Health and demography in late 19th century Kimberley : a palaeopathological assessment

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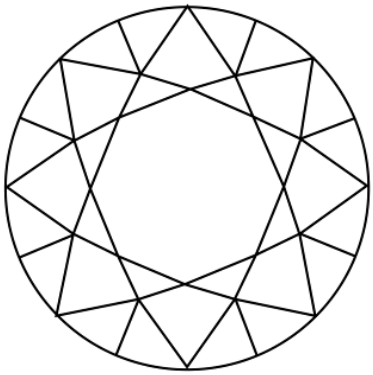

CHAPTER 10

General Discussion

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The history and health of a nineteenth-century migrant mine-worker population from Kimberley, South Africa

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Bultfontein mine compound hospital, 1900s
(McGregor Museum Kimberley Photography nr.5354)

Bultfontein Mine Compound, 1900s
(McGregor Museum Kimberley Photography nr.5357)

This study has brought together the results of archaeological, archival, palaeopathological and craniometric analyses to detail the history, health and possible ancestry of the unknown individuals whose remains were salvaged and investigated following accidental disturbance of unmarked graves next to the fenced Gladstone cemetery. The burial patterns, grave goods, demographic composition, and results obtained detailing the possible ancestry of male individuals in this sample, are all consistent with this having been a migrant worker population.

The grave goods (see Appendix 2), clearly reflect that the sample population had rural African connections and constitute an important archaeological indicator that the population in question was most likely comprised of migrant labourers. A comparison of these finds with grave goods recovered from a small number of documented African interments from the 1870s in the Transvaal Road area of Kimberley (Morris, 2004) indicates a striking contrast: these earlier graves contained a wide range of probably locally-purchased items such as pipes, enamel ware and buttoned clothing, reflecting a more open socio-economic context for migrant workers in Kimberley in the pre-compound era. The picture emerging from the 1890s interments at Gladstone Cemetery suggests a situation with greater restriction, with migrants having limited access to the kinds of goods available in shops outside the compounds.

By far, the majority of individuals within this study were male, with only a few females and three children. These findings also match the historical documents stating that the majority of those working on the mines were migrant workers and that they were predominantly male (Stoney, 1900a; McNish, 1970; Worger, 1987; Jochelson, 2001). Men left their families at their distant rural homes and came to Kimberley - initially on a voluntary basis, with the expectation of financial benefits and the opportunity to purchase a firearm. But after the mid-1880s, however, migrant workers were forced to sell their labour at reduced rates when conquest was depriving 'black' societies of a viable agricultural base and ways had to be found to pay hut taxes which had been imposed (Williams, 1902; McNish, 1970; Worger, 1987).

Results of the study into the possible ancestry of individuals from the Gladstone skeletal sample also concurred with a migrant working hypothesis. As described in Chapter 9, the results support the historically described cosmopolitan nature of the labour force in Kimberley. Most of the individuals in this very heterogeneous male sample population

were most probably from Bantu-speaking sub-Saharan African descent, particularly of southern African origin. Interestingly, morphological features resembling the geographically closest population (Khoe-San) were not frequently observed. As was suggested in historical documents, the Khoe-San seemed not to have contributed much to the labour force at the Kimberley mine (van der Merwe *et al.*, in print).

It is clear that while the sex distribution within this skeletal sample does not represent a normal population distribution, it accords well with the known population profile of Kimberley at the end of the 19th century. Neither female labour nor the employment of sick and emaciated men was allowed in the mines. Therefore, the majority of individuals working in Kimberley were young, healthy male adults when they entered the mines (Williams, 1902). This demographic profile was reflected in a census held in 1898, from which it was reported that 65% of the 'black' individuals within Kimberley were aged between 15 and 45 years (Stoney, 1900a).

The high death rate of black labourers between 30 and 45 years of age, apparent in the skeletal remains examined, was well-documented in archival reports from the Officer of Health (Stoney, 1900a). These reports ascribed the high mortality rate to mining accidents associated with shaft blasting, the poor living conditions of the workers, as well as their increased susceptibility to 'Western diseases' (Stoney, 1900a).

Unhealthy living conditions, the unusual gender distribution (encouraging the spread of venereal diseases), as well as the absence of antibiotics at the time, combine to explain why tertiary stages of syphilis could be observed in this skeletal population (Harries, 1994). Although skin lesions associated with syphilis were commonly treated with mercury during the 19th century, intervention with penicillin was only implemented around 1941. Hence, treponematosis could develop to its tertiary phase, not often seen in modern populations with access to antibiotics (Ortner, 2003).

The prevalence of skeletal involvement during treponemal infection has been shown to vary greatly. Some authors have found that 1% of patients present with skeletal lesions, whereas others reported up to 20% of infected individuals showing bone alterations (Ortner, 2003). Accordingly, care should be taken when reconstructing the prevalence of treponematosis in the Gladstone population, since the occurrence of skeletal indications of syphilis might not be representative of the true prevalence of the disease within the living population. It should also be kept in mind that since the graves in question are seemingly associated with a hospital context, the population sample is biased.

Skeletal lesions suggestive of treponemal infection were observed in 8.4% of individuals within this population. The prevalence is not necessarily higher than that observed in other populations, such as in skeletal samples from the Mariana Islands (10.5%), Guam (6.6%), the Dominican Republic (8.8%) and Metaponto (17.3%), but it is extremely high when compared to other South African populations, where only single isolated cases have been reported (Henneberg & Henneberg, 1993; Douglas *et al,* 1997; Pietrusewsky *et al*., 1997; Rothschild *et al.,* 2001; Steyn *et al.,* 2003). The high prevalence rate in the Gladstone sample does correlate, however, with the reported incidence of syphilis reflected in contemporary documents in late 19th century Kimberley (Jochelson, 2001). Although no clear numbers were stated, it was reported by the Senior House Surgeon in 1899 that "syphilis is playing havoc among the coloured races" (CGHVPP, 1900:42). One may therefore assume that many individuals were affected by the condition.

Another infectious disease which was reported to have spread rapidly among the migrant labourers was tuberculosis, or phthisis, as it was referred to in archival documents (Collins, 1982; Packard, 1989; Meyer *et al.,* 2002). There are no reports of any occurrence of tuberculosis in South Africa prior to 1652 and it is suggested that the disease was introduced during European colonization, rapidly breaking out and spreading among the indigenous societies (Donald, 2001). According to the Officer of Health, a higher susceptibility amongst migrant workers to contract this condition was the reason for the epidemic. Furthermore, the overcrowded living conditions in the compounds and locations in Kimberley definitely spurred the spread of the disease (Stoney, 1900a; Packard, 1989). As indicated by archival documents, huts in the location were crowded together, with at least six individuals per hut, while in the compounds, several individuals shared a shed (Stoney, 1900b; Packard, 1989). With people living in such close quarters, the prevailing conditions were conducive to the spread of any infectious disease, not only tuberculosis. Another factor predisposing labour migrants to infection was their generally poor health induced by exhaustion from long working hours and limited nutritional resources (Harries, 1994; Packard, 1989).

Taking into consideration that skeletal lesions resulting from tuberculosis develop in only 5-7% of individuals infected by the disease, the prevalence of tuberculosis in this sample population correlates well with its frequency as described in the living migrant worker population in Kimberley (Steinbock, 1976; Santos & Roberts, 2001).

It should be kept in mind, though, that the terminology used in archival documents is sometimes ambiguous. The term “phthisis” is also given to lung diseases induced by the constant inhalation of microscopic particles of dust generated by shovelling, drilling and blasting. However, according to the *Oxford Concise Medical Dictionary* (2003), it is also a former name for tuberculosis (Harries, 1994; Packard, 1989). Nevertheless, the inhalation of dust particles also leads to fibrosis, the symptoms of which may be mistaken for those of tuberculosis. This condition is extremely prevalent in individuals working in underground mines, and it would be expected to have occurred in Kimberley, where shafts for underground mining had begun to be sunk by 1885 (Turrell, 1987; Harries, 1994; Packard, 1989).

The unavailability of antibiotic treatment in this period resulted not only in the observed skeletal lesions associated with treponematosis and tuberculosis in this population, but also in advanced non-specific osteomyelitis for which the treatment in the late 19th century was amputation. Non-specific osteomyelitis is considered to be more prevalent in rural environments with poor sanitation in the home and/or hospital settings (L’Abbé, 2005; L’Abbé & Steyn, 2007). In late 19th century Kimberley, notoriously bad conditions were reported even from the Kimberley Hospital, specifically in its pauper wards. According to reports, the ‘Native Medical Ward’ was in an appalling state in 1897 (Medical Officer of Health, 1897). It was described as being "low, hot, badly lighted and badly ventilated, and worst of all there [was] a scullery opening into it" (CGHVPP, 1898).

Although only one case of non-specific osteomyelitis was observed, it is possible that some of the osteomyelitis cases admitted to hospital were treated by amputation. In some of the amputated limbs observed, clear signs of infection were present. If all the amputations observed in this population were indeed the result of infection, the prevalence of osteomyelitis would increase to 6.5%, possibly being more representative of the true prevalence rate of the condition. However, it should be kept in mind that some of the amputations may have been the result of untreatable crushing injuries, as may be expected in a hazardous mining environment, without time for a secondary infection to develop.

The high prevalence of skeletal lesions suggestive of healed scurvy also correlates well with contemporary reports. Increased levels of scurvy can be expected in a population following a diet consisting of mainly maize meal and occasional coarse meat, as was described in historical documents and supported by the investigation of the population’s dental health (see Chapter 7) (Harries, 1994). Supplementary food could be purchased

from company stores, but was extremely costly (Worger, 1987). The potential for scurvy would have been exacerbated by the regular consumption of homemade beer and alcohol. Opportunities to cultivate supplementary foods, such as vegetables and fruit containing vitamin C, were limited by the harsh environment and restrictions in the compounds (Van der Merwe *et al.*, 2010a; 2010c).

Histological investigations proved to be a valuable tool in distinguishing tibial lesions caused by ossified haematomas (which most likely developed as a result of scurvy) from those caused by osteomyelitis, specifically treponematosis. As was described in Chapter 6, ossified haematomas were microscopically characterized by normal original cortical bone and radiating trabecular appositional bone. Three phases of ossified haematoma formation and remodelling in humans were proposed, with the various stages resulting in gradual remodeling of the appositional trabecular bone to more compact Haversian bone, while retaining an outwards radiating bone structure (van der Merwe *et al.*, 2010a).

It was found that histological features, such as those described by Schultz (2003) as being characteristic of treponemal infection, could not be identified in the sections taken from lesions macroscopically diagnosed as resulting from treponematosis. Although the preservation of the bone material as well as the variability in distribution of these features may be the reason why they were not observed, it is also possible that these features cannot be exclusively associated with treponematosis. It was proposed as very likely that the same histological picture will be observed in samples taken from lesions caused by non-specific osteomyelitis, treponematosis and leprosy (Blondiaux *et al.*, 1994; Ortner, 2003).

Although ossified haematomas observed in the Gladstone skeletal sample are suggested to have been the result of scurvy, traumatic events, which were also documented as begin numerous during this time period, could also have been the responsible cause.

Nearly one third of individuals in the study population had at least one fracture (n=28) and 48.8% of the fractures observed could be classified as blunt force cranial fractures. This extremely high prevalence of cranial fractures is suggestive of high levels of interpersonal violence (Jurmain & Bellifemine, 1997; Standen & Arriaza, 2000). Cultural differences amongst migrant workers, competition for resources, and overindulgence in alcohol, must have caused friction between labourers or between themselves and their employers (Harries, 1994; Turrell, 1987; Worger, 1987). The frequency of lesions suggesting interpersonal violence is in accord with the historical documentation of violence and disputes in the workplace (Worger, 1987; Harries, 1994, Van der Merwe *et al.*, 2010b).

As was mentioned in Chapter 4, the hazardous mining environment should also be considered when interpreting the fractures observed in this sample (Van der Merwe *et al.,* 2010b). There is often no sure way to distinguish blunt force cranial fractures, as evidence of violent conflict, from cranial fractures resulting from mining accidents such as a rock fall. Therefore, the latter as a cause for the observed cranial fractures, also well documented in archival sources, cannot be discounted.

Injuries resulting from rock falls, mud rushes, mine shaft accidents, and the like, were a regular occurrence in Kimberley (Turrell, 1987; Harries, 1994). The high prevalence of long bone fractures, spondylolysis and longstanding subluxation of the shoulder observed in this population, most likely related to these kinds of injuries, are testimony of the hazards and strenuous demands of daily work in the mines (Van der Merwe *et al*., 2010b).

Fortunately, medical care was available to treat most of these injuries, infections and nutritional diseases. Apart from documentation which clearly describes the treatment of patients in the Kimberley and compound hospitals, the presence of well-healed and reduced fractures and surgical amputations observed in the population provides testimony to this fact (CGHVPP,1898; CGHVPP, 1899).

Several other skeletal and dental changes and anomalies, which would not in themselves have resulted in hospitalization and therefore would be more representative of the non-hospitalized population in Kimberley, were also observed during the investigation of this sample. These included lesions indicative of joint degeneration resulting from strenuous physical labour, nine cases of cribra orbitalia, as well as six cases of individuals presenting with supernumerary teeth.

The prevalence of lesions such as myositis ossificans, spondylolysis, Schmörl's nodes, other degenerative bone changes and enthesopathies were high considering the young age of individuals within the study sample, and can most likely be ascribed to regular engagement in strenuous physical activities. It may be argued that these lesions were not associated solely with mining activities, but could also have resulted from agricultural and other physical enterprises in which these individuals took part at their rural homes. However, when comparing the prevalence of lesions such as Schmörl's nodes (31% of individuals in the Gladstone sample) with other South African rural populations such as the Venda (2.6%), it becomes evident that the Gladstone skeletal sample was significantly more exposed to its causes than would be a group only engaged in regular rural living (L'Abbé, 2005). Dar *et al*. (2009a) recently suggested that Schmörl's nodes may rather be

of congenital origin and not be occupational/activity or disease related. Their conclusions are however not consistent as they, in a later paper, implicate morphological differences and the consequently ability of the vertebrae and vertebral discs to withstand torsion to be responsible for the distribution pattern of Schmörl's nodes across the spine (Dar *et al.*, 2009a,b).

The prevalence of vertebral osteophyte formations (as a result of degenerative disc disease) observed in the Gladstone (14.9%) and Koffiefontein (22.2%) (a contemporary mining sample) samples was statistically comparable (L'Abbé *et al., 2*003). Taking the age distribution of the Gladstone population into account, it is obvious that factors such as strenuous activities associated with mining, or, to a lesser degree, physical labour associated with a rural lifestyle, are more likely to have influenced degenerative changes observed in this population than naturally occurring degeneration patterns related to aging.

Cribra orbitalia was observed in 11% of individuals with orbits in the Gladstone skeletal sample. The cause of this condition is still under debate (Steinbock, 1976; Stuart-Macadam, 1989; Mann & Murphy, 1990; Stuart-Macadam, 1992). Iron-deficiency, vitamin B_{12} and folic acid deficiency, haemolytic anaemia, scurvy, malnutrition, chronic gastrointestinal bleeding, ancylostomiasis, osteoporosis, as well as infectious diseases have all been implicated in the development of the condition (Mann & Murphy, 1990; Thillaud, 2008; Walker *et al.,* 2009). It has even been suggested that the lesions may be a non-specific trait or the result of post-mortem damage (Thillaud, 2008). The prevalence of cribra orbilatia in the Gladstone population (11% of individuals with orbits) was relatively low in comparison with its frequency in other adult South African skeletal samples such as the Griqua (34.6%), Khoe (36.1%) and the 20th Century 'Black' peoples (46.6%) studied by Peckmann (2003) (Griqua $\chi^2 = 11.1$, Khoe $\chi^2 = 11.8$, 'Black' peoples $\chi^2 = 14.9$, p-value < 0.05 for all).

However, it should be considered that cribra orbitalia usually develops during childhood (Steinbock, 1976; Mann & Murphy, 1990; Fairgrieve & Molto, 2000). Therefore, the prevalence of cribra in this population should be interpreted with caution. The lesions may be the remnants of a childhood condition and therefore would not be representative of conditions present (be they nutritional, pathological or hereditary factors resulting in haemolytic anaemia) in the Kimberley context at the time these individuals were working there, since this is a migrant worker population. It would, however, suggest that the majority of individuals within the Gladstone population came from population

groups that were relatively well-adapted to their environments (Larsen, 1997; Wapler *et al*., 2004).

Should it be possible for cribra orbitalia to develop in adults, conditions resulting in acquired haemolytic anaemia (e.g. malaria) could be the reason for the presence of this lesion in the Gladstone population (Harries, 1994; Walker *et al.*, 2009.). Again, it must be stressed that because the majority of individuals within this sample population were most likely migrant workers, these cribra lesions may be more representative of the various places the migrant worker came from.

The high prevalence of supernumerary teeth in the Gladstone skeletal sample did not add to the understanding of the health status of this 19th century migrant working population, but it did add interesting detail to the demography of the skeletal sample. As was discussed in Chapter 8, the high prevalence of supernumerary teeth (6.7%) observed in this population could not be explained by their ancestry or the presence of syndromal pathological conditions. Therefore, taking the similarity and distribution of these extra teeth into consideration, it was suggested that there may have been a genetic relationship between some of the individuals presenting with the anomaly (van der Merwe & Steyn, 2009). This can be expected in a migrant working population such as this, where young men from the same rural area often traveled to Kimberley in groups, laboured in the mines, and returned to their rural homes once their contracts had expired.

Result obtained in this study gave substance to contemporary reports on the appalling conditions and hazards to which migrant workers were exposed when selling their labour to the mines in late 19th century Kimberley. Migrant workers came on contract, recruited from distant rural areas, to meet the demands for labour. In closed compounds and in the mines they were subjected to harsh and restrictive living conditions, disease, violence and a hazardous working environment. Many of them would never make the return journey home. The remains of some of these latter individuals were unwittingly disturbed from unmarked, forgotten pauper graves. It is hoped that this study will have contributed to the recollection and recognition of these anonymous dead whom Kimberley and South Africa had forgotten, foregrounding something of the real cost in human hardship and loss of life against which the wealth of the nation was built.

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