Research Article

A BIOARCHAEOLOGICAL ANALYSIS OF HISTORICAL HUMAN SKELETAL REMAINS RECOVERED FROM LANCASTER MINE, WITWATERSRAND, SOUTH AFRICA

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ABSTRACT

In 1996, during ground-laying work for the construction of Main Reef Road in Krugersdorp, South Africa, human skeletal remains were inadvertently uncovered. The identities of the people interred in these graves were unknown. Since these individuals have never been identified and the context of the cemetery never confirmed, this study attempts to identify the remains within their historical context by using techniques derived from bioarchaeology. Archaeological and archival information suggests that these individuals were buried in a pauper's cemetery on the premises of the Lancaster Gold Mining Company, and that they were most probably interred somewhere between 1895 and 1914. Individual osteobiological profiles and possible indicators of trauma and pathology are identified. Results suggest a MNI of 19 individuals, representative of African men and women of mostly young adult and adolescent ages. Infectious disease and non-specific signs of disease indicate the general poor health and harsh living and working conditions often associated with migrant labour. Based on the bioarchaeological findings, the Lancaster sample represents early migrant workers who moved to the Witwatersrand area prior to the implementation of the closed-compound system. These people probably worked on gold mines as unskilled mine labourers or in the low-income sector in the nearby towns, lived in informal settlements, and died as paupers. Even though these people remain unnamed, their remains enable us to reconstruct some aspects of their lives, in some sense giving a voice to a small group of people representative of the millions of migrant workers who shaped South Africa's industrial economy.

Key words: South African mining, paupers' cemetery, migrant labour, compound system, Krugersdorp.

INTRODUCTION

In 1996, during ground-laying work for the construction of Main Reef Road in Krugersdorp, South Africa, human skeletal remains were uncovered (Fig. 1). A team of archaeologists from the Department of Anatomy, University of Pretoria, conducted rescue excavations of the exposed graves soon after the discovery was made. Construction activities caused the disturbance and commingling of an undetermined number of graves (Fig. 2). The individuals interred remain unidentified since no headstones or surface markers were present. Only one of the individuals recovered during the rescue excavations was interred in a coffin. The ages, ancestries and sexes of these individuals were hence also unknown. It is, however, possible that these individuals were associated with the Lancaster Gold Mining Company during its operational years, as the location of the accidentally uncovered cemetery falls within the boundaries of the old Lancaster Gold Mining premises.

This paper attempts, firstly, to gain an understanding of the mining history of the Witwatersrand area and how the Lancaster mine and cemetery fit into this broader historical context; and then secondly, to discuss some of the preliminary results of the osteological analysis of the remains recovered from Lancaster mine. Comparable studies have been conducted on other mining populations in South Africa, such as those at Koffiefontein (L'Abbé *et al.* 2003), Gladstone (Van der Merwe *et al.* 2010a–d, 2011), Bultfontein (Vorster 2014), and the Witwatersrand (Meyer & Steyn 2016; Meyer *et al.* 2013). These studies play an important role in expanding our understanding of the often poorly documented historical and social contexts migrants found themselves in while working and living on the South African mines.

WITSWATERSRAND MINES AND MIGRANT LABOUR

By the mid-1890s, numerous gold mining companies had opened on the Rand, making the region the world's biggest

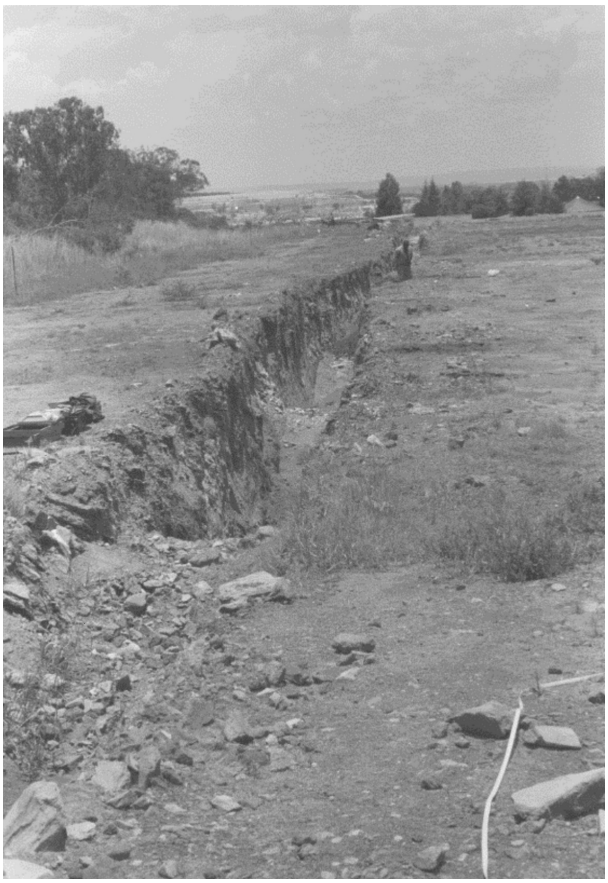

FIG. 1. *Trench dug during construction of Main Reef Road, Krugersdorp, responsible for the accidental discovery of human skeletal remains. Source: M. Loots.*

FIG. 2. *Grave excavated* in situ. *Note the partial disturbance of the grave as a result of construction activities. Source: M. Loots.*

mining district at the time (Beck 2013). Owing to the labour-intensive nature of mining, most of these companies employed a large labour force. This labour force was almost exclusively sourced from the rural areas within and outside South Africa. People from the rural areas for the most part sought work away from home, as local living conditions were increasingly affected by new tax laws, land dispossession and population increases (Crush *et al.* 1991). An outbreak of rinderpest in 1897 killed off 90% of cattle on the Highveld. This was another blow to those seeking a self-sustaining life in the rural areas (Callinicos 1985; Beavon 2004). Many Africans had no income other than that derived from their cattle, and with severe legal restrictions on their lives, they were effectively forced to find work elsewhere (Beavon 2004; Stewart 2016). So began South Africa's migrant labour system. Migration not only served the labour demands of the mines, but also those who were in charge of 'supplying' labour (Crush *et al.* 1991). Recruitment of migrant labour in countries outside South Africa (mainly Mozambique) became common (Wilson 1972; Crush *et al*. 1991). Even Chiefs and homestead heads were drawn to the prospect of gaining additional revenue through their followers (Crush *et al.* 1991). This constant influx of cheap labour came in favour of the mines, leading to the monopolising of low wage labour. Mining authorities' efforts to gain ultimate control over unskilled labourers was reinforced with the founding of the Witwatersrand Native Labour Association (WNLA) at the turn of the century, to ensure the recruitment of labour specifically for the gold mines (Wilson 1972; Crush *et al.* 1991).

Following the outbreak of the South African War (1899–1902), mines were forced to stop production for a brief time. Thereafter, the mines found it difficult to recruit sufficient numbers of labourers. These shortages may have been linked to the fact that the Chamber of Mines had lowered wages, in response to the financial losses brought on by the South African War (De Villiers 1967; Wilson 1972). However, the more probable cause could have been the high death toll and extremely harsh working and living conditions, which continued to plague African migrant mine workers.

To meet the demand for labour, the Transvaal Government explored other avenues. From 1904 to 1910, approximately 63 695 Chinese indentured labourers were brought to South Africa (Richardson 1982). Noting the inadequate conditions in which the African labourers had to live, the Chinese Government insisted that the mine camps be improved for their citizens who were to arrive in 1904 (Wilson 1972; Callinicos 1985; Meyer *et al.* 2013). With the arrival of Chinese labourers came the implementation of the closed compound system and the strict regulation of all labourer movement through the use of permits (Wilson 1972; Richardson 1982; Kynoch 2003; Meyer & Steyn 2016). This set the stage for the eventual implementation of the pass law system and forced segregation based on racial classification in South Africa (Crush *et al.* 1991; Demissie 1998; Stewart 2016).

Prior to the closed compound system, migrant labourers settled in small mining camps around the Witwatersrand. These mining camps were informal, consisting of makeshift dwellings made of wood and iron (Moodie & Ndatshe 1994; Ansell 2005). Often referred to as open compounds, these camps did not yet impose the extreme restrictions seen during the closed compound phase (Wilson 1972). Most of the migrant labourers employed on the Witwatersrand were men. However, as poverty and loss of land increased in the rural areas, more families moved to the urban areas in search of work (Crush *et al.* 1991; Beavon 2004). Labourers and their families settled in the urban areas, a development that was of concern to the mine authorities (Crush *et al*. 1991). After pressure from the Chamber of Mines, government implemented the Native Labour Regulation Act in 1911 (Demissie 1998), which required African migrant labourers to carry a form of identification (fingerprints and registration certificate) that also served as a type of permit that dictated the movement of labourers at all times. This Act was followed by the Native Land Act in 1913, which prohibited Africans from acquiring land beyond what was termed 'native reserves' (Demissie 1998). These laws ensured the control of labourer movements, while restricted access to land ensured that Africans would remain in segregated areas and dependent on the mines as a source of income; effectively maintaining the migrant labour status quo.

THE WORKFORCE OF THE LANCASTER MINE

The Lancaster Gold Mining Company Limited, registered in May 1895 by Mr A. Goerz and Mr Brakhan, was one of many gold mining companies engaged in large-scale mining in the Witwatersrand area (Cartwright 1962; Beavon 2004; Handley 2004). Between 1902 and 1906, "Europeans", "Africans", "Coloured" and Chinese labourers were listed as workers at the Lancaster mine (Handley 2004). Although not much is known about the living and working conditions of the African labourers working at the Lancaster mine, it can be assumed that their situation was not much different from that experienced by workers on other mines on the Witwatersrand. In spite of the enormous workforce required by the mining industry, the literature from this period remained limited to reporting industry statistics reflecting production and losses, perpetuating the

notion that mines saw migrant workers as just another dispensable commodity. There are few sources of information: archival accounts that do provide information on migrant miners' experiences mostly date to the time when Chinese indentured labourers were employed (Richardson 1982).

Sources describing and referring to the history of the Chinese migrant labourers in the then Transvaal can be used to make assumptions about living and working conditions experienced by the African migrants. Even though it was requested that compounds be improved and renovated during the negotiations between South Africa and China, the Chinese labourers still found themselves in dangerous and unhealthy living and working conditions (Meyer & Steyn 2016; Meyer *et al.* 2013). The living and working conditions on the mines were generally harsh, and many workers lost their lives through disease and malnutrition, or work-related accidents (Richardson 1982; Meyer & Steyn 2016). The death records and monthly health return forms for Chinese workers employed on the Lancaster mine specifically, indicate that workers suffered from a variety of health issues (Transvaal Archives Depot, FLD 128, 18/25, 1908). Some of the most common ailments and causes of death are malnutrition, infectious diseases, respiratory tract diseases (most likely silicosis), work-related accidents, and suicides (Transvaal Archives Depot, FLD 128, 18/25, 1908). There are also records of abuse by mine officials and fellow workers (Richardson 1982). It is reasonable to assume that the conditions for African labourers were similar to those of the Chinese labourers.

MATERIALS AND METHODS

Archival and retrospective archaeological investigations were conducted for this study. The latter involved Ground Penetrating Radar (GPR) and foot surveying of the area to confirm the presence and extent of the original cemetery. The skeletal remains assessed in this study were recovered during the rescue excavations undertaken in 1996, and are currently curated as part of the Archaeological Human Remains Collection at the Department of Anatomy, University of Pretoria.

Owing to the disturbance of many of the graves, the skeletal remains were in a commingled state and were sorted prior to analyses. The sorting and matching of commingled remains followed the techniques set out by Adams & Byrd (2008) and L'Abbé (2005). Bones of individuals were identified and matched, after which the minimum number of individuals (MNI) was estimated.

Morphological and metric methods were used to make some preliminary assessments of the age-at-death (Brooks & Suchey 1990; Oettle & Steyn 2000; Boldsen *et al.* 2002; Schaefer *et al.* 2009; Falys & Lewis 2011), sex (Loth & İşcan 2000; Klales *et al.* 2012; Krüger *et al.* 2014), ancestry (Hefner 2009; Jantz & Ousley 2005; İşcan & Steyn 2013), and stature (Lundy & Feldesman 1987; Feldesman 1992) of each individual, where possible. In addition to the more traditional morphometric techniques employed for ancestry estimation, the use of FORDISC 3.1 (FD 3.1) was also employed. Discriminant functions software such as FD 3.1 was used to assess biological ancestry of an individual (Jantz & Ousley 2005). A custom database comprising of known early 20th century Black, Coloured and White South Africans was used for comparison. Because of the historical age of the Lancaster remains, cranial measurements were also compared to the historical "Zulu" and "Bushman" reference groups from the Howells population database (Howells 1973, 1989). The "Zulu" and "Bushman" reference groups are to date the only pre-20th century South African reference samples available for use in FD 3.1. Since these above-mentioned population groups are not representative of all historical population groups within southern Africa, the results discussed in this paper are only tentative pending further in-depth craniometrics and possibly genetic approximations.

In addition to the creation of individual biological profiles, skeletal remains were also assessed for any macroscopic signs of disease or trauma. Lesions were described in terms of location, type, and extent. Possible aetiologies for each were explored using several reference texts (Aufderheide & Rodríguez-Martin 1988; Lovell 1997; Hillson 1998; Ortner 2003; Waldron 2009; Roberts & Manchester 2010).

RESULTS

Following archival research, it was established that the individuals were buried on a portion of the Luipaardsvlei 225 farm owned and used by the Lancaster Gold Mining Company (Fig. 3) from 1895 to 1914 (Transvaal Archives Depot, FLD 128, 18/25 1908; Goldmann, & Kitchin 1895–6; Handley 2004). A map dating to around 1895 indicates the presence of a rectangular feature (Fig. 4) on the mining premises. This feature corresponds to the location of the accidentally disturbed graves (Fig. 5), which potentially indicates the boundaries of a cemetery. This same rectangular feature was again observed on a contour plan map dating to 1981 (Fig. 6), indicating the planned construction route for the Main Reef Road, and clearly showing where the new road intersects the rectangular feature. A GPR survey was done on a portion of this rectangular feature. Results from the GPR survey indicate the presence of several subsurface anomalies (Fig. 7). These anomalies appear in frequent, equally spaced intervals, and were oriented in an east–west direction. It therefore seems very plausible that the anomalies observed during the GPR survey are indicative of additional graves. During a foot survey of the area, ashy soil deposits and historical artefacts were identified. One type of artefact observed during initial excavations of the graves (Loots 1996a,b) represents fragmented stoneware crucibles. These stoneware crucibles were made and exported to South Africa between 1881 and 1900 by the Morgan Crucible Company, a factory based in Battersea, England (G. de Kamper, pers. comm. 2015), indicating a relative timeframe for the cemetery.

The remains of 16 individuals were recovered from primary contexts during the rescue excavations (Loots 1996a,b). In addition to primary context remains, some disturbed skeletal elements were recovered from spoil mounds (Loots 1996a,b). Sorting of commingled remains resulted in the identification of at least three more individuals, placing the minimum number of individuals at 19. The three additional individuals identified during the sorting process are represented by very fragmented and incomplete adult skeletal remains. Results discussed here therefore pertain to the 16 individuals recovered from primary contexts.

Age-at-death could be estimated for 14 of the 16 individuals, representing an age distribution ranging between 11 and 35 years (Table 1). Seven individuals are estimated to have been of adolescent age (younger than 20 years), and four are estimated to have been of young adult age (20–34 years). The remaining five individuals could only be assessed as 'adults' based on the complete fusion of all epiphyses. Sex could only be estimated for seven individuals: they represent three males and four females. Preliminary ancestry estimation results based on the morphometric analysis suggest that eight of the 16 individuals were of African ancestry ('African' here refers to individuals from populations groups that are indigenous to sub-Saharan Africa. The use of this term is preferred because popula-

FIG. 3. *Google map indicating the Lancaster mine, Lancaster dam, and the historical dumping area.*

tion-specific data enabling the identification of more specific regional/linguistic groupings are as yet not available for all African regions. If this skeletal sample is representative of a migrant population, it seems appropriate as it includes population groups from a larger geographical area). For ancestry estimation using FD 3.1, only four individuals could be assessed based on the availability of cranial measurements. Results from the discriminant function analyses suggested that two individuals were most similar to 20th century Black South Africans (UP 52 and UP 54), one individual to 20th century Coloured South Africans (UP 58) and another to the historical "Zulu" population (UP64). Owing to the low posterior probabilities and the low cross-validated accuracies of UP 58, a Black South African ancestry cannot be excluded as a possible ancestry estimate. In addition, owing to poor preservation, stature could only be estimated for three individuals: values ranged between 162.8 and 168.2 cm.

Pathological conditions include mostly non-specific signs of disease along with some specific infections and ante-mortem trauma (Table 1). Two individuals (UP 52 and UP 59) have lesions indicative of non-specific signs of environmental stressors in the form of linear enamel hypoplasia and porotic hyperostosis. Another individual (UP 63) suffered from pyogenic osteomyelitis of both the left and right ulna (Fig. 8). The ulnae show marked thickening and cloaca on the proximal two-thirds of the shafts. A chronic, bilateral condition like this

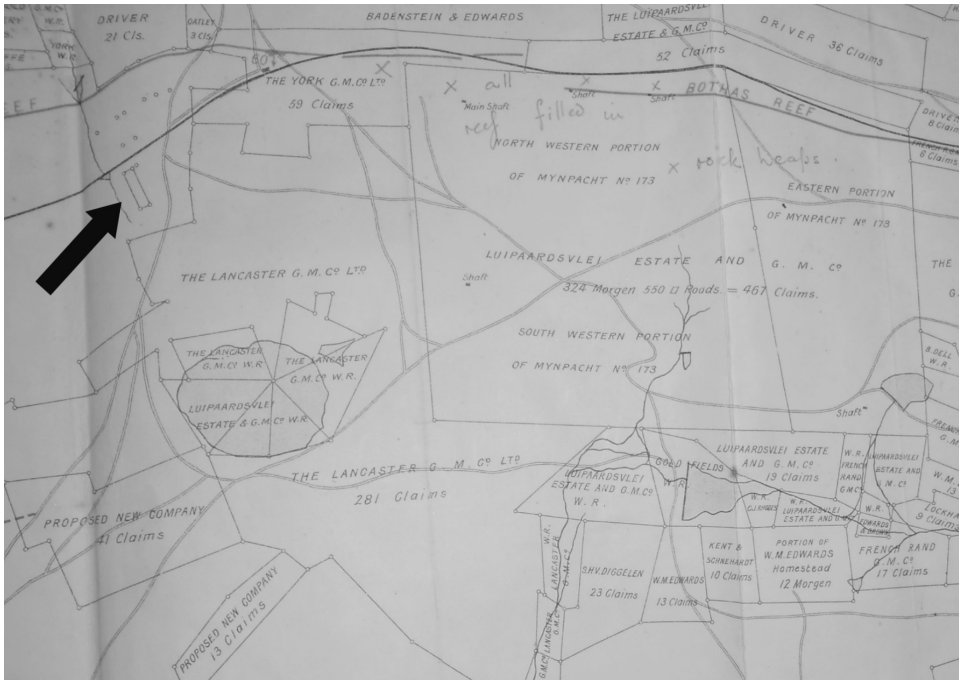

FIG. 4. *Historical map indicating the Lancaster gold mine, with Luipaardsvlei 225 farm, and showing the borders of the Lancaster GMC. Note the small rectangular area in the upper left corner indicated by the arrow, which corresponds with the location of the accidentally uncovered graves. Map sourced from Goldmann & Kitchin (1895–6).*

FIG. 5. *Google Earth image indicating some boundaries of the old Lancaster gold mine. On the upper left, a rectangular feature* (outlined) *can be observed, as well as the original location of the disturbed graves* (arrow).

could have been caused by the haematogenous spread of bacteria following an injury. Two individuals experienced traumatic events some time prior to their death. One (UP 60) broke his or her left ulna, while the other (UP 63) had a healed fracture to the left clavicle. Both fractures presented with clear callus formation on the diaphyses. Almost all the individuals have dental problems, most commonly dental caries and dental calculus (Fig. 9), as well as one case of a periapical abscess. Interestingly, one individual's (UP 52) central upper incisors were modified by means of filing (Fig. 9).

DISCUSSION

The results from the GPR survey likely indicate the presence of additional graves. It therefore seems that only a small section of a much larger cemetery was disturbed during the construction activities undertaken in 1996. The east–west alignment and equal spacing of anomalies observed suggests a planned layout. Nevertheless, the lack of grave markers and the limited use of coffins indicate that these people were probably labourers and their children. Based on the archival maps and associated historical artefacts, it can be surmised that the cemetery was in use from at least 1895 to around 1914, when the Lancaster mine stopped production.

The results from osteobiological analyses of the skeletal remains recovered from the old Lancaster mine premises seem to suggest a small population group made up of African teenagers and young adults. The young adult age of these individuals is typical of the age profile of migrant labourers who sought work on the gold mines. Employment statistics from 1960 suggests that the average age for African migrant labourers was 27 years, and that 62.5% of labourers were between 20 and 34 years (Wilson 1972). Looking at the age estimation results obtained in this study, four individuals were aged within the 20 to 34-year age category. It is, however, interesting that so many of the individuals from this group are actually teenagers ($n = 7$; refer to Table 1), as only 11.3% of labourers were reported to have been younger than 19 years (Wilson 1972). This may suggest that the age distribution of African migrant labourers changed over time. With the arrival of Chinese mine workers, stricter control over the minimum age (20 years) of labourers was enforced (Richardson 1982), and may likely have influenced the hiring profile of those labourers to follow. However, it should also be kept in mind that this sample is only a small representation of a much larger population group, and may not be reflective of the true age distribution of the Lancaster mine labourers. The presence of females amongst these

FIG. 6. *A detailed contour plan map of Luipaardsvlei 246 indicating the proposed location of the new Main Reef Road. Again, the same rectangular area can be observed, clearly intersected by the proposed road. Map sourced from Dent* et al. *(1982).*

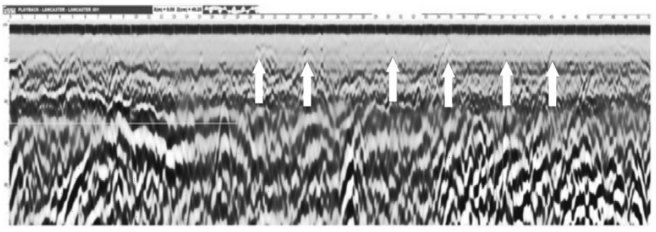

FIG. 7. *GPR output image indicating the presence of subsurface anomalies* (arrows) *possibly indicative of additional graves.*

individuals is interesting since mines almost exclusively hired men. During the early phases of gold mining, very few women were reported on the gold mines. Some references are made to women occupying clerical positions and performing domestic services on and near mines, but this seems to have happened infrequently (Wilson 1972; Harries 1990). Harries (1990) indicates that the female-to-male ratio for 1896 was 1:63. Some mines did make provision for women accompanying men as is evident by the allocation of 'married quarters' on certain mine premises. It is also possible that families moved to the urban areas as conditions in the rural areas deteriorated, up to a point where the government was coerced in drafting legislation that would specifically prevent Africans from moving beyond the confines of the reserves. With the implementation of the closed compound system and single-sex barracks, the demographic profile of the mines shifted to become almost exclusively male (Wilson 1972; Harries 1990; Crush *et al.* 1991). The presence of women in this small sample strengthens the argument that these individuals lived and died during the earlier phases of gold mining in South Africa.

The pathological lesions observed in these individuals speak to the general hardships associated with migrant life and the social inequalities of the time. The enamel hypoplasias observed in the teeth of two of the individuals suggest that they suffered from multiple episodes of malnutrition or illness growing up. Migrant labourers were often recruited from impoverished or poorly developed regions (Crush *et al.* 1991). People living in rural areas within South Africa were faced with increasingly difficult conditions because of the socio-political changes that would see them displaced and marginalised. One individual (UP 52), who presents with porotic hyperostosis, is

TABLE 1. *Summary of osteobiological results.*

Individual	Age (yrs)	Sex	Ancestry	Est. stature (cm) ± 2S.D.	Dental lesions	Skeletal lesions
UP 52	18–25	Female	African[a] SA Black	–	Dental calculus Multiple linear enamel hypoplasia Periapical abscess	Porotic hyperostosis
UP53	13–15	Female	African[a]	168.2 ± 6.336[1]	Hypercementosis Coronal caries	–
UP 54	20–35	Male	African[a] SA Black[b]	–	Supernumerary tooth in maxilla Dental calculus Dental caries	–
UP 55	20–30	Female	African[a]	–	Coronal caries Enamel erosion	–
UP 56	13–17	Unknown	Unknown	–	–	–
UP 58	Adult	Male	African[a] SA Coloured[b]	–	Coronal caries Ante-mortem tooth loss Agenesis of third molars	–
UP 59	14–20	Unknown	Unknown	–	Coronal caries Multiple linear enamel hypoplasia Incisive canal cyst on the maxilla	
UP 60	14–20	Unknown	Unknown	163.8[2]	–	Ante-mortem fracture to L distal ulna
UP 61	14–20	Unknown	African[a]	–	Coronal caries Dental calculus	–
UP 62	Adult	Female	African[a]	162.9 ± 5.554[1]	–	–
UP 63	14–20	Unknown	Unknown		Coronal caries	Ante-mortem fracture on L clavicle Pyogenic osteomyelitis of L & R ulnae
UP 64	25–35	Male	African[a] Historical Zulu[b]	–	–	–
UP 66	11–16	Unknown	Unknown	–	–	–
UP 67	Adult	Unknown	Unknown	–	–	–
UP 68	Adult	Unknown	Unknown	–	–	–
UP 69	Adult	Unknown	Unknown	–	–	–
Commingled 1	Unknown	Unknown	Unknown	–	–	–
Commingled 2	Unknown	Unknown	Unknown	–	–	–
Commingled 3	Unknown	Unknown	Unknown	–	–	–

R = right side; L = left side.
– = absent/cannot be provided owing to poor preservation or incomplete skeletal elements.
[a]Morphometrics (İşcan & Steyn 2013).
[b]FORDISC 3.1 (Jantz & Ousley 2005).
[1]Lundy and Feldesman (1987).
[2]Femur Stature Ratio (Feldesman 1992).

FIG. 8. *Pyogenic osteomyelitis of the left and right ulna (UP 63). Arrow indicates the presence of a cloaca.*

of particular interest. This condition was traditionally ascribed to iron deficiency anaemia; however, newer research suggests multiple aetiologies including megaloblastic and haemolytic anaemia, vitamins C and D deficiency, and even parasitic infections (Aufderheide & Rodríguez-Martin 1988; Ortner 2003; Brickley & Ives 2008; Roberts & Manchester 2010). None of these causative agents can be isolated as a primary cause. Nevertheless, it is interesting that this young girl, who also showed signs of stress growing up in the form of dental enamel hypoplasia, had undergone modification of her central incisors. This practice has been documented in several sub-Saharan African regions, where it has been practised for centuries (Van Reenen 1964, 1986; Handler 1994). Several studies have observed historical human skeletal remains in South Africa with dental modification similar to what has been observed in this study. Most of these individuals were reported to have come from Mozambique (Cox 1995, 1999; Cox & Sealy 1997). Although this practice is obviously not limited to Mozambique, migrant labourer statistics indicate that labourers were recruited from Mozambique (Wilson 1972; Crush *et al.* 1991). Even women from Mozambique were entering the mining region (Harries 1990). This young woman shows evidence of anaemia, which in its haemolytic form (thalassemia, malaria and sickle cell anaemia) (Stuart-Macadam 2005; Walker *et al.* 2009; Oxenham & Cavill 2010), may be linked to malaria. As malaria is endemic to Mozambique, it would make sense that this woman could have suffered from anaemia related to the disease. However, this cannot be confirmed.

Two individuals suffered bone trauma (UP 60 and UP 63). In both cases, the injuries showed remodeling with a clear callus (Waldron 2009), suggesting significant healing prior to death. UP 60 broke his or her left arm specifically in the area of the distal ulna. Fractures to the distal portion of the ulna shaft are often referred to as parry fractures and may be caused by a direct blow to the raised forearm (Lovell 1997; Judd 2008). This type of injury is frequently used in the bioarchaeological literature as an indication of interpersonal violence; however, it has also been suggested that parry fractures can be sustained during an accidental fall (Larsen 2015). It is very difficult to know the exact mechanism behind injuries in cases where there are no medical records available (Lovell 1997; Larsen 2015). For this individual, an injury caused by personal violence or an accidental fall could be equally as likely. Most of the historical accounts are clear on the fact that conditions in the mines (especially during the closed compound era) were dire, and that this often resulted in violence amongst fellow labourers, and from the mine bosses and police (Richardson 1982; Crush *et al.* 1991). Dangerous working conditions posed an equal threat. Monthly health records for the Lancaster mine, as with most mines, indicate a high occurrence of work-related accidents (Transvaal Archives Depot, FLD 128, 18/25, 1908). With the implementation of deep-level mining, these work-related injuries and deaths became even more frequent (Meyer & Steyn 2016). Nevertheless, the injuries sustained by UP 60

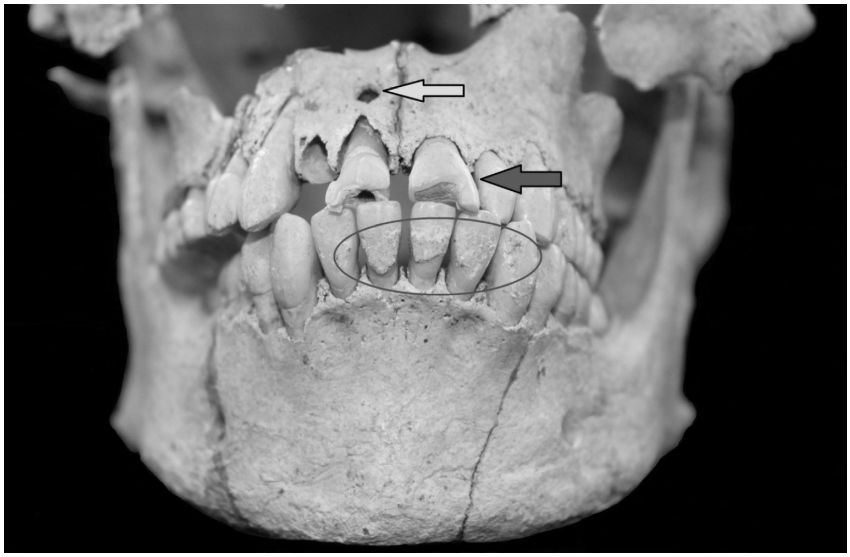

FIG. 9. *Dental calculus* (circled), *periapical abscess* (top arrow) *and dental modification* (bottom arrow) *observed in UP 52.*

and UP 63 could also have happened prior to their employment on the mines since both fractures show significant healing. UP 63 shows signs of an infection (pyogenic osteomyelitis) affecting both ulnae. This type of infection is often acquired after an open wound injury where the causative agent, *Staphylococcus aureus*, gains access to the blood system or through the haematogenous spread of an infection elsewhere in the body (Waldron 2009; Larsen 2015). For UP 63, this may or may not have been associated with the clavicle fracture. This condition must have been very painful and may have caused this individual's death if the infection spread to the organs (Waldron 2009).

CONCLUSION

Archaeological and archival information suggested that these individuals were buried in a paupers' cemetery on the premises of the Lancaster Gold Mining Company between 1895 and 1914. Anomalies observed during the GPR survey point to the possibility of additional graves in the area. It is clear that the interred individuals were forced into a labour system that saw them exposed to extremely difficult working and living conditions. Based on the bioarchaeological findings, it can be concluded that the remains recovered in 1996 are those of migrant workers. These people were most likely employed on the Lancaster mine during the mine's operational years and at some point succumbed to either disease or injury. Although these people remain unnamed, their remains enable us to reconstruct some aspects of their lives, in some sense providing recognition to a small group of people that is representative of the millions of unknown migrant workers who shaped South Africa's industrial economy.

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