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A BIOARCHAEOLOGICAL ANALYSIS OF SKELETAL REMAINS FROM VAN ZYL'S FARM, CLARENS, FREE STATE, SOUTH AFRICA

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ABSTRACT
In 1933, several skeletons were recovered from Van Zyl's farm near Clarens in the Free State Province of South Africa. Apart from the general location from which these remains were recovered, very little was known about these individuals' temporal and cultural contexts. This study aimed to analyse and describe these skeletons and any possible associated historical and archaeological records to reconstruct aspects of their archaeological context and lifestyle. Most of the remains were commingled, and from these, a minimum number of individuals (MNI) of 11 was established. There was one complete and intact individual, which raised the sample size to 12 individuals. The assemblage comprised three juveniles (<5 years) and nine adults (between the ages of 20 and 45, and 50+ years), of which six were estimated to be males and three females. The complete individual, an older adult male, was radiocarbon dated to 844±35 BP (Ua-61831). Several individuals had osteoarthritis and signs of non-specific and dental disease. One of the younger adult female individuals had culturally modified upper central incisors. Stable $\delta^{13}C$ and $\delta^{15}N$ values indicated a predominantly C4 terrestrial plant-based diet, with little reliance on animal-derived protein. The only complete male individual was of interest due to his unique biological characteristics, being very tall and morphologically robust and clearly not of Khoe-San ancestry. The date obtained for the complete individual is unusual as it is generally thought that Bantu-speaking farmers only reached the interior Drakensberg and Maluti regions much later.

Keywords: bioarchaeology, Late Iron Age, farming communities, skeletal analysis, collections-based research

1. Introduction

One of the goals of bioarchaeology is to interpret remains within their associated archaeological context, taking into consideration the influences of culture and the ability of societies to adapt to their environments (Zuckerman & Armelagos 2011; Larsen 2018). Unfortunately, the way in which many sites and skeletons were excavated in the past has led to the irretrievable loss of much information with very limited means to place them into a proper context. These past practices resulted in there now being many skeletal assemblages housed in various collections in South Africa of which little is known. This is also the case with remains recovered from the Clarens region in 1933, which are now housed in the Raymond A. Dart Archaeological Human Remains Collection (School of Anatomical Sciences, University of the Witwatersrand).

The only information available on the origins of the remains found near Clarens were a few entries in old, archived catalogues, which indicated that the remains were discovered on Van Zyl's farm by a Mrs E.M. Wells in 1933. According to the catalogues, the remains were thought to have been associated with the Stone Age. Unfortunately, there is no other information pertaining to these skeletons and their archaeological context is largely unknown.

All human remains are valuable as much information can be gained from them, even if they are incomplete and not well-documented. On an ethical level, the reconstruction of lost contexts is a necessary step towards rehumanising remains and is essential to the effective long-term management of such remains in collections. This is true for multiple excavations that occurred during the early 20th century from the Drakensberg region of South Africa (e.g., Steyn et al. 2019; Meyer et al. 2021) and other areas (e.g., Meyer et al. 2013; Meyer & Steyn 2016; Steyn & Meyer 2020). These excavations had little to no documentation of the graves or their context; however, information gained from skeletal analysis, radiocarbon dating and ancient DNA (aDNA) analysis provided insight to past lifestyles and population movements, subsequently proving useful in reconstructing aspects of the southern African Iron Age archaeological sequence. While highly specialised analyses such as aDNA assessment provide immensely valuable insights into southern Africa's past, these studies cannot stand on their own or be interpreted without knowledge of the individuals themselves and the landscapes they were occupying (Morris 2017). Assessment of the remains themselves, within their context, remains the mainstay of bioarchaeology.

This study aimed to analyse and describe the skeletons from the Clarens region of South Africa, currently housed in the Raymond A. Dart Archaeological Human Remains Collection, including any available associated artefacts. Using standard bioarchaeological methods, we attempted to gain a better understanding of the context of the remains and the lifestyles of the communities they represent. Following several avenues, attempts were also made to establish the remains' original location.

2. Materials and methods

Other than for the one intact and complete individual, the remains were in a commingled state and therefore required sorting and the establishment of a minimum number of individuals (MNI). The techniques set out by Adams and Byrd (2006) and L'Abbé (2005a) were used to determine the MNI, with some adaptations related specifically to this sample given the extreme extent of commingling. These methods require a stepwise, methodological assessment of commingled remains using visual pair matching, articulation, and a process of elimination.

Before these techniques could be applied each skeletal element was grouped, sided, counted and where possible the bones were measured (Buikstra & Ubelaker 1994). Standard osteological measurements (Langley et al. 2016) were used as an additional means of attempting to match paired bones. A code was given to each bone, which represents the left (L) and right (R) sides, as well as a number.

Once this was completed, visual pair matching was performed. This entailed the matching of the left and right sides of the same skeletal element using morphological (size and shape) similarities. For the sake of consistency and standardisation it was decided that skeletal elements with similar measurements, within 2 mm, were assigned as possibly belonging to the same individual. Visual pair matching also included the analysis of the bones for age and sex. Elements could be excluded in cases where the age ranges or sex did not correspond.

Articulation was used to match different skeletal elements of the major joints, but it could not be used to match the vertebrae and ribs, for example. The procedure involved the articulation of two bony elements to create the best fit of a joint. If the bones articulated poorly with each other they were excluded from being part of the same individual (L'Abbé 2005a). If there were bones that remained, a process of elimination was used that designated any repeated skeletal elements on either side to a separate individual. Other factors such as pathology and taphonomy of the remains were also considered in the sorting process.

Age in juvenile remains was assessed using the epiphyseal and sutural fusion of the cranial and postcranial skeleton (Schaefer et al. 2009) as no teeth were recovered. The maximum lengths of the long bones were also measured (in mm) (Schaefer et al. 2009) and compared to the ages provided by Scheuer and Black (2000) and Stull et al. (2014). Age estimation of adults was based on the assessment of degenerative changes following complete epiphyseal union. Techniques used include morphological changes observable on the sternal ends of ribs (Oettlé & Steyn 2000), the pubic symphyseal face (Brooks & Suchey 1990), and a general assessment of degenerative changes such as osteophytic lipping on the major joints and osteophyte formation on the vertebral bodies.

Both metric and morphological characteristics of the skull and pelvis were used to estimate sex in adult individuals (Phenice 1969; Buikstra & Ubelaker 1994; Walker 2008; Klales et al. 2012; İşcan & Steyn 2013; Krüger et al. 2015). As some of the commingled remains could not be assigned to a particular pelvis or skull with certainty, other methods were used. In these cases, the sex was estimated using single long bone dimensions such as the humeral and/or femoral head diameter, femoral distal breadth and humeral epicondylar breadth (Steyn & İşcan 1997, 1999).

To gain more information on the possible origin of the individuals, measurements from the crania were used to conduct a FORDISC 3.2 analysis (Ousley & Jantz 2012). Only measurements that could be recorded with standard spreading and sliding callipers were included. This, of course, can only be a broad estimate as there are limited comparative samples available in the FORDISC database. Howells (1973) measurements of historic African populations were used from the database and included the Teita (representing East African groups), Dogon (representing West African groups), Bushman (Khoe-San) and a modern Zulu group (representing South African groups), following his terminology. Stature could only be estimated for the one complete individual. This was done using the Lundy and Feldesman (1987) formulae with soft tissue correction factors developed by Raxter et al. (2006).

All skeletons were observed for signs of disease and trauma (Aufderheide & Rodríguez-Martin 1998; Ortner 2003). Remains were assessed for non-specific signs of disease, infectious diseases, degenerative lesions, and trauma. The analysis of dentition included documenting the presence of occlusal surface wear, scoring dental caries, abscesses, periodontal disease, antemortem tooth loss, and dental calculus (Lukacs 1989; Goodman & Rose 1990; Langsjoen 1998; Ortner 2003). Teeth were also observed for enamel defects such as hypoplasia and possible dental modifications. Caries frequency in the Van Zyl's remains was compared to those of Oakhurst (Patrick 1989), K2/Mapungubwe (Steyn 1994), Riet Rivier (Morris 1992) and Soutpansberg (L'Abbé 2005b) remains, using Fisher's exact tests. The Oakhurst sample represents a Stone Age hunter-gatherer society and the K2/Mapungubwe sample an Iron Age agriculturalist society, whereas the other two are from historic and more recent communities.

A tooth sample from one of the individuals, A4237, was radiocarbon dated using accelerator mass spectrometry (AMS) at the Tandem Laboratory, Department of Physics and Astronomy, Uppsala University, Sweden (SAHRA Permit ID: 2789). Isotopic data were also obtained from this laboratory.

Several avenues were followed to find more information about the Van Zyl site, which included a detailed internet search of the archaeological history of Clarens and the potential sites in the area, as well as an archival search of documents housed within the School of Anatomical Sciences.

3. Results

The results from sorting the commingled remains yielded an MNI of 11 individuals (Table 1), based on the most common element – in this case, right femora. The assemblage also included 10 crania. This brings the total sample to 12 when the one complete individual (A4237/A4231) is added. The complete individual has two catalogue/box numbers as the one was assigned to the skull (A4231), and the other to the post-cranial remains (A4327). The commingled remains and complete individual were all accessioned into the collection together and there is no reason to suspect that they may be from different assemblages. No taphonomic differences, such as differences in colour or preservation, were noted.

The assemblage included a minimum of three juveniles below the age of five years (Table 2). The remaining nine individuals (including the complete individual) were adults (Tables 2 and 3) based on complete epiphyseal fusion. A4237 (the complete individual) was estimated to be older than 50 years based on the morphological features visible on the sternal rib ends (presenting as phase 7; 52 to 69 years) and pubic symphyses (phase 5; 27 to 66 years). His age estimate was supported by the presence of osteophytes on almost all the vertebrae and extensive osteophytic lipping of all the major joints.

Table 1. Skeletal elements present, excluding the complete individual, with the total number of bones indicated for the vertebrae. Minimum number of individuals (MNI) represented are indicated in brackets.

Skeletal elements	Left	Right	MNI
Skull	10		10
Vertebra	36		3
Sacrum	3		3
Sternum	3		3
Ribs	36 (2)	32 (4)	4
Clavicle	5	4	5
Scapula	5	4	5
Humerus	9	7	9
Ulna	4	4	4
Radius	7	5	7
Pelvis	6	4	6
Femur	7	11	11
Tibia	7	7	7
Fibula	6	5	6
Patella	0	2	2
Calcaneus	4	2	2
Talus	4	4	4
Carpals	0	0	0
Tarsals	2	4	4
Metacarpals	13	8	N/A
Metatarsals	11	4	N/A
Phalanges	10	8	N/A

Table 2. Age and sex estimations of commingled post-cranial remains. The skeletal regions on which the estimations were based are also shown.

Age	Juveniles	Adult
Total individuals (years)	3 (<5 years)	8 (>20 years)
Sex	**Male**	**Female**
Pelves	5	2
Humeri	4	0
Femora	2	3
Total	**5**	**3**

Sex estimation was only attempted for the adult remains, the results of which indicated that six individuals were male (including A4237) and three were females. Sex could not be estimated for the remaining adult individuals due to the incomplete nature of their remains. A summary of the age and sex of all individuals is shown in Tables 2 and 3. Cranial measurements that were possible are shown in Table 4.

Table 3. Summary of individual age, sex, and stature for the crania and complete individual.

Catalogue no.	Age (years)	Sex
A4326	2-5	-
A4238	25-45	Male
A4239	50+	-
A4240	20-45	Female
A4241	50+	Male
A4242	-	Female
A4243	50+	Female
A4244	50+	-
A4245	<5	-
A4246	50+	-
A4237	50+	Male

Relatively few signs of disease were observed in the commingled remains and none of the individuals had evidence of cribra orbitalia, porotic hyperostosis or enamel hypoplasia. The most common change was bony lipping on a variety of elements such as the calcanei, femoral and humeral heads, the glenoid cavity, an olecranon process, the femoral condyles and a proximal tibia. The commingled vertebrae had evidence of osteophytic lipping. These are all changes that could be expected in older individuals. A femur and two tibiae had evidence of non-specific subperiosteal bone deposition. One of the tibiae presented with myositis ossificans, which is a bony outgrowth commonly associated with overlying soft tissue trauma.

Table 4. Cranial measurements in mm (Howells 1973).

Measurement	Abbreviation	A4237 (male)	A4240 (female)	A4238 (male)	A4241 (male)
Glabello-Occipital Length	GOL	200	186	182	188
Nasio-Occipital Length	NOL	197	184	178	187
Basion-Nasion Length	BNL	112	103	104	106
Basion-Bregma Height	BBH	145	138	136	145
Maximum Cranial Breadth	XCB	133	127	132	-
Maximum Frontal Breadth	XFB	117	110	115	123
Bistephanic Breadth	STB	114	103	100	120
Bizygomatic Breadth	ZYB	144	-	128	146
Biauricular Breadth	AUB	126	115	118	127
Minimum Cranial Breadth	WCB	73	66	69	77
Biasterionic Breadth	ASB	114	110	105	117
Basion-Prosthion Length	BPL	109	96	103	101
Nasion-Prosthion Height	NPH	69	71	75	74
Nasal Height	NLH	52	47	55	54
Orbit Height	OBH	33	34	36	38
Orbit Breadth	OBB	41	38	40	41
Nasal Breadth	NLB	31	27	29	31
Palate Breadth	MAB	67	62	63	65
Mastoid Height	MDH	31	28	29	31
Mastoid Width	MDB	19	14	18	23
Bimaxillary Breadth	ZMB	101	82	91	94
Bifrontal Breadth	FMB	111	95	102	107
Biorbital Breadth	EKB	110	95	101	107
Interorbital Breadth	DKB	36	24	26	28
Simotic Chord	WNB	19	8	9	11
Malar Length Inferior	IML	41	-	41	41
Cheek Height	WMH	26	21	24	27
Foramen Magnum Length	FOL	38	36	40	40
Nasion-Bregma Chord	FRC	115	113	114	119
Bregma-Lambda Chord	PAC	126	117	104	125
Lambda-Opisthion Chord	OCC	101	94	93	98

Individual A4237 (Figs 1 & 2) was of particular interest, as this was the only complete/non-commingled skeleton. This individual was an older male who was quite robust with prominent muscle attachments. He was estimated to have been 181.7±2.371 cm tall. Non-specific subperiosteal bone deposition, possibly indicative of chronic disease and/or malnutrition, was observed on both femora and tibiae. The individual suffered from osteoarthritis, as evidenced by prominent osteophytic lipping in several skeletal regions as well as eburnation on both tibiae and the right femur. This individual had a healed fracture on the right ulna (Fig. 3), which is also referred to as a parry fracture as it is often observed in cases of interpersonal violence when an arm is raised in self-defence (Ortner 2003); it can also be associated with a fall. An anatomical anomaly or variation was observed in the form of a right first rib which had fused to the manubrium of the sternum.

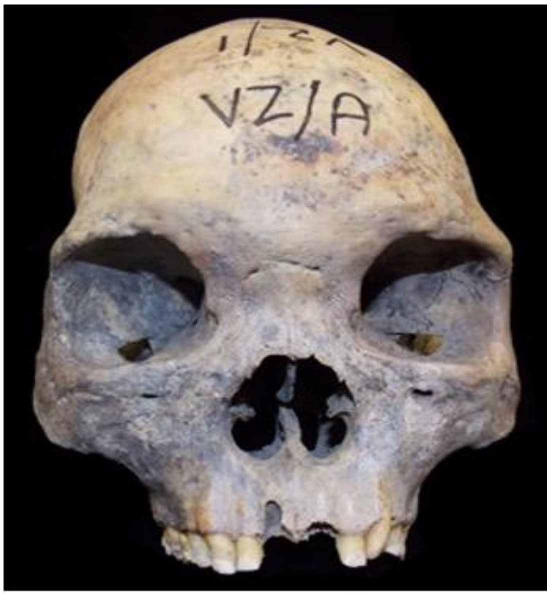

Figure 1. Anterior view of cranium A4237.

Figure 2. Left lateral view of cranium A4237.

Figure 3. Healed fracture of the right ulna of A4231/A4237.

A summary of the dental pathology in adult individuals (permanent teeth only) is shown in Table 5. Four individuals had evidence of antemortem tooth loss. Dental calculus was observed in three individuals, as were periapical abscesses. Most of the abscesses were not associated with dental caries except for one on a tooth of A4237. A4237 was the only individual with carious lesions but only one abscess was associated with a carious lesion (maxillary M1) (Fig. 4). This individual had particularly extensive dental wear of all the teeth that were present, and the carious lesions observed most probably followed after the dentine or pulp was exposed. The exposure of dentine leaves the tooth susceptible to further infection which could account for the carious lesions (Hillson 2008; Molnar 2011). The wear was at an angle and large patches of dentin had been exposed especially on the posterior teeth.

Table 5. Summary of dental pathology in adult individuals, indicating the number of teeth affected per individual.

Catalogue no.	Periodontitis	Caries	Calculus	Antemortem tooth loss	Enamel hypoplasia	Periapical abscesses
A4238	Present	-	-	4	-	3
A4239	Present	-	-	-	-	-
A4240	Present	-	Present	2	-	-
A4241	Present	-	Present	-	-	-
A4244	Present	-	-	-	-	-
A4246	Present	-	-	6	-	1
A4237	Present	3	Present	2	-	5

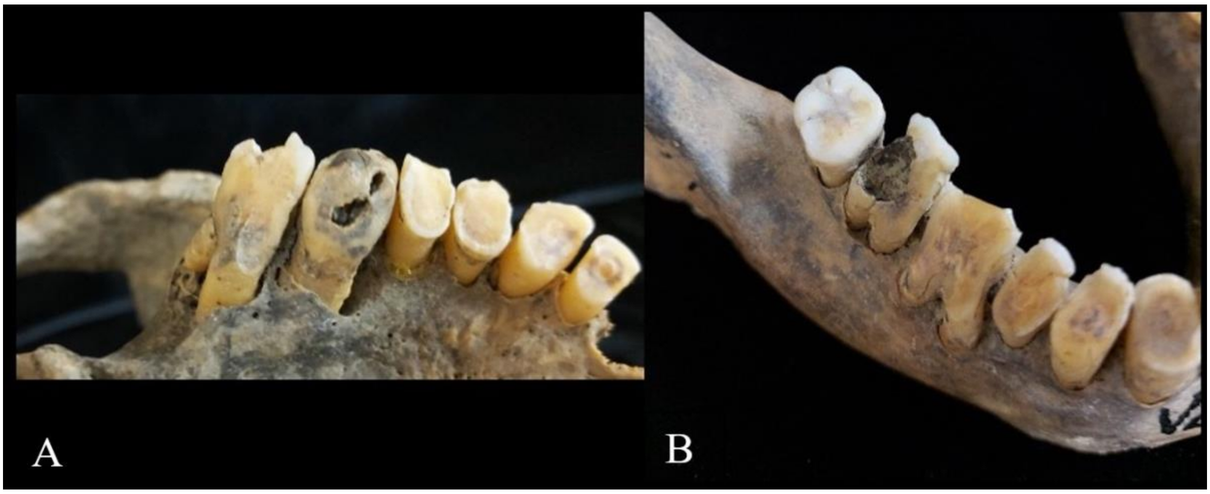

Figure 4. Extensive dental wear and carious lesions were observed on A4237 on the the right maxillary dentition M1 (a) and right mandibular dentition M2 (b).

The sample size from Clarens is quite limited, but nevertheless, an attempt was made to compare the occurrence of caries with those from four other sites (Table 6). Of the five sites, the Van Zyl's farm sample had the lowest caries frequency and intensity. There was only one statistically significant result when comparing the caries frequency, which was that the Clarens sample had a lower caries frequency than the Soutpansberg sample, but this is probably related to sample size. The caries intensity of the Van Zyl's sample is significantly lower than all other samples except for the Riet Rivier sample. This indicates a non-cariogenic diet.

Table 6. Carious lesion comparisons using Fishers Exact tests, with individuals unaffected by caries (n^{un}) and individuals affected by caries (n^{a}) indicated. Caries frequency (Freq.[a]) = total number of individuals (Ind.) affected with caries/total number of individuals in the sample; Caries intensity (Inten.[b]) = total number of teeth affected with caries/total number of teeth in the sample. References and key sites include Oakhurst (Patrick 1989), K2/Mapungubwe (Steyn 1994), Riet Rivier (Morris 1992) and Soutpansberg (L'Abbé 2005b).

Site	n^{un}	n^{a}	Total	No. Unaffected teeth	No. Affected teeth	Total	Freq.[a]	Inten.[b]	X^2 Freq.	X^2 Inten.
Van Zyl	6	1	7	114	2	116	14.3	1.7	-	-
Oakhurst	12	9	21	243	32	275	42.9	17.7	0.3642	0.0007
K2/Mapungubwe	24	23	47	231	68	299	54.5	18.3	0.1167	<0.00001
Riet Rivier	-	-	46.5	1015	46	1061	41.7	4.3	-	0.2216
Soutpansberg	38	59	97	1859	157	2016	60.8	7.8	0.0399	0.0101

One of the females, A4240, presented with dental modification. The two upper central incisors were modified through mesial filing to form a V-shaped gap between the two teeth (Fig. 5).

Figure 5. Dental modification of the upper central incisors of A4240.

Four individuals could be analysed using FORDISC, with measurements as shown in Table 4. Individual A4237, the robust male, aligned to the Teita group with a posterior probability of 79.5%. The graphical output is shown in Figure 6a, which shows that the individual placed far from any centroid and is thus not typical for any of the groups. Individual A4240, the only female analysed, closely corresponded to the modern Zulu group (Fig. 6b) but was not close to any centroid. When the modern Zulu data were taken out of the analysis (Fig. 7), FORDISC could not align this individual with the other population groups. A4238, another male, aligned most closely with the modern Zulu data (Fig. 6c). When the modern Zulu group was taken out and the analysis was run against the other three groups, he then aligned more closely to the Teita data. A4241, another robust male, could not be classified by FORDISC as he was too atypical. Many of the measurements for this individual fell above two standard deviations of the mean. The analyses thus clearly exclude the individuals as being of Khoe-San ancestry and suggest that they are probably unrelated to those groups represented in the FORDISC database.

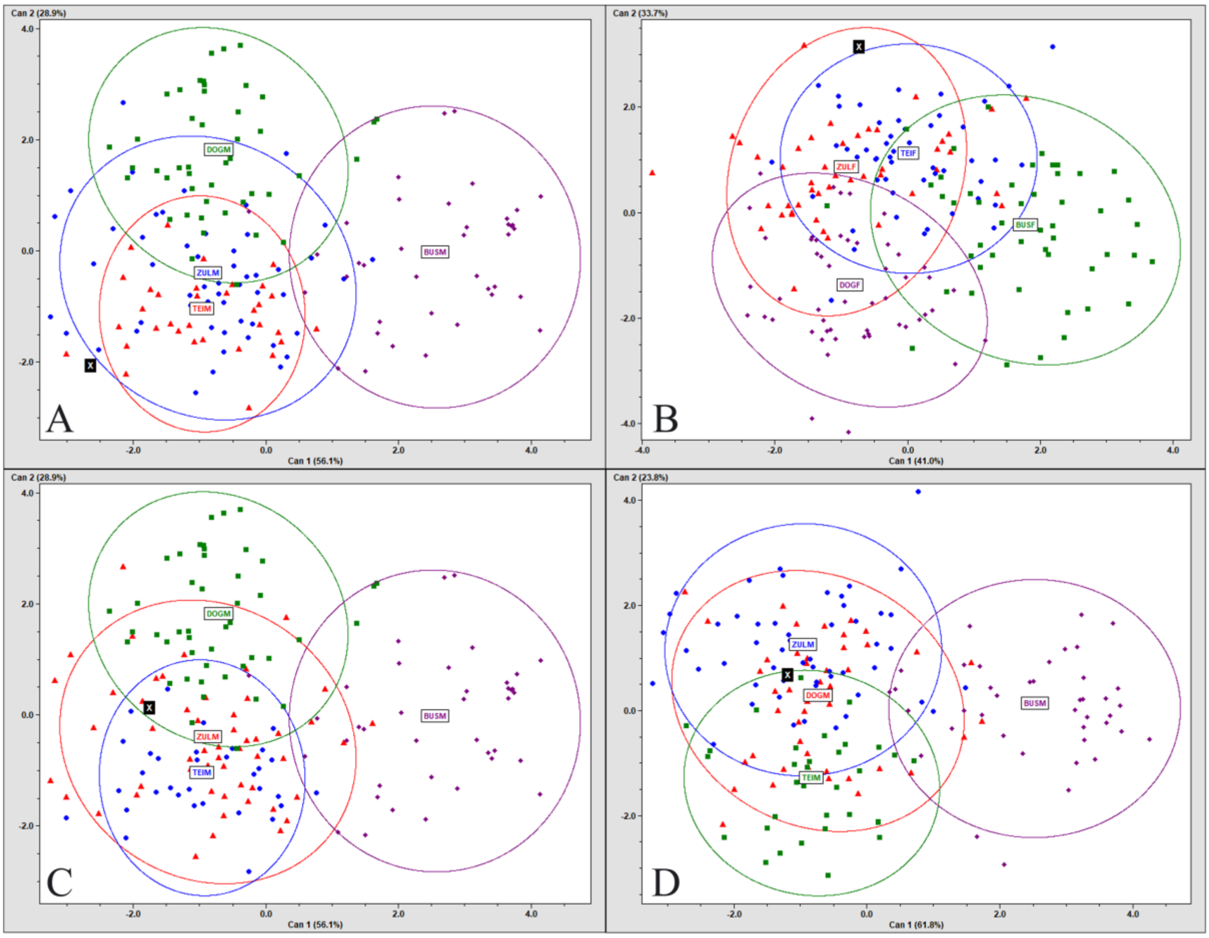

Figure 6. FORDISC output: (a) A4237, (b) A4240, (c) A4238, (d) A4241. The X indicates the individual analysed.

Very few cultural artefacts were associated with the remains, but those that were present included iron and copper spiral-wire bangles (Figs 8 & 9), as well as eight beads (seven red glass and one ostrich eggshell; Fig. 10). Unfortunately, it is not known with which individual these artefacts were recovered and the only information was a note that stated it was collectively found “near grave 2” (it is not stated which remains are referred to as grave 2). There were also four undecorated red burnished ceramic sherds. These sherds are described as being discovered on the surface by Mrs E.M. Wells.

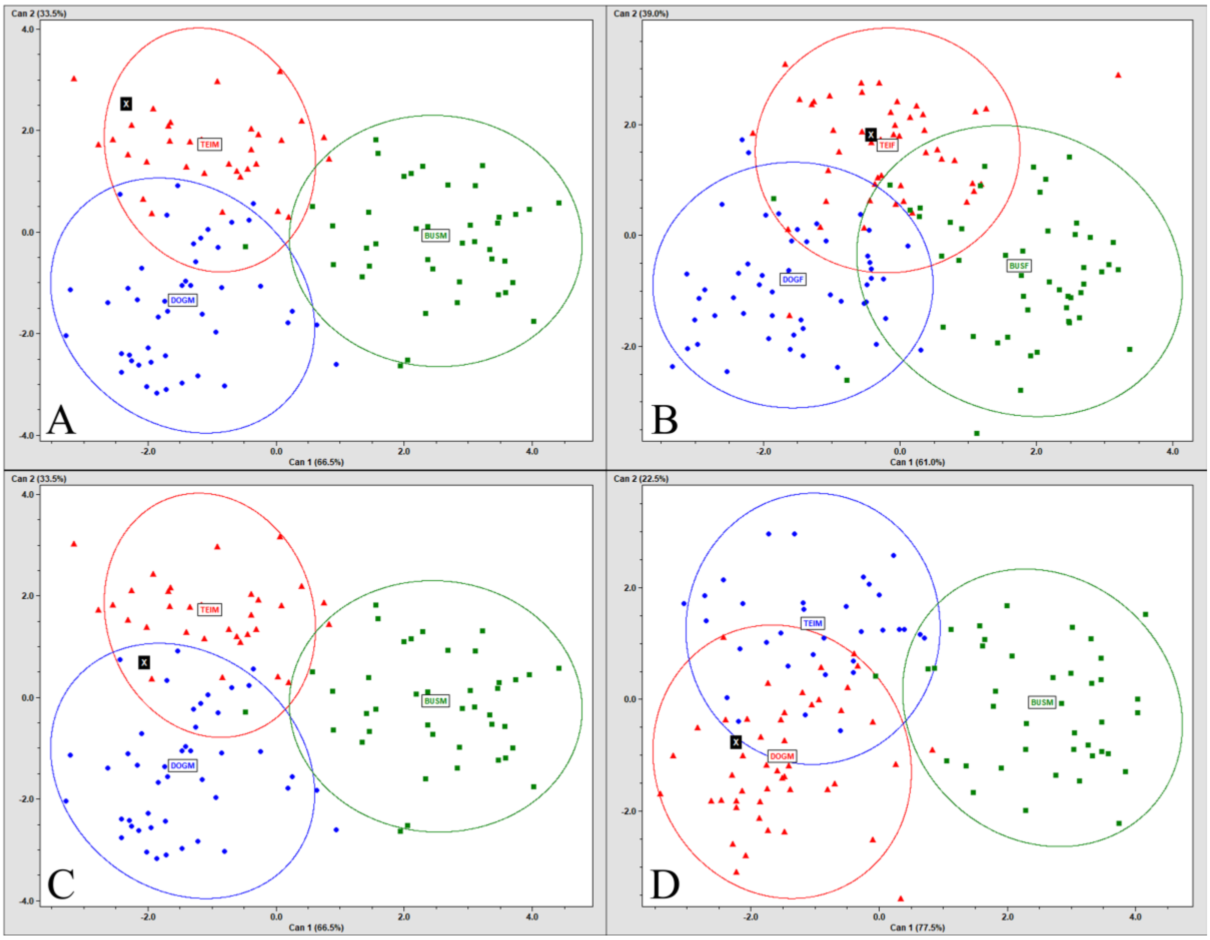

Figure 7. FORDISC output with Zulu data removed: (a) A4237, (b) A4240, (c) A4238, (d) A4241. The X indicates the individual analysed.

Figure 8. Copper spiral-wire bangle found with the assemblage.

Figure 9. Iron bangle fragments found with the assemblage.

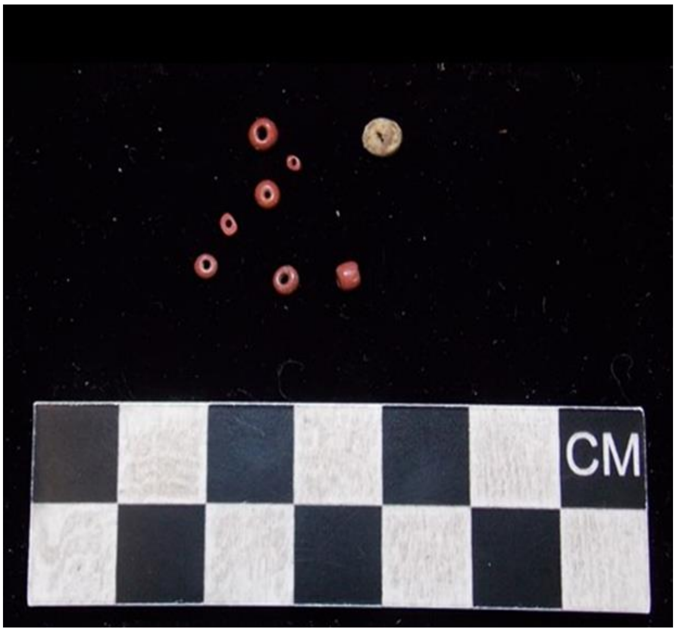

Figure 10. Eight beads, of which seven are red glass and one is ostrich eggshell.

Radiocarbon dating was performed on a bone sample from individual A4237 and provided an estimated date range of AD 1150-1270 (844±35 BP; Ua-61831)[1]. The radiocarbon date places these skeletons into the early part of the Late Iron Age. Additionally, carbon and nitrogen isotopes were also analysed for individual A4237 (Ua-61831). Results indicated a $\delta^{13}C$ value of -8.8‰ Vienna Pee Dee Belemnite (VPDB) and a $\delta^{15}N$ value of 8.3‰ atmospheric nitrogen (AIR), indicating a diet predominantly made up of C4 terrestrial plants, such as sorghum and millet (Ribot et al. 2010; Lightfoot et al. 2015; Meyer et al. 2021).

[1] The radiocarbon measurement presented here was calibrated with OxCal 4.4 (Bronk Ramsey 2009) using the atmospheric curve SHCal20 (Hogg et al. 2020).

Based on archival and published work it seems the Clarens area presented a rich archaeological history that included various sites attributed to the Stone and Iron Ages. Looking specifically at information related to the Van Zyl's farm, the following information could be obtained.

The Van Zyl's were one of the pioneering families of the area and owned large properties, including the Schaapplaats farm which is well-known for its rock art (Woodhouse 1996; Wadley & Laue 2000). Entries in an old handwritten artefact catalogue housed in the School of Anatomical Sciences, University of the Witwatersrand, indicated several small collections of stone implements recovered from sites in the Clarens region. The entries indicated that the stone tools were collected by a Mrs E.M. Wells during the 1930s. Two entries specifically mentioned surface collections of stone implements from Van Zyl's farm and Schaapplaats in 1933. According to Malan (1941), Mrs Wells and Dr L.H. Wells collected stone artefacts from various sites in the Upper Caledon Valley (including Clarens). The Stone Age designation originally assigned to the Van Zyl's skeletal remains is therefore likely related to the stone implement surface collection also recovered from the same farm. However, given that the stone implements were recovered from the surface, a direct association with the skeletal remains cannot be confirmed.

Harper (1997) studied two sites on the Schaapplaats farm, known as the Twin Caves. These caves are situated on a hilltop facing west and overlooking a perennial stream. Harper's excavations only focused on the cave towards the north of the hilltop, which he attributed to a Middle Stone Age assemblage possibly predating Rose Cottage Cave. Even though Harper did not excavate the southern cave, he does mention the presence of Iron Age walling and ceramics within, the latter of which he regarded as originating from the "large Iron Age site in the adjoining cave." (Harper 1997: 96) Additionally, there is another site, near to the Schaapplaats farm, called Adullam that also had Later Stone Age tools as well as evidence of Late Iron Age inhabitants (Wadley & Laue 2000). The University of the Witwatersrand's School of Geography, Archaeology and Environmental Studies were contacted to retrace the artefacts mentioned in the old catalogues housed in the School of Anatomical Sciences. Several entries associated with material recovered from the Clarens region, including specifically Van Zyl's farm and Schaapplaats 1785, were recorded in the School of Geography, Archaeology and Environmental Studies' catalogues (Thembiwe Russel pers. comm. October 2021). Entries contained information related to the material culture or artefacts (e.g., flaked stone and ceramics), the donor's information (in this case "Wells 1933"), a map number, and Global Position Systems (GPS) coordinates. Unfortunately, no direct reference to the skeletal remains was noted in the catalogues. GPS coordinates recorded in the catalogues (28º34'30"S and 28º27'08"E, associated with Schaapplaats 1785 I; 28º34'30"S and 28º27'42"E, associated with Schaapplaats 1785 II; and, 28º34'45"S and 28º25'40"E, associated with Clarens) were assessed using satellite imagery from Google Earth Professional Software (2021) (Figs 11 & 12).

Both sets of coordinates associated with the Schaapplaats farm are situated at the base or foothill (Schaapplaats II) of the surrounding hills. It may be that Schaapplaats I is associated with the Twin Caves site seeing as though it also faces west, but this can only be confirmed with a foot survey. An aerial survey of the immediate surroundings showed no evidence of settlement structures or features associated with historic farming. The area is, however, affected by modern-day farming that may have obscured historic features. The third GPS coordinate associated with a 'Clarens' site is about 2 km west-south-west of Schaapplaats I. This site is not situated on the Schaapplaats 1785 farm, but on Letsoana Stad 347. The site is also situated at the base of a hilltop next to a perennial river. An aerial survey of the immediate area indicated the presence of several features that may represent archaeological cattle enclosures and other settlement features. Much of the area has been affected by modern-day farming, which may have resulted in the destruction of additional features associated with a settlement, such as stonewalling and hut floors.

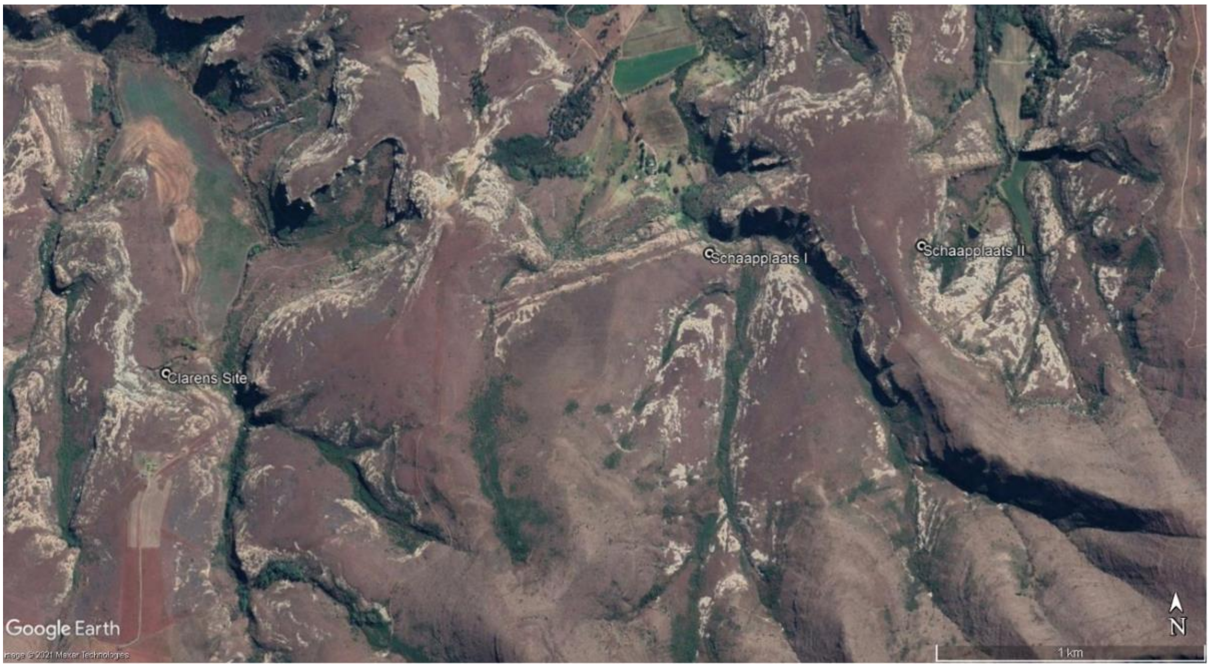

Figure 11. The location of two sites associated with Schaapplaats I and II, as well as a 'Clarens' site to the west. All three sites are located at the base or foothills of the surrounding Maluti mountains (image from Google Earth Professional, date: 2019/6/10, Maxar Technologies satellite).

Figure 12. The Clarens site is situated at the base of the hilltop and next to a perennial river (blue arrow). Several features can be observed (yellow arrows) that may be associated with cattle enclosures and other settlement structures. The area has, however, been affected by modern farming as is evident by the ploughland (red arrow), which may have obscured some of the settlement features (image from Google Earth Professional, date: 2019/6/10, Maxar Technologies satellite).

4. Discussion

The skeletal assemblage represented at least 12 individuals and included children as well as adult males and females. The adults were mostly older individuals, while the three juveniles were all estimated to have been younger than five years of age. In this sense it seems to represent a normal spread of individuals, arguing against selective burial practices. The relatively high number of juveniles (25% of the assemblage) may suggest a high infant mortality rate, but this is difficult to substantiate due to the small sample size.

In the catalogues at the University of the Witwatersrand, these remains are described as dating to the Stone Age, but it is unclear how this was originally established. It may relate to the recovery of stone artefacts throughout the Clarens regions by a Mrs E.M. Wells, amongst which included from the Van Zyl's and Schaapplaats' farms. The results of a radiocarbon date placed them within the range of AD 1150-1240, which suggests they lived in the early part of the Late Iron Age (Maggs 1980; Vogel & Fuls 1999).

The Bantu-speaking farmer expansions during the Late Iron Age (ca. AD 1025-1820) into southern Africa consisted of two major streams: an Eastern stream and a Western stream (Hammond-Tooke 2004). The western stream consisted of the Sotho-Tswana speaking groups of which some moved into the Free State. Maggs (1976) noted that Ntsuanatsatsi can be regarded as one of the oldest Sotho settlements south of the Vaal River, dating to AD 1410. From Ntsuanatsatsi, the Koena lineage divided into several groups who moved southwards where some would eventually occupy the Caledon Valley around the mid-17th century (Maggs 1976). The relatively early date for the Van Zyl's farm remains makes this group quite unique and interesting, as there are to our knowledge no other similarly dated Iron Age groups in the western side of the Drakensberg region around this time. However, this region has not been studied as extensively as other parts of the Free State, with most research in this area related to the work done by Maggs (1976). Therefore, this sample is most probably associated with the Eastern stream that represents Nguni-speaking groups (Hammond-Tooke 2004; see also Badenhorst 2010). This assumption is tentatively supported by the FORDISC analyses, which showed a weak link to the Teita (as representing an eastern African group) (Howells 1973). This migration/expansion moved down primarily between the Indian Ocean and the Drakensberg while smaller groups branched off into the highveld (Hammond-Tooke 2004), which includes the Free State province where Clarens is situated. This correlates well with the archaeology as the Zulu group forms part of the Nguni-speaking population that is associated with the eastern stream migrations. However, this assemblage could form part of a group that is not yet within the FORDISC database as evidenced by the low posterior probabilities and typicalities. This should be further investigated by doing more sophisticated analyses using other databases. The alignment of the individuals from Van Zyl's farm with eastern stream migrations (i.e., the Teita data) is somewhat surprising considering that other similar and slightly later dated skeletons from the eastern Drakensberg (Steyn et al. 2019; Meyer et al. 2021) seem to be of West African descent. This interpretation attests to the complex nature of migrations into southern Africa, which probably cannot be oversimplified into two migration streams only.

The Early Iron Age and the early part of the Late Iron Age had much in common (e.g., Mitchell 2002; Mitchell & Whitelaw 2005; Badenhorst 2010). During this time, people practised metalworking, cultivated crops, kept livestock and had distinctive pottery (Maggs 1994/5). Early Iron Age settlements were mostly situated near water sources. The savanna was preferred as this environment provided abundant grazing grasses as well as wood for building and fires. The Free State, however, is a grassland biome that only became heavily populated during the Late Iron Age (Maggs 1994/5; Vogel & Fuls 1999), making this group of individuals in this study, in this region and at this particular period, quite unusual. The expansion into the grasslands was suggested to be caused by the increasing importance of cattle in the Late Iron Age economy (Mitchell 1992). The individuals from Van Zyl's farm can probably be placed within the transition period from the Early to Late Iron Age and could possibly represent some of the expansion from the east of South Africa to the grassland interior.

The health and diet of this group of individuals were difficult to infer due to the commingled state of the remains and the small sample size. Most of the pathological lesions observed were osteoarthritic changes mainly observable on the major joint surfaces and the vertebrae in the form of osteophytes. This should be expected as there were many older individuals in the assemblage. These changes are highly dependent on increasing age, but activity patterns also have an impact (Jurmain & Kilgore 1995). Advancing age primarily influences the vertebral column while activity patterns have more of an effect on the appendicular joints; however, other factors need to be taken into account, such as genetics and individual variation in anatomy (Weiss & Jurmain 2007).

There was no evidence of specific infectious diseases such as osteomyelitis, tuberculosis or treponematosis, nor were there non-specific indicators of stress such as cribra orbitalia, porotic hyperostosis or enamel hypoplasia. This is similar to remains from other nearby regions, such as in KwaZulu-Natal at sites dated to the Early Iron Age and the early part of the Late Iron Age, including Nanda (6th and 7th century AD) and KwaGandaganda (AD 620-1050) (Morris 1993; Whitelaw 1993), and at Elands Cave, Champagne Castle, Mfongosi and those at Newcastle (AD 1300-1700) (Steyn et al. 2019).

Non-specific subperiosteal bone deposition, however, was seen on the complete individual's (A4237) tibiae and femora as well as on one femur and three of the tibiae from the commingled remains. This is associated with the inflammation of the periosteum. It is a non-specific indicator of stress as it can be caused by localised trauma, infectious diseases as well as malnutrition. It is a relatively common skeletal finding in archaeological assemblages (Aufderheide & Rodríguez-Martin 1998; Ortner 2003) and may suggest some nutritional or other stress. In an assessment of remains from the Cathkin Peak region in the eastern Drakensberg (Meyer et al. 2021), several individuals with subperiosteal deposition and other non-specific signs of disease were noted, attesting to the hardships of living in this region.

Only one individual (the adult male, A4237) had signs of trauma. He had a healed fracture of the right ulna, commonly referred to as a parry fracture (Lovell 1997). This type of fracture can result from a fall or from defensive movements when raising the arm to protect against a blow. The presence of this fracture may indicate an episode of interpersonal violence.

Dental wear in many of the individuals was considerable, and many had periodontal disease. A4237 had five periapical abscesses of which only one was associated with dental caries. A4237 was also the only individual with dental caries. Two other individuals (A4239 and A4244) also had periapical abscessing. These lesions are most likely associated with severe dental wear, which exposed the pulpal space in some individuals. This would probably suggest an abrasive diet that, as expected, was low in refined carbohydrates (Lukacs 1989; Forshaw 2014). This is supported by the low levels of caries in this group. The observed advanced dental wear was mostly observed on the posterior teeth, arguing against the use of teeth for purposes other than mastication (Smith 1984; Deter 2009). It has been shown that the angle of the occlusal wear plane may differ between hunter-gatherers and agriculturalists due to the differences in masticatory loads brought on by dietary differences. In agricultural communities, occlusal wear facets are often at an angle, with the wear plane showing attrition towards the buccal surfaces, whereas in hunter-gatherer communities occlusal wear results in a more uniform horizontal flattening of the crowns (Larsen 2015). The dental wear observed in A4237 could therefore serve as further confirmation that this individual consumed an agriculture-based diet.

The stable isotope values for A4237 indicated a diet rich in C4 terrestrial plants. The relatively low nitrogen value suggests a low consumption of proteins derived from animal sources, probably only on an occasional basis. The $\delta^{15}N$ value observed in A4237 (8.3‰) is similar to that observed for the Cathkin peak individuals, who had an average of 8.4‰ (Meyer et al. 2021). This suggests that the Van Zyl's farm individual, like the Cathkin Peak individuals, were more dependent on the consumption of grains like sorghum and millet as opposed to cattle and caprines.

Individual A4240, a young adult female, had dental modification of the maxillary central incisors. In Africa, a variety of modification styles have been observed, which include chipping, filing, avulsion of predominantly the anterior teeth, notching and ablation (Finucune et al. 2008). In this case, the mesial edge of the incisors had been filed away to create an inverted V-shaped gap between the teeth. Dental modification was a common practice in many regions of the world such as Australia, East Asia, the Americas, and Africa (Morris 1998; Finucane et al. 2008), especially during the Early Iron Age (Morris 1998; Badenhorst 2010). Dental modifications have been associated with group identity or may form part of a rite of passage ceremony when the individual reaches puberty (Shaw 1931; Pindborg 1969; Van Reenen 1986; Morris 1998). The modification seen on A4240 is fairly common and was also observed during 10th to 13th century AD K2 and Mapungubwe sites in the Limpopo Valley (Steyn 1994); however, these sites are far removed from the Van Zyl farm site. Nanda in KwaZulu-Natal also had two individuals with dental modifications (Morris 1993). This site is closer to Clarens and the western side of the Drakensberg mountains, but the modification style was very different. Here the modification included the removal of all the lower incisors and the upper central incisors as well as the chipping of upper lateral incisors and canines to form a point (Morris 1993). The modification was observed on both a male and a female individual. A4240 was the only individual for whom dental modification could be observed as the upper central incisors of the remaining crania were unfortunately not recovered.

The beads that were recovered from the site were red glass beads and one ostrich eggshell or bone bead. The glass beads are consistent with those associated with East Coast Indo-Pacific beads, manufactured, and traded in the early 13th century AD (Wood 2011; Wilmsen 2017). East Coast Indo-Pacific beads were discovered at the Cathkin peak site and were associated with the pelvis of a skeleton (Wells 1933), as well as at Sibudu Cave in KwaZulu-Natal (Wood et al. 2009).

Unfortunately, the Van Zyl's farm remains cannot be directly linked to any of the documented sites mentioned in this paper and these locations should be seen as speculative. The Late Iron Age date, population affinity results and associated artefacts seem to suggest that these people represent one of the farming communities that either moved in from the east (KwaZulu-Natal), or that they represent an earlier unknown lineage from West Africa. Both the Twin Caves site, situated on the Schaapplaats farm, and the Clarens site, situated on the Letsoana Stad farm, indicate the presence of settlement features associated with farming communities in the region, and these could potentially be linked to the skeletal remains. Foot surveys and dating of these sites may shed more light on their possible association with the skeletal remains discussed here.

5. Conclusion

Through the current research the possible origin, as well as the temporal context, of the Van Zyl's farm skeletons were established. Unfortunately, not much is known about the archaeology of the site itself, but the analyses of these previously unstudied remains provide valuable information on settlement patterns and population movements, and they could prove useful in future research.

One of the skeletons from Van Zyl's farm was dated to between AD 1150 and AD 1240. This date is associated with the early part of the Late Iron Age. This is an early date for this particular region, predating all the known local Sotho-Tswana sites. Based on the FORDISC results it seems that the Van Zyl's farm individuals are most closely aligned with eastern and southern African reference samples. This, along with the early date, seems to suggest that these people were part of the eastern stream of Bantu-speaking farmers who moved into South Africa. They may represent one of the proto-Nguni-speaking populations that moved into the interior. Most of the Early Iron Age populations occupied the savanna biomes but during the Late Iron Age, there was expansion into the grasslands. Thus, this sample could be an early representation of these expansions. There has been very little archaeological research in this area and thus this sample represents the earliest date, as yet, for this particular region associated with the Nguni-speakers' expansion. This is further supported by the isotope values as the $\delta^{13}C$ value indicated a diet primarily of C4 plants such as sorghum and millet. Assessment of health was difficult due to the small sample size and poor preservation, but the presence of subperiosteal bone deposition in four individuals may indicate some nutritional or other stress.

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