of vertebrae with sharp force peri-mortem trauma .....	79
Fig. 3.42	Vertebral elements affected by peri-mortem trauma .....	80
Fig. 3.43	Direction of blows causing sharp force trauma .....	81
Fig. 3.44	Skull 3748, sharp-force peri-mortem trauma to occipital .....	81
Fig. 3.45	Completeness of discrete articulated skeletons (N=40). ....	82
Fig. 3.46	Bone surface condition of all infra-cranial skeletons (N=61) (after McKinley 2004, 16). ....	83
Fig. 3.47	Fragmentation of all infra-cranial skeletons (N=61) .....	83
Fig. 3.48	Mortality profile of discrete infra-cranial skeletons (N=40) .....	83
Fig. 3.49	Stature distribution (22 discrete infra-cranial skeletons). ....	85
Fig. 3.50	Distribution of periostitis by element (TPR; 40 discrete infra-cranial skeletons) .....	93
Fig. 3.51	Skeleton 3804, spinal lesions consistent with infection, possibly brucellosis. ....	94
Fig. 3.52	Skeleton 3806, 3rd lumbar vertebra exhibiting 'parrot beak' osteophyte and inflammation, possibly brucellosis .....	94
Fig. 3.53	Skeleton 3715, 5th lumbar and 1st sacral vertebrae exhibiting lesions consistent with infection, possibly brucellosis. ....	95
Fig. 3.54	Skeleton 3764, peri-articular lytic lesions on the left and right first metatarsals, possible <i>hallux valgus</i> . ....	96
Fig. 3.55	Skeleton 3801, peri-articular lytic lesion on the right first metatarsal, possible <i>hallux valgus</i> .....	97
Fig. 3.56	Skeleton 3775, <i>osteochondritis dissecans</i> in the left ankle (tibial facet of talus) .....	98
Fig. 3.57	Skeleton 3770, lytic lesion on the inferior body surface of the 11th thoracic vertebra caused by disc herniation. ....	100
Fig. 3.58	Limb/extremity 3780, fracture on the left tibia distal articular surface .....	102
Fig. 3.59	Skeleton 3783, right rib shaft fragment exhibiting an un-united fracture .....	102
Fig. 3.60	Skeleton 3811, healed ununited fracture of the right clavicle, medial end. ....	102
Fig. 3.61	Distribution of ante-mortem fractures by element (TPR; 40 discrete infra-cranial skeletons). ....	103
Fig. 3.62	Skeleton 3810, probable trauma to the proximal shaft of the left tibia, posterior surface .....	104

## *List of Figures*

Fig. 3.63	Skeleton 3770, healed fracture of right proximal femur . . . . .	104
Fig. 3.64	Skeleton 3810, probable trauma and secondary infection involving the right 1st and 2nd metatarsals . . . . .	105
Fig. 3.65	Crude prevalence of peri-mortem trauma by type (40 discrete infra-cranial skeletons) . . . . .	105
Fig. 3.66	Distribution of peri-mortem trauma by element (TPR; all discrete infra-cranial skeletons and isolated limbs/extremities). . . . .	106
Fig. 3.67	Skeleton 3715, two peri-mortem sharp-force wounds to the left clavicle. . . . .	108
Fig. 3.68	Distribution of peri-mortem sharp force trauma (excluding cervical vertebra trauma) . . . . .	109
Fig. 3.69	Skeleton 3810, peri-mortem sharp-force trauma to the cervical spine – at least three separate wounds . . . . .	112
Fig. 3.70	Skeleton 3763, peri-mortem sharp-force trauma to the right (a & b) and left (c & d) clavicles . . . . .	113
Fig. 3.71	Skeleton 3755, peri-mortem sharp-force trauma to the left clavicle and scapula, single wound, shown by red line . . . . .	113
Fig. 3.72	Skeleton 3775, peri-mortem sharp force trauma to left radius, shaved defect. . . . .	114
Fig. 3.73	Skeleton 3775, peri-mortem sharp force trauma to the left and right hands . . . . .	114
Fig. 3.74	Limb/extremity 3771, peri-mortem sharp-force trauma to right radius, shaved defect . . . . .	115
Fig. 3.75	Skeleton 3778, peri-mortem sharp-force trauma to right radius and ulna, superficial cuts . . . . .	118
Fig. 3.76	Skeleton 3778, peri-mortem sharp-force trauma to right hand . . . . .	119
Fig. 3.77	Skeleton 3796, peri-mortem sharp-force trauma to the left radius, a superficial cut and a cut into the medullary . . . . .	119
Fig. 3.78	Skeleton 3811, peri-mortem sharp-force trauma to the left radius, superficial cut. . . . .	120
Fig. 3.79	Skeleton 3777, peri-mortem sharp-force trauma affecting the left hand . . . . .	121
Fig. 3.80	Skeleton 3810, peri-mortem sharp-force trauma affecting the left hand . . . . .	121
Fig. 3.81	Skeleton 3785, peri-mortem sharp-force trauma affecting the left hand . . . . .	122
Fig. 3.82	Skeleton 3763, possible peri-mortem sharp force trauma to the sternum (photographs taken during excavation) . . . . .	122
Fig. 3.83	Skeleton 3804, possible peri-mortem sharp-force trauma to the right ilium . . . . .	123
Fig. 3.84	Skeleton 3805, peri-mortem helical fracture of the left femoral shaft . . . . .	123
Fig. 3.85	Skeleton 3805, possible trauma to the anterior surface of the left femoral neck . . . . .	124
Fig. 3.86	Skeleton 3753, pseudo peri-mortem trauma to the right foot, plantar surfaces of the right metatarsals . . . . .	124
Fig. 3.87	Skeleton 3789, pseudo peri-mortem trauma to the lumbar spine. The site photo shows the humerus of another skeleton underlying the lumbar spine . . . . .	126
Fig. 3.88	Disarticulated left femur (context 3681) with osteomyelitis . . . . .	127
Fig. 3.89	Small find 10384, probable kidney or bladder stone . . . . .	128
Fig. 3.90	Disarticulated bone, context 3681, peri-mortem sharp-force trauma to a cervical vertebra . . . . .	128
Fig. 3.91	Disarticulated bone, context 3681, peri-mortem sharp-force trauma to a right lateral clavicle . . . . .	128
Fig. 3.92	Comparison of sex estimation . . . . .	131
Fig. 3.93	Ridgeway Hill mortality profiles compared with those of Towton and St John's . . . . .	131
Fig. 4.1	Skull 3686 . . . . .	135
Fig. 4.2	Skull 3692 . . . . .	136
Fig. 4.3	Skull 3693 . . . . .	136
Fig. 4.4	Skull 3694 . . . . .	137
Fig. 4.5	Skull 3695 . . . . .	137
Fig. 4.6	Skull 3696 . . . . .	138
Fig. 4.7	Skull 3704 . . . . .	138
Fig. 4.8	Skull 3705 . . . . .	139
Fig. 4.9	Skull 3706 . . . . .	140
Fig. 4.10	Skull 3707 . . . . .	140

Fig. 4.11	Skull 3708	141
Fig. 4.12	Skull 3709	142
Fig. 4.13	Skull 3710	142
Fig. 4.14	Skull 3711	143
Fig. 4.15	Skull 3712	144
Fig. 4.16	Skull 3720	144
Fig. 4.17	Skull 3721	145
Fig. 4.18	Skull 3722	146
Fig. 4.19	Skull 3723	146
Fig. 4.20	Skull 3724	147
Fig. 4.21	Skull 3725	147
Fig. 4.22	Skull 3726	148
Fig. 4.23	Skull 3728	148
Fig. 4.24	Skull 3729	149
Fig. 4.25	Skull 3730	150
Fig. 4.26	Skull 3731	150
Fig. 4.27	Skull 3732	151
Fig. 4.28	Skull 3733	151
Fig. 4.29	Skull 3734	152
Fig. 4.30	Skull 3735	152
Fig. 4.31	Skull 3736	153
Fig. 4.32	Skull 3738	154
Fig. 4.33	Skull 3739	154
Fig. 4.34	Skull 3740	155
Fig. 4.35	Skull 3741	155
Fig. 4.36	Skull 3742	155
Fig. 4.37	Skull 3743	156
Fig. 4.38	Skull 3744	157
Fig. 4.39	Skull 3746	157
Fig. 4.40	Skull 3747	158
Fig. 4.41	Skull 3748	159
Fig. 4.42	Skull 3749	159
Fig. 4.43	Skull 3750	160
Fig. 4.44	Skull 3751	160
Fig. 4.45	Skull 3752	161
Fig. 4.46	Skull 3757	162
Fig. 4.47	Skull 3758	162
Fig. 4.48	Skull 3759	163
Fig. 4.49	Skull 3760	163
Fig. 4.50	Skull 3761	164
Fig. 4.51	Skeleton 3687	164
Fig. 4.52	Skeleton 3688	165
Fig. 4.53	Skeleton 3689	166
Fig. 4.54	Skeleton 3697	167
Fig. 4.55	Skeleton 3698	167
Fig. 4.56	Skeleton 3699	168
Fig. 4.57	Skeleton 3700	168
Fig. 4.58	Skeleton 3714	169
Fig. 4.59	Skeleton 3715	170
Fig. 4.60	Skeleton 3716	171
Fig. 4.61	Skeleton 3719	171
Fig. 4.62	Skeleton 3753	172
Fig. 4.63	Skeleton 3754	173
Fig. 4.64	Skeleton 3755	174

## *List of Figures*

Fig. 4.65	Skeleton 3756 .....	175
Fig. 4.66	Skeleton 3762 .....	176
Fig. 4.67	Skeleton 3763 .....	177
Fig. 4.68	Skeleton 3764 .....	178
Fig. 4.69	Skeleton 3767 .....	179
Fig. 4.70	Skeleton 3768 .....	179
Fig. 4.71	Skeleton 3769 .....	179
Fig. 4.72	Skeleton 3770 .....	180
Fig. 4.73	Skeleton 3771 .....	181
Fig. 4.74	Skeleton 3772 .....	182
Fig. 4.75	Skeleton 3773 .....	182
Fig. 4.76	Skeleton 3774 .....	182
Fig. 4.77	Skeleton 3775 .....	183
Fig. 4.78	Skeleton 3777 .....	185
Fig. 4.79	Skeleton 3778 .....	186
Fig. 4.80	Skeleton 3779 .....	187
Fig. 4.81	Skeleton 3780 .....	187
Fig. 4.82	Skeleton 3781 .....	188
Fig. 4.83	Skeleton 3782 .....	188
Fig. 4.84	Skeleton 3783 (re-associated with 3766) .....	189
Fig. 4.85	Skeleton 3784 .....	189
Fig. 4.86	Skeleton 3785 .....	190
Fig. 4.87	Skeleton 3786 .....	191
Fig. 4.88	Skeleton 3787 .....	192
Fig. 4.89	Skeleton 3788 .....	192
Fig. 4.90	Skeleton 3789 .....	193
Fig. 4.91	Skeleton 3790 .....	194
Fig. 4.92	Skeleton 3791 .....	195
Fig. 4.93	Skeleton 3792 (re-associated with 3797) .....	195
Fig. 4.94	Skeleton 3793 .....	196
Fig. 4.95	Skeleton 3794 .....	196
Fig. 4.96	Skeleton 3795 .....	197
Fig. 4.97	Skeleton 3796 .....	198
Fig. 4.98	Skeleton 3798 .....	199
Fig. 4.99	Skeleton 3799 .....	199
Fig. 4.100	Skeleton 3800 .....	200
Fig. 4.101	Skeleton 3801 .....	201
Fig. 4.102	Skeleton 3802 .....	202
Fig. 4.103	Skeleton 3803 .....	202
Fig. 4.104	Skeleton 3804 .....	203
Fig. 4.105	Skeleton 3805 (re-associated with 3807 and 3808) .....	204
Fig. 4.106	Skeleton 3806 .....	205
Fig. 4.107	Skeleton 3809 .....	206
Fig. 4.108	Skeleton 3810 .....	207
Fig. 4.109	Skeleton 3811 .....	208
Fig. 5.1	Facial reconstruction of Skull 3761 (created by Danielle Schumaker and Professor Caroline Wilkinson, University of Dundee) .....	212
Fig. 5.2	Panel from the Franks Casket, showing the use of the bow in combat, 8th century BM 1867,0120.1 .....	215
Fig. 5.3	Spearhead, with decorative inlay on socket, from River Thames, London, late 9th-10th century. The slender shape of the spearhead is well suited for throwing. BM 1893,0715.2 .....	216
Fig. 5.4	Spearhead, with decorative inlay on socket, London, 11th century. The broad head is designed for thrusting rather than throwing. BM1856,0701.1452 .....	216



Fig. 5.5	Axe-head for a single-handed axe from Hof, Hedmark, Norway, L. 18cm. BM 1873,1219.227.....	217
Fig. 5.6	Large axe-head from River Thames, Hammersmith, London, 10th–11th century. 21.5 x 20.7cm. BM 1909,0626.8.....	217
Fig. 5.7	Single edged sword blade from Digeråkeren, Øverli, Oppland, Norway, 8th–9th centuries. BM 1891,1021.27.....	218
Fig. 5.8	Pattern-welded sword, with hilt fittings decorated with copper alloy and silver, possibly from the River Thames at Temple Church, London, 10th century. BM 1887,0209.1.....	219
Fig. 5.9	Anglo-Saxon sword with inscribed blade and guard inlaid with silver and copper alloy, from River Witham, near Lincoln, Lincs., 10th century. BM 1848,1021.1.....	219
Fig. 5.10	A) Large seax from River Thames, Battersea, London, inscribed with the futhorc (runic alphabet) and the runic name <b>beagnoth</b> , 10th century, L. 72.1cm. BM1857,0623.1. B) Short seax from Sittingbourne, Kent, with the inscriptions + BIORHTELM ME PORTE (Biorhtelm made me) and + S[I]GEBEREHT ME AH (S[i]gebereht owns me), 10th century, L. 32.10cm. BM 1881,0623.1.....	220
Fig. 5.11	Warrior Fig. from Middleton Cross B, St Andrew's Church, Middleton, North Yorkshire, 10th century.....	221
Fig. 5.12	Shield Boss from Barrow 1, Bolstad, Sogn og Fjordane, Norway. BM 1891,1021.44.....	221
Fig. 5.13	Silver penny of Cnut (1016-35), Pointed Helmet type, 1020s. BM E.4353.A.....	222
Fig. 5.14	Modern replica of riveted mail. Private collection.....	223
Fig. 5.15	Artist's impression of the executions (by Mark Gridley).....	225
Fig. A1.1	Burial pit and sample (SK) locations.....	238
Fig. A1.2	Sampling skulls.....	238
Fig. A1.3	Sampling the interior sediment of SK3751.....	239
Fig. A1.4	SK3753 sampling positions. Sampling position for the left foot not shown.....	239
Fig. A1.5	SK3754 sampling locations and proximity to SK3755.....	239
Fig. A1.6	SK3755 sampling locations and proximity to SK3754.....	240
Fig. A1.7	Cross plot of nitrogen/organic carbon and hydrogen/organic carbon atomic ratios for the soils.....	243
Fig. A3.1	Contour map of $\delta^{18}\text{O}$ in recent groundwaters of the British Isles (after Darling <i>et al.</i> 2003, fig 6).....	260
Fig. A3.2	Isotope map of Scandinavia showing long-term average of annual $\delta^{18}\text{O}$ in precipitation (after IAEA/WMO, 2006; IDW long-term annual average precipitation $\delta^{18}\text{O}$ map).....	261
Fig. A3.3	Map of bio-available $^{87}\text{Sr}/^{86}\text{Sr}$ in the UK (after Evans <i>et al.</i> 2010).....	262
Fig. A3.4	a) Probability and b) Kernel Density plots showing the variation in carbon isotope values of dentine (population 'A'), and femur and rib (population 'B').....	267
Fig. A3.5	a) Probability and b) Kernel Density plots showing the variation in nitrogen isotope values of enamel (population 'A'), and femur and rib (population 'B').....	268
Fig. A3.6	a) Probability and b) Kernel Density plots showing the variation in oxygen isotope values of enamel (population 'A'), and femur and rib (population 'B').....	270
Fig. A3.7	Plot of femur $\delta^{13}\text{C}(\text{r-f})$ (the difference between rib and femur $\delta^{13}\text{C}$ ) against $\delta^{13}\text{C}$ for the 31 individuals analysed for both rib and femur.....	273
Fig. A3.8	Plot of femur $\Delta^{15}\text{N}(\text{r-f})$ (the difference between rib and femur $\delta^{15}\text{N}$ ) against $\delta^{15}\text{N}$ for the 31 individuals analysed for both rib and femur.....	273
Fig. A3.9	Plot of femur $\delta^{18}\text{O}(\text{r-f})$ (the difference between rib and femur $\delta^{18}\text{O}$ ) against $\delta^{18}\text{O}$ for the 31 individuals analysed for both rib and femur.....	274
Fig. A3.10	a) Probability and b) Kernel Density plots showing the variation in strontium isotope values in tooth enamel from population 'A'.....	275
Fig. A3.11	Plot of mean $\delta^{18}\text{O}(\pm 1\text{s})$ and $^{87}\text{Sr}/^{86}\text{Sr}$ for enamel (population 'A') against the expected $^{87}\text{Sr}/^{86}\text{Sr}$ range values for 'local' Weymouth and upper limit for Denmark, and $\delta^{18}\text{O}$ drinking water ranges for 'local' Weymouth area, UK, cold and very cold climate regions.....	276

## *List of Figures*

Fig. A3.12	A comparison of carbon and nitrogen isotope composition of dentine from individuals in population 'A' with UK and Belgian data. ....	281
Fig. A3.13	A comparison of carbon and nitrogen isotope composition of dentine from individuals in population 'A' with Scandinavian and Icelandic populations ....	281
Fig. A3.14	A comparison of carbon and nitrogen isotope composition of femurs and ribs from individuals in population 'B' with UK and Belgian data ....	282
Fig. A3.15	A comparison of carbon and nitrogen isotope composition of femurs and ribs from individuals in population 'B' with Scandinavian and Icelandic populations ....	282
Fig. A3.16	Plot of the difference in $\delta^{13}\text{C}$ between rib and femur ( $\delta^{13}\text{C}(\text{rib-femur})$ ) against the difference in $\delta^{15}\text{N}$ between rib and femur ( $\delta^{15}\text{N}(\text{rib-femur})$ ) for the 31 individuals from population 'B' with rib and femur pairs ....	283

## List of Tables

Table 2.1	Position of skulls. . . . .	24
Table 2.2	Body position and orientation of the infra-cranial skeletons. . . . .	30-33
Table 2.3	Roman pottery – quantification of fabrics . . . . .	39
Table 2.4	Identification and quantification of lithics . . . . .	40
Table 2.5	Distribution of flints by context . . . . .	40
Table 2.6	Animal bones by taxon and anatomical element (NISP) . . . . .	41
Table 3.1	Criteria employed to score skeletal condition (after McKinley 2004,16) . . . . .	45
Table 3.2	Age categories employed in the analyses. . . . .	46
Table 3.3	Classifications of sharp force defects employed in the present analysis (based on Byers 2005, 340-341; Kimmerle and Baraybar 2008, 268 and Reichs 1998) . . . . .	47
Table 3.4	Summary of comparative assemblages. . . . .	49
Table 3.5	Summary of cranial and infra-cranial re-association exercise . . . . .	50
Table 3.6	Intrusive elements . . . . .	51
Table 3.7	Summary of age indicators employed for each individual skull . . . . .	52-55
Table 3.8	Summary of skull measurements. . . . .	58
Table 3.9	Summary of indices calculated for skull 3761 . . . . .	58
Table 3.10	True prevalence of cranial and vertebral non-metrical traits . . . . .	59
Table 3.11	Number and type of dental anomalies observed (N=number of skulls with dentition) . . . . .	59
Table 3.12	Summary of dental pathology at Ridgeway Hill compared with a range of other sites. . . . .	60
Table 3.13	Summary of skeletons with abnormal dental attrition. . . . .	62
Table 3.14	Summary of individuals with dental modification (possible and definite) . . . . .	63
Table 3.15	Skulls with dental trauma. . . . .	65
Table 3.16	Distribution of dental trauma by tooth position . . . . .	65
Table 3.17	Summary of skeletons with joint changes (osteophytosis, porosity and joint contour change). . . . .	68
Table 3.18	Distribution of sharp force cranial trauma by skeletal element where skull, mandible, dentition and each cervical vertebrae are considered as separate elements. . . . .	69
Table 3.19	Minimum number of blows inflicted per individual. These figures exclude dental trauma . . . . .	71
Table 3.20	Number of elements affected by sharp force trauma . . . . .	72
Table 3.21	Locations of sharp-force peri-mortem trauma by cranial element (TPR excludes disarticulated material) . . . . .	72
Table 3.22	Direction of injuries . . . . .	72
Table 3.23	Direction of injuries by individual (n=39). Includes skulls, mandibles and cervical vertebrae . . . . .	73
Table 3.24	Numbers of elements employed in MNI and MLNI counts . . . . .	82
Table 3.25	Distribution of age and sex: post-cranial skeletons. . . . .	83
Table 3.26	Stature comparisons between Ridgeway Hill and broadly contemporary sites (males only). . . . .	84
Table 3.27	Robusticity indices . . . . .	86
Table 3.28	Individuals exhibiting Score 3 at attachment sites . . . . .	86
Table 3.29	Asymmetry in humeral measurements. . . . .	87
Table 3.30	Frequency of post-cranial non-metrical traits . . . . .	88
Table 3.31	Summary of congenital and developmental abnormalities. . . . .	90
Table 3.32	Contexts with non-specific bone inflammation and probable or possible associated trauma . . . . .	92

## *List of Tables*

Table 3.33	Discrete articulated skeletons with periostitis: distribution of elements involved by skeleton . . . . .	92
Table 3.34	Description of spines with 'parrot beak' osteophyte and other associated changes . . . . .	95
Table 3.35	Skeletons with osteoarthritis. . . . .	96
Table 3.36	Skeletal distribution of extra-spinal osteoarthritis . . . . .	96
Table 3.37	True prevalence of conditions of the spine. . . . .	97
Table 3.38	Age distribution of skeletons with Schmorl's nodes. . . . .	97
Table 3.39	Osteochondritis dissecans . . . . .	98
Table 3.40	TPR of osteochondritis dissecans by skeletal region . . . . .	98
Table 3.41	Summary of ante-mortem fractures (infra-cranial skeleton) . . . . .	101
Table 3.42	Peri-mortem sharp force trauma: number and percentage of elements affected amongst infra-cranial skeletons . . . . .	106
Table 3.43	Peri-mortem sharp force trauma: number and percentage of skeletal wounds amongst infra-cranial skeletons . . . . .	106
Table 3.44	Infra-cranial skeletons with peri-mortem sharp force trauma – distribution of lesions and number of elements affected (27 individuals and two isolated limbs/extremities) . . . .	107
Table 3.45	Distribution of sharp force trauma in the cervical spine (24 infra-cranial skeletons) . . . . .	108
Table 3.46	Peri-mortem sharp force trauma (infra-cranial skeletons) – excludes cervical vertebrae . . . . .	110-13
Table 3.47	Peri-mortem sharp force trauma (infra-cranial skeletons) – cervical vertebrae . . . . .	114-17
Table 3.48	Summary of infra-cranial skeletons with pseudo peri-mortem trauma . . . . .	125
Table A1.1	List of samples collected for chemical (C) and micromorphological (MM) analysis . . . . .	237
Table A1.2	Bulk elemental carbon hydrogen nitrogen sulfur (CHNS) and total organic carbon (TOC) contents of the soils . . . . .	242
Table A2.1	Summary of disarticulated human bone fragments recovered from context 3681. . . . .	248-50
Table A2.2	Age distribution within the disarticulated assemblage from context 3681. . . . .	251
Table A2.3	Summary of disarticulated human bone fragments recovered from context 3685 (non-small finds) . . . . .	253-4
Table A2.4	Summary of the small find bones from context 3685. . . . .	255-6
Table A3.1	Carbon and nitrogen isotopes in ribs and femurs . . . . .	264-5
Table A3.2	Carbon and nitrogen isotopes in dentin . . . . .	267
Table A3.3	Descriptive statistics for carbon isotopes in dentine, femur and rib . . . . .	268
Table A3.4	Descriptive statistics for nitrogen isotopes in dentine, femur and rib. . . . .	269
Table A3.5	Oxygen, carbon and strontium isotopes in tooth enamel . . . . .	270
Table A3.6	Oxygen isotopes femur and rib . . . . .	271
Table A3.7	Descriptive statistics for oxygen isotopes in enamel, femur and rib . . . . .	272
Table A3.8	Descriptive statistics for calculated drinking water in enamel, femur and rib . . . . .	272
Table A3.9	Descriptive statistics for strontium isotopes in enamel . . . . .	274



## Summary

This volume describes one of the most exciting and unexpected archaeological discoveries to have been made in Britain in recent years, that of a rare mass grave of executed vikings on Ridgeway Hill, Dorset. The burial was found by Oxford Archaeology in 2009 during the construction of the Weymouth Relief Road. The skeletons, around 50 in total, were predominantly of young adult males all of whom had been decapitated: heads had been deposited in a pile located at the southern edge of the grave, while the beheaded bodies had been apparently thrown in with little care. Since their recovery experts have undertaken forensic studies of the bones and have applied cutting edge techniques to elicit the most information possible, in order to understand who the individuals were and what circumstances led to their demise. The discovery of the grave has inspired considerable speculation in this regard and here we provide the key facts as they are currently known. The volume reveals an extraordinary story of the discovery of what is arguably the most dramatic physical evidence for violence in early medieval Britain ever encountered by archaeologists.

The discovery of the mass grave was made as staff of Oxford Archaeology were undertaking work at other sites on Ridgeway Hill and nearby at Redlands and at Southdown Ridge. Unlike these sites, the area in which the mass grave lay could not be explored archaeologically for health and safety reasons, so initially the area was exposed during machine excavation under the supervision of archaeologists. The pile of skulls were the first items to be spotted, but at that stage they were presumed to represent a Roman or prehistoric funerary context. However, as more and more bones were uncovered it quickly became apparent that this was the context of something much more gruesome.

The grave was excavated by archaeologists over a period of three months. It was a highly complex deposit requiring as many bones to be exposed as possible before they could be recorded and lifted. This, in addition to two and three dimensional recording by hand, photography and computer survey, meant that it was possible to identify discrete individuals and reveal exactly how each was lying despite their jumbled positions. It was the first step in reconstructing events and is presented in the volume through a detailed archaeological description of the grave.

This information suggests that the burial had been a one-off occurrence and had taken place at the time of, or shortly after, the men's execution which had probably been performed at the graveside. The individuals seem to have been buried in no particular order, possibly more than one at a time from different sides of the grave. They may have been stripped of their clothes prior to burial and, unlike some contemporary parallels, do not appear to have had their hands bound. The grave was, in fact, a re-used quarry pit, originally dug in Roman times and probably still visible as a pit or depression when it was re-used for the mass burial. In addition, the location of the grave – on the crest of Ridgeway Hill next to a Parish boundary and Roman road, near prehistoric monuments and within view of Maiden Castle – had undoubtedly been selected to make an example of the executed individuals contained within it. This implies that the executions had been a formal event, perhaps attended by spectators. We will never know precisely how these strands of information combine to form the narrative of the individuals' fate, but the idea that potentially some 50 men had queued, perhaps naked, waiting and watching as their comrades were executed, is certainly a very evocative and moving one.

As for the total number of individuals, analysis has highlighted the difficulties in determining exactly how many men were executed. The final total could not be determined during the excavation, but was explored off site in the laboratory using methods that are employed to investigate modern day mass graves. Generally, these involved counting the most frequently occurring bone or bones and matching pairs of bones. Results indicate that between 47 and 52 individuals were present. Interestingly, there were more beheaded skeletons than skulls and this could mean that some heads had been taken as trophies following the executions.

All of the men had suffered horrific ends, their executions being an ugly affair involving excessive violence. Although it was clear during the excavation that the men had suffered significant injuries the true extent and magnitude of these did not become fully apparent until the bones had been cleaned and examined in the laboratory. Wounds were concentrated in the region of the neck indicating that, in most cases, it had taken several attempts, from a variety of angles, to remove the heads. Blows intended to decapitate had been delivered from as

high up as the back of the head to as low down as the shoulder blades, indicating that they had not been very well performed or well organised. Approximately 188 wounds were observed on all of the skeletons, that is an average number of almost four wounds per individual. Each wound has been examined and described in detail and compared with other finds of violent death and execution in the archaeological record, both contemporary (for example, a mutilated skeleton from Maiden Castle) and later in date (for example, the skeletons of soldiers who were killed in the Battle of Towton in 1461).

Forensic analysis of the wounds has allowed us to conclude that the decapitations had probably been performed with a sword. This is the weapon used in the *Jómsvíkinga saga*, a probable Icelandic story of a mass execution, composed around AD 1200. The saga describes the beheading of 70 captured warriors who were roped together and had their hair secured back to keep it out of the way of the sword blade. Perhaps this had also been the case at Ridgeway Hill.

Not all of the injuries on the Ridgeway skeletons were directly associated with decapitation, however. Some individuals had received cuts to their arms and hands and the sides/tops of their heads, including perhaps one of the most vivid lesions observed: a large egg shaped wound where the bone had been completely removed causing considerable trauma to the brain. This injury had been delivered prior to this man's decapitation, but he may have still been alive when his head was removed.

The cuts to the hands, arms and tops/sides of heads may have been defence injuries and decapitating injuries implying that not all men had succumbed to their fate without a struggle. That the injuries could suggest some other context of violence, for example, a battle, had taken place prior to their execution is difficult to reconcile with the evidence. The pattern and extent of the injuries are not consistent with those observed on other skeletons from battle or massacre related contexts, although it is important to consider that not all injuries will penetrate the soft tissues and affect the skeleton. These factors considered, it would seem that, on balance, evidence for combat prior to the executions is not very compelling, although it cannot be ruled out.

Besides the injuries a great deal of other information about the individuals was revealed during the analysis of the bones, which is given in a skeleton by skeleton description in the volume. Extensive chemical analysis suggests that they were a disparate group of people in terms of their origins, migratory histories and dietary habits, although a general emphasis on Arctic and sub-Arctic areas of

Scandinavia, northern Iceland, the Baltic States, Belarus and Russia, and on terrestrial food sources, are suggested. It would appear that the majority were not living in the British Isles in the years leading to their deaths.

Although most of the men were 18-25 years old when they died the youngest was in their early or mid teens and the oldest, over 50. They possessed features, particularly those relating to height and facial appearance, that were very similar to Scandinavian populations of similar date. In addition, some had a physique that was similar to other skeletons of fighting/warrior class status, although this was not the case for all individuals. A remarkable find is that at least one individual had filed his teeth, seen as horizontal grooves on his two front central, upper incisors. In life, the grooves may have been coloured and they would have been clearly visible when the individual smiled; they may have been a status symbol or a marker of their occupation. This is a very rare find indeed: examples are known from Scandinavia, but none have been found in the UK before.

Evidence for infection and physical impairment was surprisingly frequent for a group of predominantly young individuals who had died in their prime of life. Most striking is a leg bone from one individual which, due to infection, was twice the size of a normal bone and had openings (holes) in the bone which would have oozed smelly pus during his life. The leg would have been swollen and painful and must have posed a considerable disability both to the individual and consequently to the rest of the group. Surprisingly, none of the skeletons showed convincing evidence for previous war wounds. These observations undermine the idea of an elite group of viking warriors, possibly a ships' crew, which had been promoted by the huge amount of publicity shown in the grave from the media ever since its discovery.

So what might explain the reason why these men came to be in Dorset, and what event led to their untimely executions on the Ridgeway? We can estimate that they died in the 10th or 11th century, but there are no historical records that directly link their deaths with an event. There are a number of possibilities, however. For example, they may relate to the ravaging of Portland in 982, or viking attacks on Dorset in 998, 1015 and 1016, all of which took place during the reign of Æthelred (978-1016). Although it seems very likely that these were vikings executed by the English, the possibility that they were a group of mercenaries fighting for the English and executed by vikings cannot be entirely ruled out. Other possible scenarios are that the men were merchants or recent settlers in England who were sentenced to judicial execution by the English

authorities, or were victims of the St Brice's Day massacre that took place in 1002, when Aethelred ordered all Danes (here thought to refer to all Scandinavians) in England to be killed. It is also possible that the grave relates to an event during the reign of Cnut (1016-35), with the individuals either hostages or combatants engaging in reprisals against previous enemies.

We may never know precisely what brought the men to Dorset, or how they came to be executed on the Ridgeway. This report by no means provides all the answers, rather it suggests further questions for the future. For example, if the wounding

patterns suggest disorganised assaults, how does this fit with the suggestion that it had been a formal event? Can it be presumed that the victims had been restrained despite the fact that no direct evidence of this was found? Can they still be considered to have been warriors, given their unhealthy profile and lack of battle wounds? If the men had resisted their fate, why isn't this more evident on the skeletons? Not only is the mass grave one of the most remarkable discoveries to be made in recent years, it is also perhaps one of the most perplexing and will, no doubt, hold our attention for years to come.

## Acknowledgements

Oxford Archaeology was employed by Skanska Civil Engineering, the Main Contractor building the Weymouth Relief Road on behalf of Dorset County Council, who funded the work, and the central part played by these organisations is gratefully acknowledged. The project was managed for Dorset County Council by Matthew Piles and Oxford Archaeology would like to extend their appreciation to him and his team and in particular Kerry Hall, DCC Public Relations Officer for the enthusiastic and positive way in which they supported the archaeological works. Their proactive approach to promoting and disseminating the results of the work was very refreshing and enriched the archaeological experience for all concerned. A special mention is due to Steve Wallis, Dorset County Archaeologist who monitored the works on behalf of the Planning Authority for his sound advice and guidance and constantly cheerful disposition. Also to Mick Rawlings, RPS Consulting, Skanska's archaeological consultant who produced the original project specification and provided additional valuable input during the works. Oxford Archaeology would also like to acknowledge Willie McCormick, Project Manager, Skanska and his project team for the efficient way in which they facilitated our work on site and in particular Helen Jenkins, Environment Manager, Skanska who was directly responsible for overseeing our work on the project. The ground works on the scheme were undertaken by Walters UK Ltd and thanks are due to Paul Baker, Contracts Manager, and Kevin Davies, Works Manager, and their excellent site staff for providing plant and other attendances and ensuring that our excavations ran smoothly.

A number of other individuals are also thanked for their input into the work that has resulted in the production of this monograph. The project was managed for Oxford Archaeology by David Score and the excavation of the burial pit was directed by Project Officer Dan Sykes and Angela Boyle, ably assisted by Alistair Zochowski and many other field-staff from Oxford Archaeology. These include Emily Glass, Jacek Gruszczynski, Michael Harris, Robin Maggs, Emily Plunkett and Christopher Reese. All survey and initial digitising work was carried out by Emily Plunkett and Conan Parsons. The post-excavation of the project was coordinated in the earlier stages by Angela Boyle and the later stages by Louise Loe. The skeletons were cleaned and packaged by a

dedicated team of OA staff, led by Kay Proctor, under the management of Leigh Allen. Angelea Boyle wrote the assessment report and project design for full analysis, with input from Róisín McCarthy and Alistair Zochowski on the disarticulated human bone and with general assistance from Ceridwen Boston and Sharon Clough. The programme of full osteological analysis was led by Louise Loe, with input from Angela Boyle on the analysis of the skulls and Helen Webb on the analysis of the infra-cranial skeletons and disarticulated human bone. General assistance was also provided by Mark Gibson. The archive is being prepared for deposition by Leigh Allen and Nicola Scott.

The following specialists have contributed advice and reports to this monograph, generously funded by Dorset County Council: Carolyn Chenery, Angela Lamb, Jane Evans, Hilary Sloane and Carlyn Stewart of the NERC Isotope Geoscience Laboratory, British Geological Survey, on the stable isotopes; Alex Bayliss (English Heritage) is gratefully acknowledged for her advice and contribution to the radiocarbon dating report. Edward Biddulph, Mike Donnelly, Ian Scott and Ruth Shaffrey, all of Oxford Archaeology contributed specialist reports on the pottery, flint, metalwork and stone, respectively. We are especially grateful to Lesley Abrams of Balliol College, University of Oxford and Gareth Williams, of the British Museum, for their generous contributions on the historical background and weaponry. The organic residue analysis of the soils was undertaken by Matthew Pickering, Carol Lang, Maria Raimonda Usai, Brendan Keely and Don Brothwell, from the Departments of Chemistry and Archaeology at the University of York, with funding from the European Research Council under the European Community's Seventh Framework Programme (FP7/2007-2013)/ERC grant agreement No. 230193. We are also grateful to Caroline Ahlström Arcini for her helpful comments on patterns of dental wear and filed teeth; to Rebecca Redfern for information on human skeletal assemblages from Dorset; Anthea Boylston, Don Ortner and Iain Watt for their comments on pathology and other specialists who responded to requests sent via the BABAO mailing list for comparative information. Radiography was by Mark Farmer of Reveal Imaging. Lesley Abrams would like to thank Jane Kershaw for her help and access to unpublished work on Scandinavian-related metalwork and to Tom Lambert for advice regarding Anglo Saxon Chronicle 1124.



Several individuals from Oxford Archaeology have greatly assisted with the later stages of the production of this monograph, which was overseen by Anne Dodd and Robert Williams. Bones and finds were photographed by Magdalena Wachnik with input from Kate Brady. Illustration was by Lucy Gane, Hannah Kennedy, Julia Collins, and Georgina Slater, led by Magdalena Wachnik. Gary Jones co-ordinated the 3D reconstructions of the grave. Ianto Wain provided comments on earlier drafts of the text and the indexing was by Edward Biddulph. Rebecca Nicholson edited and co-ordinated the production of this volume, which would not have been achieved without dedicated typesetting by Charlie Webster (Production Line, Oxford). Danielle Schumaker and Professor Caroline Wilkinson (University of Dundee) kindly provided the facial reconstruction for skull

3761 (Fig. 5.1) and Mark Gridley is gratefully acknowledged for the reconstruction drawing (Fig. 5.15). We would also like to thank the executors of the estate of John Wain for permission to quote from his translation of *The Seafarer*.

The authors are indebted to a number of external academic advisers (anonymous as well as named): Simon Mays, who kindly read and commented upon a draft of the osteology chapter; Rachel Newman, who read parts of the whole monograph and provided helpful comments on it and Paul Lashmar, the Hon. Editor of the DNHAS Proceedings, who commented on an entire earlier draft and kindly advised on the summary and cover design. The monograph has benefitted greatly from their input and any remaining shortcomings are our own.