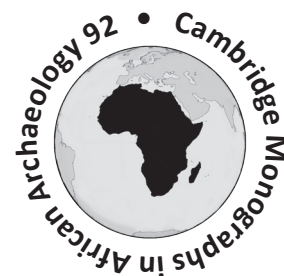


Reinterpreting chronology and society at the mortuary complex of Jebel Moya (Sudan)

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Contents

Foreword	xi
Chapter 1: Introduction	1
1.1 Aims and methods.....	1
1.2 The prehistoric geographic context of Jebel Moya	1
1.3 Wellcome’s excavations and subsequent research.....	3
1.4 Records concerning the Wellcome excavations at Jebel Moya	7
1.5 Structure of this research	9
Chapter 2: The evolution of complexity theory and mortuary studies	10
2.1 Forms and processes of political and social organisation.....	10
2.2 Expressions of social complexity in the Saharan and Sahelian Belts	12
2.2.1 History of the cultural complexity debate in North Africa	12
2.2.2 Conceptualising the construction of social complexity in the Sudan during the Neolithic and post-Neolithic.....	15
2.3 Modelling social organisation in mortuary assemblages.....	16
2.3.1 Early mortuary practice studies	17
2.3.2 Moving beyond the Saxe-Binford modelling	18
2.4 Approaches to social structure in the Jebel Moya mortuary complex	24
Chapter 3: Ceramic assemblages and a revised chronology for Jebel Moya	28
3.1 Previous studies of the Jebel Moya pottery	28
3.1.1 Frank Addison	28
3.1.2 J. Desmond Clark, Haaland, Caneva, Gerharz and Manzo.....	32
3.1.3 Discussion.....	35
3.2. Analytical methods of pottery studies.....	36
3.2.1 History of approaches to pottery studies.....	36
3.2.2 Typological-based approaches in the Sudan	38
3.2.3 Attribute-based approaches.....	39
3.2.4 Weighing up analytical options	40
3.3 Analysing the British Museum’s pottery collection	41
3.3.1 Describing the newly classified assemblages.....	41
3.3.2 Description of the sherds per tray.....	42
3.3.3 Single and co-occurrence of sherd attributes	47
3.3.3.1 Single attribute occurrences	47
3.3.3.2 Attribute co-occurrences	52
3.3.4 Description of the three assemblages as determined by attribute analysis of the strata.....	57
3.3.4.1 Assemblage 1 (Figure 3.11).....	57
3.3.4.2 Assemblage 2 (Figure 3.12).....	58
3.3.4.3 Assemblage 3 (Figure 3.13).....	59

3.3.4.4 Pottery from burials	59
3.4 The absolute dating of Jebel Moya	61
3.5 Implications of the new pottery and radiometric analyses	64
3.5.1 Claimed non-local artefacts in the burial assemblages	65
3.5.2 Claimed non-local artefacts in non-burial contexts.....	65
3.5.3 Cardinal directionality and burial posture of burials-without-goods versus burials-with-goods	67
3.6 Resituating Jebel Moya in a Classic-Late Meroitic context in the southern Gezira	67
Chapter 4: Implications of occupational traces and spatial use of the site over time	71
4.1 Re-examination of claimed habitation remains at Jebel Moya	71
4.1.1 Floors, pavements and post-holes	71
4.1.2 Fireplaces and ovens	76
4.1.3 Cultivation	77
4.1.4 Discussion of occupational traces	78
4.2 Intra-site mortuary data	79
4.2.1 Distribution of the burials	79
4.2.2 Origins of the cemetery layout.....	84
4.2.2.1 Comparative nature of the burial assemblages	84
4.3 Discussion: Site spatial use over time.....	86
Chapter 5: The bioanthropology of Jebel Moya.....	88
5.1 The original 1955 analysis: Mukherjee, Rao and Trevor.....	88
5.2 Rachel Hutton MacDonald: Jebel Moya as a pastoral population	93
5.3 Irish and Konigsberg: Population affinity using dental traits	95
5.4 The Duckworth Laboratory collection revisited.....	96
5.5 Discussion: The bioanthropological make-up of Jebel Moya	99
Chapter 6: Social patterning in the Jebel Moya mortuary complex.....	100
6.1 Introducing Inverse Distance Value	100
6.2 Differential patterns in biological age groups: Inverse Distance Value and burial orientations	103
6.2.1 Infants, juveniles, young adults and adults	103
6.2.1.1 Infants	105
6.2.1.2 Juveniles.....	106
6.2.1.3 Young adults.....	107
6.2.1.4 Adults.....	107
6.3 Spatial methods for examining the Jebel Moya burial assemblage inventory	109
6.3.1 Correspondence Analysis	117
6.3.2 Pair Correlation Function	119
6.3.3 Multi-dimensional scaling	125
6.4 Burial treatment	129
6.5 Discussion: The social implications of the mortuary patterns.....	131

Chapter 7: Situating Jebel Moya’s cemetery within a wider Sudanese context	134
7.1 The socio-political nature of the Meroitic state	136
7.2. Mortuary patterns in Meroitic and Post-Meroitic Nubia	139
7.2.1 Lower Nubia	139
7.2.1.1 Ballana and Qustul	140
7.2.2 Upper Nubia	142
7.2.3 Shendi Reach: The heart of the Meroitic state.....	145
7.2.4 Gezira Plain.....	147
7.2.4.1 Abu Geili.....	148
7.2.4.2 Sennar	148
7.2.4.3 Other cemeteries and settlements near Jebel Moya.....	149
7.2.5 Western Butana.....	151
7.3 Discussion: The importance of Jebel Moya	152
Chapter 8: Conclusion.....	154
8.1 Research questions on burial and society at Jebel Moya	154
8.2 Positioning Jebel Moya as a pastoralist occupational site in the southern frontier zone of the Meroitic state	156
8.3 Final thoughts.....	157
Bibliography	159
Appendix I: Burial distribution map of Jebel Moya.....	175
Data available at http://bit.ly/2axUAGY	175
Appendix II: New Register of Graves for Jebel Moya	176
Data available at http://bit.ly/2axUAGY	176
Appendix III: British Museum sherd trays	177
Data available at http://bit.ly/2axUAGY	177
Appendix IV: Burials with illustrated pottery sherds.....	178
Appendix V: Foreign objects from Jebel Moya at the Griffiths Institute	191
Data available at http://bit.ly/2axUAGY	191

List of Figures

Figure 1.1 The location of Jebel Moya in south-central Sudan. <i>Adapted from Edwards (1989: Figure 1) and Winchell (2013: Figure 1.2)</i>	2
Figure 1.2 View of the Jebel Moya excavations from the north-west. <i>Reproduced from the Griffiths Institute’s photographic archive with permission</i>	4
Figure 3.1 Form of vessels as reconstructed by Addison and the Maryleborne staff. <i>From Addison (1949: Plate LXXXIX)</i>	29
Figure 3.2 Addison’s Impressed Ware divided into four sections, A-B in the top row and C-D in the bottom row. <i>From Addison (1949: Plate XCIV)</i>	30
Figure 3.3 Bone pottery decoration tools found in unspecified context at Jebel Moya. (1) A potential toothed rocker, (2) too damaged to identify, (3 & 7) toothed rockers, (4) stylus, (5, 8 & 9) combs, and (6) a spatula stylus. They can be used to make dragged and incised impressions as well as rocker-stamping and parallel channels. They, or any other decor tools, have not been re-located in any of the UK curated collections. <i>From Addison (1949, Plate LVII B)</i>	31
Figure 3.4 Rolled/everted rim from the Jebel Moya-like pottery found at Rabak, termed ‘Rabak Ware’ by Haaland. <i>From Haaland (1987: 57)</i>	33
Figure 3.5 Manzo’s categories: <i>a-b</i> external thickened rims mostly from large jars, <i>c-d</i> zone impressed with straight or slightly everted rims, and <i>e-f</i> rims with comb-impressed bands or incised rim bands. <i>From Manzo (2011: Figure 2)</i>	34
Figure 3.6 Gerharz’s Phase II Incised and Rocked pottery with horizontal bands filled with comb-pricked designs. <i>From Gerharz (1994: Figure 47 (1-5))</i>	35
Figure 3.7 Gerharz’s Phase II Incised and Rocked pottery related to C-Group and Kerma pottery. <i>From Gerharz (1994: Figure 47 (6-9))</i>	35
Figure 3.8 Gerharz’s Phase III pottery (1) claimed to represented at Napatan and Meroitic sites to the north (2-4: Kadada, Sennar, Amir). <i>From Gerharz (1994: Figure 50)</i>	35
Figure 3.9 “Egyptian-style” beaker from Gerharz’s Phase III. <i>From Gerharz (1994: Figure 56(3))</i>	35
Figure 3.10 Sherd from Tray JM6 (British Museum, 6cm width at rim) of a type previously mistaken as resembling Kerma or C-Group Wares. <i>Reproduced with the kind permission of the Trustees of the British Museum</i>	43
Figure 3.11 Jebel Moya: Assemblage 1: (a) body sherd 2 - 3mm thick with comb-stamped decoration; (b) rim and body sherd 3 mm thick with comb-stamped and pivoted comb décor; (c) body sherd 5 - 6 mm thick with dragged comb lines and stamped comb décor; (d) a selection of Assemblage 1 body and rim sherds. The temper of all the sherds is sand paste with bone and mica. <i>(a-c) are from tray JM 3 and are reproduced with the kind permission of the Trustees of the British Museum; (d) is from Addison (1949: Plate XCIV)</i>	57
Figure 3.12 Jebel Moya: Assemblage 2: (a) thick, rolled everted rim and body sherd 5 -10mm thick with dragged comb chevrons on the rim and a comb-stamped line under the lip; (b) thick, rolled everted rim and body sherd 3 - 24mm thick with dragged comb chevrons on the lip and a wad of cord impression just under the lip; (c) thick, simple rim and body sherd 8 - 26mm thick with incised angular lines on the lip and rows of vertical incised fillets just under it. The temper of all the sherds is coarse grit. <i>(a-c) are from tray JM4 and are reproduced with the kind permission of the Trustees of the British Museum; (d) is from Addison (1949: Plate CIV)</i>	58
Figure 3.13 Jebel Moya: Assemblage 3: (a) body sherd 2.5 - 4.5mm thick with comb-stamped angular lines forming quadrangles; (b) simple rim and body sherd 3 - 6mm thick with two comb-stamped channels under the lip and comb-stamped triangles on the body; (c) body sherd 1 - 4.5mm thick with stylus-stamped wavy-lines, stylus-stamped chevron lines and comb-stamped triangular and vertical wavy-lines. The temper of all the sherds is sand with mica (with some organics). <i>(a-c) are from tray JM2 and are reproduced with the kind permission of the Trustees of the British Museum; (d) is a selection of large rim sherds from Addison (1949: Plate CI)</i>	60

Figure 3.14 Jebel Moya: The spatial distribution of pottery (red) in recorded association with human burials (grey). <i>From Brass and Schwenniger (2013: Figure 6)</i>	61
Figure 3.15 Jebel Moya: The plotted luminescence date intervals from the Assemblage 2 and 3 samples which fall into two distinct clusters. The Assemblage 1 range is hypothetical based on Caneva (1991). <i>From Brass and Schwenniger (2013: Figure 7)</i>	63
Figure 3.16 Jebel Moya: The relative density of burials-with-grave-goods to burials-without-grave-goods is greater in the southwest and north (>0.5) than in the east and northeast. The overall ration of burials-with-grave-goods to all burials is $1108/3135 = 0.35$, which is the global average risk or probability of burials with goods. <i>From Brass and Schwenniger (2013: Figure 8)</i>	64
Figure 3.17 Cardinal co-ordinates and their frequency for burials-without-goods across the site.	68
Figure 3.18 Cardinal co-ordinates and their frequency for burials-with-goods across the site.	68
Figure 3.19 Abu Geili: Pottery: 1 - 3 and 5 stylus-stamped wavy lines. 4 and 6 - 9 comb-stamped decoration sometimes within incised lines. All are burnished black and brown sherds originally infilled with red pigment. <i>From Crawford and Addison (1951: Plate XXXVIII B)</i>	69
Figure 3.20 Abu Geili: Locally produced wheel-made pottery. <i>From Crawford and Addison (1951: Plate XLIII)</i>	69
Figure 3.21 Abu Geili: Painted Meroitic pottery. <i>From Crawford and Addison (1951: Plate XLA)</i>	70
Figure 4.1 The distribution of claimed fireplaces and floors in the different squares and through the stratigraphy. <i>From Addison (1949: Figures 79-80)</i>	72
Figure 4.2 (1) Mud plaster remnants of wattle & daub structure, (2) claimed floor, (3 & 4) hardened clay impregnated with calcium carbonate, formerly claimed by the excavators and Addison to be a living floor. <i>From Addison (1949: Plate XXXV)</i>	72
Figure 4.3 Hardened earth, claimed by Addison to be a <i>tukl</i> (grass hut) floor. <i>From Addison (1949: Plate XXXVI 2)</i>	74
Figure 4.4 A pot or pots crushed under pressure but claimed by Addison to be a flooring of red-ware sherds. <i>From Addison (1949: Plate XXXVI 3)</i>	74
Figure 4.5 Addison's plan showing the location of claimed floors over the site. <i>From Addison (1949: Figure 81)</i> . ..	75
Figure 4.6 Six small stone structures which were located in the south-east portion of the East sector of the cemetery and recorded in Oric Bates' diary from the second field season, 1911 – 12.	76
Figure 4.7 Examples of mud plastered, barrel-shaped pits serving as ovens. <i>From Addison (1949: Plate XXXVII)</i> . ..	77
Figure 4.8 Two ovens from square M.5, N.6 which cut through the 'third flooring' marked in Figure 4.1b. <i>From Addison (1949: Plate XXXVIII 2)</i>	77
Figure 4.9 Mapping of the surface of Stratum C in relation to the modern ground surface at the time of excavation across the excavated sectors of the valley. <i>From Addison (1949: Figure 5)</i>	81
Figure 4.10 Reconstruction of the number of burials (vertical axis) dug from levels above and below the surface of Stratum C (horizontal axis) for the South-West sector.....	82
Figure 4.11 Reconstruction of the number of burials (vertical axis) dug from levels above and below the surface of Stratum C (horizontal axis) for the East sector.....	82
Figure 4.12 Reconstruction of the number of burials (vertical axis) dug from levels above and below the surface of Stratum C (horizontal axis) for the North-West sector.....	83
Figure 4.13 Reconstruction of the number of burials (vertical axis) dug from levels above and below the surface of Stratum C (horizontal axis) for the North-East sector.	84
Figure 5.1 Mahalanobis D ² technique applied to Jebel Moya and comparative African samples to determine population affinity. <i>From Mukherjee et al. (1955: 85)</i>	93
Figure 5.2 14 trait Mahalanobis D ² distance on dental records using Multi-Dimensional Scaling. The triangles are sub-Saharan, with the black squares representing Saharan populations. <i>From Irish and Konigsberg (2007: Figure 3)</i>	98

Figure 6.1 Jebel Moya: the relative density of burials with grave goods (red) to burials without grave goods (yellow) is greater in the south-west and north-west (>0.5) than in the east and north-east.....	101
Figure 6.2 Burial distribution of individuals categorised as Infants by the original field anthropologists.....	106
Figure 6.3 Burial distribution of individuals categorised as Juveniles by the original field anthropologists.	106
Figure 6.4 Burial distribution of individuals categorised as Young Adults by the original field anthropologists.	107
Figure 6.5 Occurrence of raw materials amongst the burials of the South-West, North-West, East and North-East per adult female and adult male burials. Each sex category includes those tentatively assigned to it.	110
Figure 6.6 Occurrence of artefact categories amongst the burials of the South-West per adult female and adult male burials. Each sex category includes those tentatively assigned to it.	111
Figure 6.7 Occurrence of raw materials amongst the burials of the North-West per (a) adult female and adult male burials. Each sex category includes those tentatively assigned to it.	112
Figure 6.9 Occurrence of raw materials amongst the burials of the North-East per adult female and adult male burials. Each sex category includes those tentatively assigned to it.....	113
Figure 6.10 Occurrence of artefact categories amongst the burials of the North-East per adult female and adult male burials. Each sex category includes those tentatively assigned to it.	114
Figure 6.11 Occurrence of raw materials amongst the burials of the East per adult female and adult male burials. Each sex category includes those tentatively assigned to it.	115
Figure 6.12 Occurrence of artefact categories amongst the burials of the East per adult female and adult male burials. Each sex category includes those tentatively assigned to it.....	116
Figure 6.13 Correspondence analysis of the artefact categories against all burials across the cemetery with accompanying burial assemblages.	117
Figure 6.14 Correspondence analysis of the raw material categories against all burials across the cemetery with accompanying burial assemblages.	117
Figure 6.15 Correspondence analysis against burials containing the 20 most commonly occurring types of artefact categories.	118
Figure 6.16 Correspondence analysis against burials containing the 20 most commonly occurring types of raw material categories.	118
Figure 6.17 Pair Correlation Function plot of richer burials versus each across all sectors of the cemetery. X-axis: metres out from any given rich burial. Y-axis: an estimate of the density of neighbouring rich graves for difference distances along the x-axis. Red line: average PCF value for 99 random sets. Black line: the burial data. Grey shaded area: wider envelope of possible values from the random sets.	120
Figure 6.18 Pair Correlation Function plot of richer burials versus lesser-rich burials across all sectors of the cemetery. X-axis: metres out from any given rich burial. Y-axis: an estimate of the density of neighbouring rich graves for difference distances along the x-axis. Red line: average PCF value for 99 random sets. Black line: the burial data. Grey shaded area: wider envelope of possible values from the random sets.....	120
Figure 6.19 Pair Correlation Function of richer burials versus lesser-rich burials in four sectors of the cemetery: (a) South-West, (b) East, (c) North-West and (d) North-East. X-axis: metres out from any given rich burial. Y-axis: an estimate of the density of neighbouring rich graves for difference distances along the x-axis. Red line: average PCF value for 99 random sets. Black line: the burial data. Grey shaded area: wider envelope of possible values from the random sets.	121
Figure 6.20 The 27 IDV 10+ burials in relation to the distribution map of all the burials plotted against Addison's original grave distribution map.....	122
Figure 6.21 The plotted location of the 27 IDV 10+ burials in the North-East sector.	122
Figure 6.22 Comparative histograms of the (a) cardinal directionality of the 27 IDV 10+ burials, and (b) cardinality directionality of all burials in the North-East sector.	124

Figure 6.23 Comparative compass map of the (a) cardinal directionality of the 27 IDV 10+ burials, and (b) cardinality directionality of all burials in the North-East sector.....	124
Figure 6.24 Reconstruction of the number of the IDV 10+ burials dug from levels above and below the surface of C Stratum for the North-East sector.	125
Figure 6.25 NMDS plot of all burials across the cemetery using the occurrence of artefacts and the raw material each was made from.	126
Figure 6.26 NMDS plot of all burials across the cemetery for the presence/absence of the artefact categories...126	
Figure 6.27 NMDS plot of all burials in the North-East sector for the presence/absence of the artefact categories.	126
Figure 6.28 DMMS plot of all burials across the cemetery with three or more artefacts-with-material-type categories.	127
Figure 6.29 DMMS plot of all burials across the cemetery with three or more presence/absence occurrences of artefact categories.	128
Figure 6.30 Comparative chart of the occurrence of artefact categories between the laboratory-sexed male and female individuals.....	130
Figure 6.31 Compass map of the recorded bodily (not head) orientation of all individuals across the cemetery..	131
Figure 6.32 Compass map of the recorded orientations by age and sex (Duckworth Laboratory) across the cemetery: (a) adult, (b) adult male, (c) adult female, and (d) young adult.....	132
Figure 6.33 Breakdown of tooth extraction amongst individuals re-sexed by the Duckworth Laboratory.	133
Figure 7.1 Colour-coded map of select Mesolithic, Neolithic, Meroitic and Post-Meroitic sites in the Sudan: blue (Meroitic), brown (Mesolithic), green (Meroitic, Post-Meroitic/X-Group), orange (Neolithic), purple (Mesolithic, Neolithic, Meroitic), red (Neolithic, Meroitic, Post-Meroitic/X-Group) and light grey (Neolithic, Meroitic).	134
Figure 7.2 The chronology of Jebel Moya and its main contemporary (Post-)Meroitic sites elsewhere in the Sudan used in analysing comparative mortuary behaviours.	137
Table 5.1 Re-sexing of the adult skeletal remains at the Duckworth Laboratory by Mukherjee <i>et al.</i> From Mukherjee <i>et al.</i> (1955: Table 2.1).	90
Table 6.8 Frequency of the raw material composition of burial artefacts per Duckworth Laboratory adult-sexed individuals in each sector of the cemetery. The two columns “ceramics” and “pottery” refer to ceramic wares and clay lipstuds/nosestuds/earstuds respectively.	108
Table 7.1 Summary of the different regions in the Sudan, reflecting their currently known burial and socio-economic activities. (1).....	135
Table 7.1 Summary of the different regions in the Sudan, reflecting their currently known burial and socio-economic activities. (2).....	136

List of Tables

Table 1.1 The breakdown of the different geographical excavated sectors into their constituent 20 x 20m excavation squares, as determined by Frank Addison, and the attendant percentage of excavated burials, including a duplicate recording, with accompanying assemblages.	5
Table 1.2 Current location of artefacts from Wellcome’s 1911 – 14 expedition.	6
Table 1.3 The types and numbers of digitised excavation records from the Duckworth Laboratory.	8
Table 1.4 A breakdown of the recorded and excavated burials as determined from the new Register of Graves.	8
Table 3.1 J.D. Clark’s C ¹⁴ dates for Jebel Moya; implied but not explicitly stated as being from two different samples. <i>Adapted from Clark and Stemler (1975: Table 1) with new calibration using OxCal 4.3 (IntCal13, Sigma 2 (95.4%) confidence interval)</i>	32
Table 3.2 C ¹⁴ dates for Rabak. <i>Adapted from el Mahi and Haaland (1984: Table 1) with new calibration using OxCal 4.3 (IntCal13, Sigma 2 (95.4%) confidence interval)</i>	33
Table 3.3 Breakdown of the British Museum Jebel Moya trays by stratum.	47
Table 3.4 The different rim forms present across the strata and their respective percentage within each stratum.	47
Table 3.5 Surface treatments across the strata and their respective percentage out of all sherds (including unburnished and unslipped) within each stratum.	48
Table 3.6a Rim sherds: Single attribute occurrences of comb as a decor tool and the corresponding motor action across the strata and their respective percentage within each stratum.	48
Table 3.6b Rim sherds: Single attribute occurrences of spatula, hollow reed and fillet as decor tools, the corresponding motor action across the strata and their respective percentage within each stratum.	49
Table 3.6c Rim sherds: Single attribute occurrences of stylus as a decor tool and the corresponding motor action across the strata and their respective percentage within each stratum.	49
Table 3.7a Body sherds: Single attribute occurrences of comb as a decor tool and the corresponding motor action across the strata and their respective percentage of occurrence on body sherds within each stratum.	49
Table 3.7b Body sherds: Single attribute occurrences of spatula as a decor tool and the corresponding motor action across the strata and their respective percentage of occurrence on body sherds within each stratum.	50
Table 3.7c Body sherds: Single attribute occurrences of wrapped cord, hollow reed, nails and fillets as decor tools and the corresponding motor action across the strata and their respective percentage of occurrence on body sherds within each stratum.	50
Table 3.7d Body sherds: Single attribute occurrences of stylus as a decor tool and the corresponding motor action across the strata and their respective percentage of occurrence on body sherds within each stratum.	51
Table 3.8a Co-occurrence of rim types and comb tool motor actions. % occurrence is calculated against the number of overall rim sherds per strata.	53
Table 3.8b Co-occurrence of rim types and spatula tool motor actions. % occurrence is calculated against the number of overall rim sherds per strata.	54
Table 3.8c Co-occurrence of rim types and stylus tool motor actions. % occurrence is against the number of overall rim sherds per strata.	55
Table 3.8d Co-occurrence of rim types and cord tool motor actions. % occurrence is against the number of overall rim sherds per strata.	56
Table 3.9 Jebel Moya: The breakdown of the spatial distribution of pottery in recorded association with human burials by sector.	61
Table 3.10 Jebel Moya: Summary of the OSL dating results.	62
Table 3.11 Jebel Moya: Summary of the sampled sherds curated at the British Museum.	63

Table 3.12 Surface finds of plaques and scarabs, and their chronological attribution of manufacture by Addison. The point references refer to the squares on the Jebel Moya site plan. <i>From Addison (1949: 117)</i>	66
Table 3.13 Breakdown of the burial postures between burials-with-goods and burials-without-goods	68
Table 4.1 The known features recorded as evidence for human habitation activity in the South-West sector, their re-evaluated designation and depth above or below the surface of Stratum C. The ground surface here at the time of excavation was 210cm above the surface of Stratum C.	79
Table 4.2 Numerical distribution of burials in each stratum.	79
Table 4.3 Breakdown of burials across the different sectors and through the strata.....	80
Table 4.4 The breakdown of human and separate animal burials, and the percentage of grave goods associated with the human burials, per sector and per square meter.	85
Table 4.5 The sum of the occurrences of artefact categories in each area of the cemetery with corresponding percentage out of the total number of burials-with-goods.....	85
Table 5.2 The numbers of individuals re-sexed in the laboratory compared to their original field sexings. The male and male?, female and female? categories have been subsumed under male and female. The total of 330 individuals differs from 369 reported in Table 4.3 due to the removal by Mukherjee <i>et al.</i> of 39 specimens whose numbering appeared doubtful. <i>Based on Mukherjee et al. (1955: Table 2.4)</i>	90
Table 5.3 The dental samples and their numbers. <i>Adapted from Rachel Hutton MacDonald (1999: Table 3.1) using the new chronology for Jebel Moya.</i>	94
Table 5.4 The comparative series of skeletal remains used by Mukherjee <i>et al.</i> (1955) (20) and Irish & Konigsberg (2007) (20). The old designation of Nubian B-Group is no longer valid. <i>From Irish & Konigsberg (2007: Table 1).</i>	97
Table 5.5 Aged and re-sexed individuals per season derived from the Duckworth Laboratory's database. Only adults were sexed. % in brackets: age as a % of the overall total, with adult sex & unknown as a % of adult. ...	98
Table 5.6 Breakdown by age and sex of all recorded individuals across the last three field seasons in the new Register of Graves.	99
Table 5.7 Accuracy of the original field physical anthropological measurements of adult specimens compared against the adult individuals re-sexed by Mercedes Okumura, using the latter as the comparative baseline. ...	99
Table 6.1 The number of occurrences of each imported raw material category in the rich North-East sector burials and their percentage of the total North-East occurrences.	101
Table 6.2 The range of raw materials from which burial artefacts were manufactured from and their potential points of origin. <i>From Clark (1973a), Humphries and Rehren (2014), Nicholson and Shaw (1999), Shinnie and Anderson (2004), Whiteman (1971) and Williams and Adamson (1982).</i>	102
Table 6.3 Breakdown of the total number of human burials and human burials with accompanying goods in the different sectors of the site. The Inverse Distance Value is the total for each sector with the accompanying mean and median values per human burial in brackets.	103
Table 6.4 The number of total burials in which imported raw materials occurred across the site and their presence/absence outside of the North-East and East sectors.	103
Table 6.5 The number of individuals with accompanying burial items, derived from the Duckworth Lab's recent resexing attempt, divided by age categories. The range, and the mean and median, are given for their Inverse Distance Value.	104
Table 6.6 Using the field anatomists' categorisations, the number for each age category and their corresponding Inverse Distance Values were calculated.	104
Table 6.7 Comparative list of the bodily orientation, grave form and burial posture of the different field-derived age categories.....	105
Table 6.9 Breakdown of the IDV per Duckworth Laboratory aged and sexed burials per sector. The category numbers includes the totals for the female and male adult individuals (see Table 5.1).....	109
Table 6.10 North-East sector burials with an Inverse Distance Value of 10+ sorted in descending order of their values. The listed lab sexing was done by the Duckworth Laboratory on their extant human remains.....	123

Foreword

The largest known pastoral cemetery in sub-Saharan Africa is found in the Jebel Moya massif, south-central Sudan. It was excavated from 1911 to 1914 by Henry Wellcome and first published in 1949. With more than 3100 human burials, the site provides extraordinary scope for exploring the interaction of indigenous and external cultural traditions on the southern boundary of the Meroitic state. This research revises our understanding of Jebel Moya and its context. The few known archaeological localities of the southern Gezira and pre-Meroitic and Meroitic-era cemeteries are compared to elucidate the nature of pastoral social organisation at Jebel Moya.

After reviewing previous applications of social complexity theory to mortuary data within and outside of Africa, new questions are posed for the applicability of such theory to pastoral cemeteries. Reliable radiometric dating of Jebel Moya for the first time by luminescence dates is tied into an attribute-based approach to discern three distinctive pottery assemblages. Three distinct phases of occupation are discerned, dating from (1) the early fifth millennium BC, (2) the mid-second to early first millennium BC, and (3) a mortuary phase from the first century BC into the sixth century AD. Analytically, new statistical and spatial analyses such as cross-pair correlation function and multi-dimensional scaling provide information on zones of interaction across the mortuary assemblages. Finally, an analysis of Meroitic and non-Meroitic mortuary locales from the central Sudan and Upper and Lower Nubia are examined to show how changing social, economic and power relations were conceptualised, and to highlight Jebel Moya's potential to serve as a chronological and cultural reference point for future studies in south-central and southern Sudan.

I am greatly indebted to my former Ph.D supervisor at the Institute of Archaeology (University College London), Professor Kevin MacDonald, who first suggested Jebel Moya as a potential candidate for my doctoral research, which this study is the result of. Our discussions and meetings have always been lively and highly stimulating, and his guidance invaluable. I would also like to thank my secondary supervisors, Professors Andrew Bevan and Dorian Q. Fuller. Professor Bevan provided incalculable assistance and guidance with the spatial analyses, while Professor Fuller gave very graciously of his time to answer any questions I had about wider Sudanese archaeology.

The support of other colleagues in the Institute of Archaeology and the intellectual freedom offered by the Institute has been significant. The director, Professor Sue Hamilton, encouraged me to publish the luminescence dates on the Jebel Moya pottery. Professor David Wengrow and Dr Richard Bussmann were always available for queries, and provided the opportunity to speak to the British Association of Near East Archaeology 2015 conference hosted by the Institute.

Dr Neil Spencer and Dr Derek Welsby kindly provided access to the Jebel Moya collection at the British Museum, and Dr Welsby extended gracious invitations to present my research to The Sudan Archaeological Research Society in 2008 and 2015. Dr Marta Lahr kindly granted access to the records archived at the Duckworth Laboratory, University of Cambridge, while the Griffiths Institute (Oxford) provided access to their collection. I am indebted to Professors Azhari Sadig, Mike Parker Pearson, Andrea Manzo, and Dr Donatella Usai and my colleagues from many conferences and organisations, notably the annual African Archaeology Research Day in the UK, Later Prehistory of Northeastern Africa (LPNEA 2011 and 2015, Poznan, Poland) and the Society of Africanist Archaeologists. There are too many people to thank individually but you know who you are.

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Chapter 1: Introduction

1.1 Aims and methods

The Jebel Moya massif is situated in the relatively under-explored southern Gezira Plain in the Sudan, approximately 250km south south-east of Khartoum and *ca.* 30km west of Sennar (Figure 1.1). The massif has a perimeter of *ca.* 11km. Its north-eastern valley was excavated by (later Sir) Henry Wellcome, the founder of the Wellcome Trust, over four field seasons from 1911 – 1914 (Addison 1949: 1). Around a fifth of the estimated 10.4 hectares of the valley floor was excavated over four seasons, yielding a recorded 3135 human burials from 2791 graves. It is by far the largest and most intensively excavated cemetery anywhere in sub-Saharan Africa.

The archaeological and bioanthropological reports were published in 1949 and 1955 respectively (Addison 1949; Mukherjee *et al.* 1955). The vast majority of extant assemblages and the expedition records are curated at different institutions in the United Kingdom. The excavation cards and extant skeletal assemblages at the Duckworth Laboratory (University of Cambridge) together with a field diary from the second season's field director, geological reports from the third and fourth seasons, a topographical survey map, Addison's correspondences, plans of some of the burials excavated during the fourth and final season, cards describing artefacts and the photographic archive at the Griffiths Institute (Oxford) and the pottery samples at the British and Petrie Museums comprise the key materials curated in the United Kingdom. They have not been comprehensively re-evaluated, subsequent to the original reports, to determine the nature of social evolution at Jebel Moya.

Developments in archaeological inference and techniques provide a unique opportunity to re-orientate the published and extant material evidence within an updated interpretive framework on mortuary social organisation at Jebel Moya. The present work places the site's different phases of occupation in secure temporal contexts to allow for informed social analysis of change over time. In particular, it focuses on questions of social organization and evaluates the nature of socio-political order in the southern Gezira Plain. This enables a focus on the site's cultural evolution and provides a basis for addressing the key research questions:

- How is the nature of the human occupation of Jebel Moya reflected in the habitation and mortuary remains across the different temporal periods?
- Are the mortuary remains at Jebel Moya from one discrete period, and can the processes behind the cemetery's evolution and layout be disentangled?
- How do phenomena including biological age groups and sex, composition and
- distribution of burial assemblages, and burial postures shed light on the forms and signification of status in death?
- How does the manifestation of social differentiation indicated by the mortuary remains at Jebel Moya compare spatially and temporally to mortuary assemblages elsewhere in the Sudan?

1.2 The prehistoric geographic context of Jebel Moya

Understanding and reconstructing the geological, site formation and destructive processes in the southern Gezira Plain is important for understanding the backdrop against which the archaeological, chronometric and physical anthropological data from Jebel Moya will be analysed.

The fertile Gezira, Arabic for Island, is a megafan built by the Blue Nile and criss-crossed by Late Pleistocene and Early Holocene channels (Williams 2009: 7). Examples are the depressions and sandy



FIGURE 1.1 THE LOCATION OF JEBEL MOYA IN SOUTH-CENTRAL SUDAN. ADAPTED FROM EDWARDS (1989: FIGURE 1) AND WINCHELL (2013: FIGURE 1.2).

ridges of palaeo-channels fanning out to the north and north-west from the area around Sennar (Mubarak *et al.* 1982: 179; Williams *et al.* 1982: 113). Jebel Moya itself is a granitic outcrop of the Basement Complex breaking through the above Sandstone Formation and its overlay (Williams and Adamson 1982). The Basement Complex contains an underground aquafer, resulting in fresh water rising to ground level surface around the bases of outcrops like Jebel Moya. This is particularly important in a plain without permanent surface water for maintaining animal herds. The underground aquafer is replenished by the waters from both the Blue and White Niles. The Blue Nile is highly seasonal, accounting for 68% of the

peak flow and 72% of the annual sediment in the Gezira Plain (Williams 2009). The White Nile has an almost constant flow throughout the year with 83% of the Nile flow during the lowest month. The Blue and White Niles join north of Khartoum (Williams 2009: 3).

From the early to middle Holocene, the 500mm isohyet was north of Jebel Moya near Khartoum, which increased the northern range of the biting Tabanidae fly. The bite of the Tabanidae fly has detrimental effects on the survival rates of cattle (Wickens 1982: 43) and this may help explain why the remains of early cattle have not been found in early-middle Holocene occupational debris in the northern Gezira (Salvatori *et al.* 2011). Moreover, the distribution of snails has been taken as suggestive of intransient rather than permanent swamp conditions away from the flood plain of the Blue and White Niles during the middle to late Holocene (Williams and Adamson 1973). This includes the late Mesolithic period of the late sixth – early fifth millennium BC marked by the first appearance of pottery at Jebel Moya (see section 3.2.2).

However, the transition from swampy conditions to a mostly acacia-tall grass savannah and subsequent semi-desert steppe, was complete by the third millennium BC (Wickens 1982: 44-6). There was a brief interlude of wetter weather around the end of the second millennium BC before the drying trend resumed. By the early centuries AD, few swamp conditions remained; one such instance was at Jebel et Tomat, situated to the north-east of Jebel Moya near the banks of the White Nile, where it co-existed with dry land (Clark 1973b). Today, the nearest riparian swamps are over 12km distant. Further evidence for different ecological conditions is provided by the Roman authors Pliny the Elder (HN 6, 181-5) and Seneca (Nat. Qu. 3-5, 6, 8). The former writes about summer rains at Alexandria (Egypt) brought by southerly winds from the south. The latter reports on two centurions sent by the Roman Emperor Nero to find the source of the Nile in the first century AD. The centurions reported their progress was halted by vast swamps, the Sudd, within which were two rock outcrops now identified as Jebel Ahmed Agha, which is to the south of Jebel Moya. If correct, the Sudd extended 200km north of its current position, although it was in slow south-bound retreat (Mawson and Williams 1984: 51).

In modern times, though, this zone can be sub-divided into swamp vegetation, riverine woodland, grassland and jebel (mountain) vegetation. The mean annual rainfall recorded from 1921 – 1950 across the Gezira is approximately 400 mm for the isohyet line nearest to Jebel Moya (Williams and Adamson 1982: 136-7). To put it into perspective, Khartoum received an annualised 164 mm over the same period. Overall, these different strands of data place the Jebel Moya surrounds near the transitional belts both in modern times and during the Classic and Later Meroitic Periods (late first millennium BC – *ca.* AD. 350).

1.3 Wellcome's excavations and subsequent research

The first intensive archaeological expeditions in the Sudan began at the turn of the 20th century after the final defeat and death of the Khalifa Abdullahi by British forces in November 1899. The cores of these early expeditions were formed of Egyptologists, which had the effect of focusing early Sudanese archaeology on cemeteries and sites such as Meroe and Kerma, amongst others, which had large standing structures (Edwards 2004; Reisner 1923). In addition, until the late 1970s and early 1980s, excavation efforts were almost exclusively concentrated along the river Nile north of the 6th Cataract (Dann 2009; Edwards 2007; Fuller 2003).

It was in this intellectual setting that Wellcome launched his archaeological expedition at Jebel Moya in response to a request from Lord Kitchener (former Governor-General of the Sudan, 2 September 1898 – 19 January 1899) to assist in unspecified “upliftment” of the indigenous inhabitants of the Sudan (Addison 1949: 1). Wellcome decided to combine paid employment with his archaeological interests. By the close of the fourth and final field season in April 1914, more than 4000 workmen from the nearby villages were engaged in various excavation and other activities such as construction and cooking (Figure 1.2) (Addison 1949: 7).



FIGURE 1.2 VIEW OF THE JEBEL MOYA EXCAVATIONS FROM THE NORTH-WEST. *REPRODUCED FROM THE GRIFFITHS INSTITUTE'S PHOTOGRAPHIC ARCHIVE WITH PERMISSION.*

Wellcome personally supervised the work during the first season (29th January – April 1911), when five test areas were excavated (Addison 1949: 3). An unrecorded number of graves and skeletons were uncovered, but it was enough for Wellcome to apply for and be granted a concession license (Addison 1949: 3-4). Subsequently, acting on the advice of the Egyptologist George Reisner who he consulted with but who did not form part of the expedition except for a few weeks before the close of the fourth field season, Wellcome appointed Oric Bates as field director for the second field season (December 1911 – April 1912) (Addison 1949: 4). Other appointments included Douglas Derry as the first chief medical officer and field bioanthropologist. These actions placed the staffing and direction of the excavations on a more scientific footing. Bates re-examined the spoil heaps from the first season and excavated a total of 709 graves in the East and South Jebel sectors (see Table 1.1 and Appendix I). It was also during this second season that construction began on the famous “House of Boulders”, designed to absorb labourers not required for excavation work and the erection of workshops and iron shed stores (Addison 1949: 5).

James Dixon and G. A. Wainwright took over the field directorship for the third season (November 1912 – April 1913), assisted by M. B. Ray and L. Dudley Buxton who replaced Derry (Addison 1949: 5). Wainwright was only present for a few weeks at the onset of the season, while Dixon continued until shortly prior to the end of the fourth season (November 1913 – April 1914). The use of sifting machines was instituted and arguably one of the oldest experiments in aerial photography occurred via the use of ‘kite trolleys’ carrying the kite along a string (Addison 1949: 6). A total of 310 graves were excavated in the South-West, West, South and North-East, but not East, sectors during the third season (Addison 1949: 5).

The fourth and final season (November 1913 – April 1914) spanned all recorded sectors of the valley, and yielded 1772 excavated graves. During this season, Reisner conducted limited excavations with a team of

Cemetery area	Squares	Burial goods
South	R.11, S.12.; R.12, S.13; S.11, T.12; S.12, T.13; S.13, T.14; Q.12, R.13	19/49 (38.78%)
South-West	M.3, N.4; M.4, N.5; M.4, N5; M.5, N.6'; M.6, N.6; M.6, N.7; M.7, N.8; M.8, N.9; N.1, O.2; N.2, O.3; N.3, O.4; N.4, O.5; N.5, O.6; N.6, O.7; N.7, O.8; N.8, O.9; N.9, O.10; O.1, P.2; O.2, P.3; O.4, P.5; O.5, P.6; O.6, P.7; O.7, P.8; O.8, P.9; P.1, Q.2; P.2, Q.3	429/824 (52.06%)
West	J.2, K.3; K.2, L.3; K.3, L.4; K.5, L.6; K.7, L.8	4/17 (23.5%)
East	L.9, M.10; L.10, M.11; L.11, M.12; L.12, M.13; K.8, L.9; K.9, L.10; K.10, L.11; K.11, L.12; K.11, L.12; K.12, L.13; M.10, N.11; M.100, N.1; M.11, N.12; M.12, N.13	216/859 (25.15%)
North-West	G.5, H.6; G.6, H.7; G.7, H.8; G.8, H.9; H.6, I.7; H.7, I.8; H.8, I.9; I.6, J.7; I.7, J.8; J.6, K.7	85/174 (49.7%)
North-East	H.9, I.10; H.10, I.11; I.8, J.9; I.9, J.10; I.10, J.11; I.11, J.12; J.8, K.9; J.9, K.10; J.9, K.11; J.10, K.11; J.11, K.12; J.12, K.13	339/1196 (28.34%)
"G1"	Burials with no assigned square or assigned squares off the map (Appendix I)	21/73 (28.77%)
TOTAL		1114/3192 (34.9%)

TABLE 1.1 THE BREAKDOWN OF THE DIFFERENT GEOGRAPHICAL EXCAVATED SECTORS INTO THEIR CONSTITUENT 20 X 20M EXCAVATION SQUARES, AS DETERMINED BY FRANK ADDISON, AND THE ATTENDANT PERCENTAGE OF EXCAVATED BURIALS, INCLUDING A DUPLICATE RECORDING, WITH ACCOMPANYING ASSEMBLAGES.

his trained Egyptian workmen (Addison 1949: 8-9). Reisner made now lost recommendations to Wellcome for improvements in excavation and recording methodologies for subsequent seasons. However, the onset of the First World War disrupted any plans for future seasons. Work did not resume after the war ended and Wellcome passed away in 1936 (Addison 1949: 9).

The Trustees of the Wellcome Trust subsequently agreed with the recommendation of Reisner to appoint Frank Addison in 1936. His remit was to analysis and publish the archaeological materials from the four field seasons. Addison was an archaeologist at the Institute of Archaeology, University College London, who had been Inspector of Schools & Conservator of Antiquities in the Sudan from 1927-31. Wellcome had shipped the vast majority of the artefacts, all of the physical anthropological remains and the expedition's records to England – to both a depot in Marylebone and a warehouse in Dartford (London). The Marylebone staff classified the artefacts, repaired broken pottery sherds and reconstructed whole vessels where possible. The Dartford staff washed and sorted pottery sherds while leaving the remainder of the boxes unopened. The Dartford warehouse was flooded in 1928. The undamaged boxes were shipped along with the Marylebone materials to Stanmore in Middlesex. It was here that Addison and his assistant (L.P. Kirwan) began their examination of Wellcome's materials and records in 1937. It was here too that pottery sherds considered to be undiagnostic or undecorated were treated as waste and discarded by Addison. The depot was sold shortly afterwards. The remaining artefacts and records were moved within London to Willesden for storage until after the Second World War, when Addison also completed his analysis.

Addison (1949: 249-260) initially placed Jebel Moya in an uninterrupted sequence dating from 1000 – 400 BC, paralleling the then recognized chronology of the Napatan period of Upper Nubia, based on the purported presence of Napatan amulets, beads, faience and metal objects within select graves and on his reconstruction of the rate of soil deposition. He later modified his dating to the last centuries BC – AD 400, contemporary with the Meroitic state to the north, with its heartland in the Shendi Reach between the 5th

and 6th Nile Cataracts, on the basis of (a) a purportedly Meroitic pot found in the uppermost stratum, and (b) a grave containing a purported Meroitic period pot overlying a burial with a Napatan period scarab (Addison 1956: 10-12).

Subsequent to the publication of Addison's investigation in 1949, the materials were spread out between different institutions. Oric Bates' field journal, geological reports from the third and fourth seasons, a topographical survey map, photographs and photographic negatives, plans of some of the burials excavated during the fourth and final field season, and cards describing artefacts were transferred by Addison to the Griffiths Institute (Oxford) in 1948. Representative pottery samples were donated to the British Museum and the Petrie Museum in London, artefacts to the Museum of Archaeology and Anthropology (University of Cambridge) and small (but unquantifiable due to the lack of consistent museum cataloguing) samples to other institutions (Table 1.2). Finally, the field cards were re-united with the osteological remains which had been transferred to the Duckworth Laboratory (headed by J. Trevor, University of Cambridge) after the Second World War ended. Independent of Addison, the Trustees of the Wellcome Trust appointed Trevor to examine the osteological remains. Trevor recruited two former pupils of his statistician colleague Prasanta Mahalanobis, R. Mukherjee (a trained bioanthropologist) and C. Rao (a statistician with experience of collaborating on bioanthropological projects). Their joint publication was released in 1955.

Subsequent scholars, Randi Haaland (1984, 1987) and, to a lesser extent, J. Desmond Clark (1973b; Clark and Stemler 1975) drew almost exclusively upon Addison's descriptions and illustrations of the pottery (1949) in claiming that there were similarities between select Jebel Moya pottery and Butana Group wares, dating to the fourth millennium BC, from the neighbouring Butana region to the east (see section 3.2.2). Subsequently, Isabelle Caneva (1991) recognised a previously unidentified late sixth – early fifth millennium BC Mesolithic component to the Jebel Moya pottery collection at the British Museum, but she did not undertake a re-examination of the remainder of the collection. In the mid-1990s, Andrea Manzo (1995) briefly looked at the non-Mesolithic pottery sherds from the British Museum collection, but his published description of them is problematic (see section 3.2.2). Finally, Rudolf Gerharz (1994) revisited the issue of

Location	Types of artefacts
British Museum, London (U.K.)	Pottery
Duckworth Laboratory, Cambridge (U.K.)	Physical anthropological remains and excavation records
National Museum of Sudan, Khartoum (Sudan)	Lipstuds, pendants, beads, polishing pebbles, pottery, figurines, drills, points, earstuds, stone implements, celts, rings, copper coils, bracelets, ear pins, shells, red pigment
Louvre Museum, Paris (France)	Lipstuds, beads, hammerstones
Museum of Archaeology and Anthropology, Cambridge (U.K.)	Some pottery, stone implements, shells, lipstuds, bone implements, bone points, copper coils, beads, drills, palettes, figurines
Nairobi National Museum, Nairobi (Kenya)	Lipstuds, pendants, stone implements, beads, polishing pebbles, bracelets, rings, pendants, shells, figurines
Peabody Museum of Archaeology and Ethnology, New Haven (U.S.)	Lipstuds, earstuds, stone implements, beads, figurines, ochre, pendants, bracelets, shells, copper coils, pottery, drills, polishing pebbles, stone picks, rings
Petrie Museum, London (U.K.)	Pottery
Pitt Rivers Museum, Oxford (U.K.)	Lipstuds, beads, copper coils, celts, rings, drills, awls, bone and stone implements, pottery, ivory, figurines
Royal Ontario Museum, Toronto (Canada)	Lipstuds, beads, stone implements, polishing pebbles, pottery, celts, copper coils, shells, rings, iron implements, pendants

TABLE 1.2 CURRENT LOCATION OF ARTEFACTS FROM WELLCOME'S 1911 – 14 EXPEDITION.

chronology in the early 1990s. Gerharz's analysis relied entirely upon Addison's dataset, Caneva's study and the conclusions reached by Haaland and Clark over chronological similarities with Butana wares. He neither re-examined any of the extant expedition records or curated assemblages, nor undertook radiometric dating to define a temporal sequence for the assemblages, habitation remains and graves (see section 3.2.2). The conclusion reached by Gerharz was that Jebel Moya epitomized an early, potentially hierarchical, pastoral complex with mortuary remains spanning nearly 3000 years until *ca.* 100 BC.

The sporadic research on Jebel Moya since its excavation is therefore tantalizing, but superficial and sporadic. It was evident that a great deal remained to be done. The wealth of the extant archive provides a unique opportunity to extend the presently poor representation of social archaeological knowledge of the areas south of Khartoum by returning to critically re-examine the surviving excavation records and materials from Jebel Moya.

1.4 Records concerning the Wellcome excavations at Jebel Moya

Addison's task of making sense of and interpreting the disparate data from Jebel Moya was made harder by its field directors no longer being alive, with the exception of Wainwright (Addison 1949: VI). Addison visited Jebel Moya in 1938, but he otherwise relied on the descriptions provided by Wellcome's camp leader, Major Uribe, for understanding the camp life and activities during the second to fourth field seasons he was present. Moreover, no detailed contextual records existed pertaining to the first season, for which the only records available to Addison (1949) were John Holmes' manuscript diary, providing little information on archaeological context, and Wellcome's brief paper presented to the British Association in 1912. The diaries of Bates and Dixon, who perished during the first World War, were technical and provided little contextual and stratigraphic setting to the excavations (Addison 1949: VI). However, Addison (1949: 20) was aided by the existence of (1) anatomical, grave and object cards, (2) an object register which was abandoned by the excavators as it effectively became a duplication of the object cards, and (3) a grave list. The grave list was a book which noted the graves' depth below the modern ground surface and the section and stratum in which the grave occurred. Unfortunately, the original object register and grave list have not survived to the present day.

In reconstructing the geological strata of Jebel Moya, Addison was aided by a report written by the geologist P. Middleton during the fourth and final season (Addison 1949: 22-3). Four strata were discerned, demarcated Stratum A – D in descending order. The record of levels used by the excavators could not be located. Instead, Addison (1949: 18) used the reconstructed original surface of Stratum C as his datum point, a reference which I have retained for the sake of continuity. Addison's secretary, M.J. Halford, attempted to bring the information together by overseeing the compilation of a Register of Graves (Addison 1949: VI).

The present study is based on the expedition's surviving records and material culture. It also draws primarily upon the published works by Addison (1949), Mukherjee *et al.* (1955), Caneva (1991), and Irish and Konigsberg (2007), as well as the unpublished study of dental characteristics by Rachel Hutton MacDonald (1999). From the Griffiths Institute, all the records were consulted in order to determine whether any pertinent information had been missed in Addison's (1949) publication. At the Duckworth Laboratory, I was able to examine and digitise the anatomical, grave and tombs cards (Table 1.3). These cards together record details of each excavated from the second to fourth seasons. Mercedes Okumura, who was a research curator at the Duckworth Laboratory, kindly made her Access database available, which provides a catalogue of the human osteological remains. Okumura's database records the locality, original catalogue numbers (relating the remains to the grave cards), the presence or absence of cranial, mandibular and dental remains, the composition and state of preservation of the remains, and her re-sexing determinations (see section 5.4).

Type of excavation record	Number
Anatomical cards (4 th season)	302
Grave cards (2 nd and 3 rd seasons)	51
Tomb cards (2 nd – 4 th seasons)	5360
Total	5713

TABLE 1.3 THE TYPES AND NUMBERS OF DIGITISED EXCAVATION RECORDS FROM THE DUCKWORTH LABORATORY.

I used the information recorded on the cards and from the osteological database to construct a new and expanded Register of Graves (Appendix II). I cross-correlated the information with Addison’s (1949) Register of Graves. Where there was a conflict between information written on the excavation cards and in Addison’s register, I used the former. The data in the new Register of Graves consists of:

- The excavation season (in years).
- The burial number.
- The square number.
- If the burial was originally omitted from Addison’s grave distribution map and needed to be added.
- Distance below the ground surface at the time of excavation.
- Distance above/below surface of Stratum C (which serves as Addison’s datum point).
- The grave type.
- Burial orientation.
- Length of body.
- Orientation co-ordinates.
- Burial positioning.
- Level of disturbance.
- Field sexing.
- Laboratory sexing.
- Presence of skeletal elements in the field and the Duckworth Laboratory.
- Presence of artefacts (marked in burial association and in the grave infill).
- Present day location of the artefacts.
- Number of the linked scanned excavation card.
- Further remarks on the burial positioning.

My new Register of Graves comprises a total of 2882 recorded graves, of which 2791 were excavated; the remaining 91 were unexcavated but allocated grave numbers by the field directors. In total there are 3191 recorded burials in the 2791 excavated graves, of which 3135 are human burials distributed across the whole of the excavated sectors of the valley (Table 1.4). Of the recorded human burials, 1114 (35.53%) have accompanying burial assemblages. The spreadsheet containing the data for the new Register of Graves was linked in the GIS database to the distribution map of the graves compiled by Addison (Appendix I).

In addition, I contacted Kathy Schick and Nick Toth at the University of Indiana, who curate J. Desmond Clark’s materials and unpublished notes from his different expeditions. These were deposited with the University of Indiana upon his death. The following records of Clark’s were located concerning Jebel Moya:

- A very brief short finds register of pottery, bone and stone.

Burials	Number
Human burials	3135
Not a grave or pit (shells in hole, arrangements of stones, collection of pottery wares, collections of assorted objects)	6
Animal burials (dog, cow)	18 cow 1 cow & dog 10 dog
Pits	10
Burials with details unrecorded	11

TABLE 1.4 A BREAKDOWN OF THE RECORDED AND EXCAVATED BURIALS AS DETERMINED FROM THE NEW REGISTER OF GRAVES.

- A very short list of pottery found during his test excavation. It consists of the number of sherds, wares, vessel type, rim type, base type, decoration type, possible decoration (exterior and interior), colour (exterior and interior), holes, internal scouring, diameter, paste and comments. However, no key to the coding system is readily apparent.
- A draft copy of the subsequently published paper *Early domesticated sorghum from Central Sudan* (Clark and Stemler 1975).
- A notebook mostly composed of photocopies of published articles relating to the site of Shabona to the north of Jebel Moya. There is a typed section in the front titled *Preliminary report of an archaeological and geomorphological survey in the Central Sudan, January to March, 1973*; the latter was published (Clark 1973).
- Two pages of what appears to be cross-sections of the stratigraphy from the test pits dug by his team at Jebel Moya

Taken together, these data permit various analyses examining bodily orientation and the spatial clustering of burials, the spatial and temporal distribution of grave goods and pottery, the attribution of grave goods to age sets, and the mortuary death profiles and its spatial placements.

1.5 Structure of this research

My research therefore re-evaluates the nature and timing of the occupation of Jebel Moya. First, the literature on social complexity and mortuary theory is reviewed, and new questions are posed for their applicability to pastoral cemeteries in Chapter 2. In Chapter 3, reliable radiometric dating of Jebel Moya, for the first time via luminescence dates, is tied into an attribute-based approach to discern three distinctive pottery assemblages, each corresponding to a phase in the site's use or occupation.

Underpinning the subsequent Chapters 4 – 6 is a re-examination of the original excavation records and the creation of a new Register of Graves, cross-correlated with Addison's original Register and the integrated with both results of the re-sexing of the extant skeletons curated at the Duckworth Laboratory and previous bioanthropological analyses (Hutton MacDonald 1999; Irish and Konigsberg 2007; Mukherjee *et al.* 1955). The resulting information and the original grave distribution map are linked together in a GIS database, permitting the plotting of multiple variables such as the quantity and spatial variability of grave goods, the number of adults and their sex, the number of infants, artefacts of demonstrable social significance in the mortuary realm, spatial neighbourhoods, and potential clusters of artefacts and burials.

Analytically, new statistical and spatial analyses such as cross-pair correlation function and multi-dimensional scaling provide information on zones of interaction across the mortuary assemblages. This is particularly valuable as social identities are fluid and defined and modified in relation to internal and external relationships, both material and personal (Richard and MacDonald 2015: 23-4). Finally, in Chapter 7, Meroitic and non-Meroitic mortuary locales from the central Sudan and Upper and Lower Nubia are examined to show how changing social, economic and power relations were conceptualised, and to highlight Jebel Moya's potential to serve as a chronological and cultural reference point for future studies in south-central and southern Sudan.