

Occupational health litigation and the development of occupational hygiene: Slavery – Part 1: From ancient times

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“At the extremity of Egypt and in the contiguous territory of both Arabia and Ethiopia there lies a region which contains many large gold mines, where the gold is secured in great quantities with much suffering and at great expense. For the earth is naturally black and contains seams and veins of a marble which is unusually white and in brilliancy surpasses everything else which shines brightly by its nature, and here the overseers of the labour in the mines work recover the gold with the aid of a multitude of workers.”¹

Diodorus Siculus, Greek historian 1st century BC, provides information on working conditions for slaves in Nubian gold mines and mentions the association of gold with quartz (referred to as white marble) and much suffering.

BACKGROUND TO THIS SERIES OF PAPERS

As discussed in the Introductory paper to this series,^{2,3} the silicosis litigation class actions against gold mining companies in South Africa in the 21st century influenced *Occupational Health Southern Africa* to include a series of papers covering occupational health litigation. This, the second paper in the series, deals with ‘Slavery’ because of the appalling working conditions that black and white miners endured at the end of the 19th and the start of the 20th century on the Transvaal gold mines;^{4,5} the slave traffic utilised for the recruitment of black Africans for the gold mines,⁶⁻⁹ and the impact of slavery on racism which became an integral part of the culture of South Africa^{8,9} with the most inhumane conditions of service for black workers on the mines. Inadequate attention to their health and safety continued through the 20th and into the 21st century.¹⁰⁻²¹

The eminent social historian, Luli Callinicos, addressed the origins of racism in South Africa.⁸ In summary, a number of European countries became rich through the slave trade, in particular through the shipment of millions of African slaves to the Americas to work in the sugar and cotton plantations, and through the exploitation of mineral wealth. South Africa’s colonial history gave rise to a racist society, and mine owners felt justified in providing poor working and living conditions, and paying low wages, to black mine workers.^{8,9,22}

The exploration of slavery and working conditions in mining, and the impact of the exploitation of mineral wealth on South Africa, has resulted in Paper 2 on *Slavery* being split into six parts. Part 1 – *From Ancient Times* – covers the period when most miners were slaves, by birth, capture in warfare, or judicial condemnation. Part 2 – *Gold and the North Atlantic Slave Trade* – is split into further sub-parts, starting in west Africa and moving to the Caribbean and the mainland of the Americas where Spanish and

Portuguese mines produced huge quantities of precious metal while also consuming countless lives of the native Indians and Africans compelled to work in them. Gold as the driving force for initial expeditions and colonisation of the territory of what is now the United States of America is covered in Part 3 – *Gold and the US*. Part 4 – *The Colliers of Scotland and Coal Mining in the US* covers how the courts enslaved the colliers of Scotland and, in the US, African Americans for the convict coal mines. Part 5 addresses *The Welsh Slate Industry* which was initially funded by the profits from slavery. Part 6 provides information on slavery in *Southern Africa and Gold Mining on the Witwatersrand* and draws on information from Parts 1 to 5 to show the part played by gold and slavery in the loss of land by indigenous people, poor working conditions and how this ultimately played a part in the current silicosis litigation in South Africa.

SLAVERY FROM ANCIENT TIMES

Slavery and the slave-trade are older than the records of human society and have spanned the globe.²³ Labour in ancient civilisations was primarily slave labour and slaves underpinned scores of cultures in the Ancient World – in Mesopotamia, Egypt, Greece, Rome, North Africa and south of the Sahara.²⁴ In 6800 BC the world’s first city-state emerged in Mesopotamia where enemies were captured and forced to work as slaves. By 2575 BC Egyptian temple art celebrated the capture of slaves in battle.²⁵ Henry Ernest Sigerist,²⁶ Swiss medical historian, states in a 1936 lecture: The pyramids of ancient Egypt were built by state slaves whose lives had no value whatever, whom every war would replace. The ancient physicians were not actually interested in the health of the manual labourers; they devoted their attention almost exclusively to the upper class. Medical care was also given to those who served to entertain the people – the gladiators.

Slavery became an important part of the economy and society only after the establishment of cities.²⁷ It is estimated that the majority of citizens in ancient Athens owned at least one slave. Slaves worked in the fields, factories or small workshops; those who could read or write were often teachers or accountants. A smaller number worked as enslaved servants in the houses of their owners.²⁸ In Athens, and Italy when the Roman Empire was at its most powerful, 30–35% of the population was enslaved.²⁹

SLAVERY IN MINING

Those slaves in ancient times who were worst off included mine workers due to appallingly bad working conditions; legal writers record that condemnation to the mines was a fate worse than death.³⁰ Vast numbers of slaves were used in the mines and a lucrative and constant revenue was gained by those who hired out slaves.²⁹ Not all slaves spent their working time in the dark and badly ventilated galleries as many were needed to perform skilled and unskilled tasks outside the pits.³¹

Most of the gold in biblical times was mined in Nubia (now encompassed by Egypt and Sudan), where production might have amounted to 30 kilograms a year.³² To build their immense wealth, the Egyptian pharaohs established a system of gold mining that sacrificed tens of thousands of war captives, prisoners, dissidents, and slave labourers.³³ Diodorus Siculus (c. 90-30 BC), provides information on working conditions for slaves in mining. Continuing from the quotation for Nubian gold mines at the start of this paper:¹

“For the kings of Egypt gather together and condemn to the mining of the gold such as have been found guilty of some crime and captives of war, as well as those who have been accused unjustly and thrown into prison because of their anger, and not only such persons but occasionally all their relatives as well, by this means not only inflicting punishment upon those found guilty but also securing at the same time great revenues from their labours. And those who have been condemned in this way – and they are a great multitude and are all bound in chains – work at their task unceasingly both by day and throughout the entire night, enjoying no respite and being carefully cut off from any means of escape . . . And since no opportunity is afforded any of them to care for his body and they have no garment to cover their shame, no man can look upon unfortunate wretches without feeling pity for them because of the exceeding hardships they suffer. For no leniency or respite of any kind is given to any man who is sick, or maimed, or aged, or in the case of a woman for her weakness, but all without exception are compelled by blows to persevere in their labours, until through ill-treatment they die in the midst of their tortures.”

The gold-bearing regions of Egypt and Nubia³⁴ made Egypt a wealthy nation as gold became the recognised standard medium of exchange for international trade.³⁵ Bisharee or the Great Nubian Desert, was once the centre of the greatest gold-mining works known to the ancient world. Del Mar considered that the Nubian mines might have been as prolific as have been those of Italy, Spain, Brazil, Russia, Australia or California.⁶ Despite the

legendary wealth of gold in Pharaonic Egypt, Dietrich Klemm and co-workers, in a paper published in 2001, estimated that, during the entire 6000 years of gold production in Egyptian history, less than the monthly gold output of South Africa was achieved.³⁶

The second major war between Carthage and the Roman Republic, *The Second Punic War*, lasted from 218 to 201 BC; a major outcome was Roman control of the rich gold and silver mines of Spain. Under the Romans a system was instituted whereby mines were granted to private individuals for a limited period. Wealthy nobles residing in Rome hired overseers to exploit the mines to maximum capacity. Thousands of Spanish natives and Carthaginians were confined to the mines, driven to death and exhaustion by profit-seeking Romans.³³ Diodorus¹ writes about the conditions in the Spanish silver mines where some 40 000 slaves were said to have worked:^{37,38}

“. . . the slaves who are engaged in the working of them [the mines] produce for their masters revenues in sums defying belief, but they themselves wear out their bodies both by day and by night in the diggings under the earth, dying in large numbers because of the exceptional hardships they endure.”

Two bronze tablets discovered in 1876 and 1906 provide information on Roman labour and economic regulations that existed for mining at the time of Hadrian Augustus (117-138 AD). As the tablets were found near the Roman copper mining district of Vipasca in the vicinity of present day Aljustrel, Portugal, they are referred to as the *bronzes of Vipasca* or the *Aljustrel bronzes*. The first tablet, christened *Vipasca I*, deals with concessions for cobblers, barbers, and teachers at the mines and various regulations for the bath-house lessee as bathing was very important for the Romans. The baths had to be well maintained, kept open within certain hours, and a proper supply of running water was required for the heated rooms. Baths were free for miners and soldiers, imperial freedmen and for slaves in the service of the procurator of the mines or on his payroll. The second tablet, *Vipasca II* or the new *Aljustrel tablet*, includes safety standards with regard to mine props and the ditch for water drainage. The theft of ores, the sabotage of the mining infrastructure, and the breach of safety regulations were punished severely – slaves were whipped at the discretion of the procurator, kept perpetually in chains, and had to be sold outside of the mining district. Those of a higher status lost their property to the fiscus and were evicted from the mining district.^{39,40}

Rio Tinto in southwestern Spain, one of the largest known mining complexes in the ancient world, has provided mineral wealth (copper, silver and gold) for some 5 000 years. Information on the typical working day in Roman times for free miners and slaves is provided by Delgado Domínguez of the Riotinto Museum.⁴⁰ Slaves in surface tasks such as smelting or teaching were paid for their work. Those condemned to the mines would be woken early in the morning and fed a strong posca to hydrate them and make them slightly drunk, so they would not be so conscious of their situation. *“They would also be fed some bread and they would probably not get anything else until the following day. They would feed them enough to be able to go through a working day, but not enough to put up resistance.”* Chained at the neck, their working day would

be determined by how long their oil lamp lasted – about 11 hours. Human bones in slag piles show that enslaved miners were not entitled to burials; instead, they were thrown out with the slag and the garbage. A popular image of a Roman soldier leading collared slaves is given below.



Roman collared slaves – Marble relief, from Smyrna (Izmir, Turkey), 200 AD, featured at a collection of the Ashmolean Museum, Oxford, England. Source: Wikimedia Commons

Gaius Plinius Secundus (Pliny the Elder c. AD 23-79)⁴¹ discussed the health and safety hazards of mining in Roman times, mentioning miners being crushed to death from underground rock falls, the galleries filled with suffocating vapours and smoke, and the cloud of dust, of a density quite incredible. Like Diodorus, he mentions the association of gold with quartz: “*The gold that is extracted from shafts . . . it is found adhering to the gritty crust of marble,*” and, “*it is seen interlaced with the molecules of the marble.*” He commented that the exhalations in silver mines were dangerous, and on the presence of some fatal substances in deep-sunk wells that could be guarded against by letting down a lighted lamp, and ascertaining whether the flame was extinguished.

The natural noxious or flammable gases in mine galleries were supplemented by the gases and smoke from fires set to heat the rock and prepare it for splitting with liquid. To overcome the problems of increasing heat with depth, smoke and toxic gases, the Romans created additional air movement through convection, so that warmer air from the mine rose and was replaced by cooler air from outside. This could be done by cutting additional shafts in parallel as was done at Rio Tinto.⁴² Inadequate ventilation brought many miners a slow and insidious death through exposure to poisonous fumes, suffocation, or silicosis. The need to constantly replace even the cheapest slaves ultimately affected the profit of a mine operator.⁴³

TREATMENT OF SLAVES

Marcus Tullius Cicero, a Roman philosopher, politician and lawyer,⁴⁴ wrote in 44 BC with regard to justice toward slaves:

“But let us remember that we must have regard for justice even towards the humblest. Now the humblest station and the poorest fortune are those of slaves; and they give us no bad rule who bid us treat our slaves as we should our employees: they must be required to work; they must be given their dues.”

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On good faith in the performance of contracts he wrote:

“It is not only in the case of real estate transfers that the civil law, based upon a natural feeling for the right, punishes trickery and deception, but also in the sale of slaves every form of deception on the vendor’s part is disallowed. For by the aediles’ ruling [magistrates of the Roman Republic] the vendor is answerable for any deficiency in the slave he sells, for he is supposed to know if his slave is sound, or if he is a runaway, or a thief. The case of those who have just come into the possession of slaves by inheritance is different.”

The slave markets of Rome were filled with persons of various nations and colours often captured in warfare. Prisoners were paraded naked, with placards around their necks describing their best and worst qualities. If information on the placards was later found to be untrue, the buyer could take the seller to court.⁴⁵ Slaves who managed to escape were guilty of theft (they had stolen their master’s property) and, if caught, would suffer terrible tortures as a means to frighten other slaves. The customary cruelty to slaves of Roman masters³⁸ is also shown in gladiatorial shows, where slaves were publicly killed for the pleasure of the free; and in the law and the practice that all the slaves living in the house of a master killed by one of his own slaves were tortured and executed.

Between 135 and 70 BC, there were three major slave rebellions in Sicily and Italy, which were apparently fostered by the concentration and neglect of thousands of the newly enslaved. The slaves’ initial success against Roman legions was not maintained; eventually the slave armies were defeated and ruthlessly crushed. Crucifixion was the capital punishment meted out specifically to slaves, traitors, and bandits. The road from Capua to Rome was lined with 6 000 crucified slaves captured from the remnants of Spartacus rebellion.^{24,38,45}

One of the most approved modes of obtaining evidence at courts of law in Rome and Athens was the torture of slaves. Forsyth⁴⁶ commented “*We find the Grecian orators constantly appealing to this test, as the most infallible they can offer of the truth of their assertions. It seems to have been deliberately preferred to any other.*” The evidence of slaves could be trusted only if it was exacted under torture, based on the belief that slaves in a position to be privy to their masters’ affairs would be too virtuously loyal to reveal damaging evidence unless coerced.

Slavery existed on a vast scale in the Roman world for more than eight centuries. Over time, as the slave supply dried up, greater reliance was placed on homebred slaves. With this decline, the attitude towards, and treatment of, slaves became steadily more humane. The emperor Augustus and his successors passed laws that protected slaves against the more brutal forms of abuse. For example, although the testimony of slaves could be taken only under torture, various restrictions, such as exemptions for women and children, were gradually applied. Claudius removed the power from slave-owners to kill or abandon sick slaves and, if a slave was abandoned by his master, he became free. Legal protection of slaves continued to grow as the empire expanded.^{24,29} Some Romans would pay a small allowance into a fund for their slaves; when there was enough money in the fund, a slave could buy his or her freedom.⁴⁵

SERFDOM AND THE DEVELOPMENT OF 'FREE' MINERS

When Rome collapsed in the early 5th century, slavery in Europe declined. Although it revived occasionally, there were few equivalent opportunities for a dominant military power to seize and enslave defeated enemies.²⁴ Shaft sinking and mining activity also decreased substantially and the social chaos and general instability in Western Europe persisted until the 11th century. From 1100 to 1500 AD the status of the miner was changed from Roman times. Mining became a respected profession. With growing stability in the 12th to 16th century, shaft sinking and mining activity increased.⁴⁷ In an extensive historical health and safety review of mining, Martinson³⁰ considered that the origins of a major revival of metal mining in Saxony, Austria and Bohemia dates back to the 11th century:

"Early in the revival mines were worked by serf labour owing allegiance to the feudal overlord within whose domain the mine lay, but the system was inefficient and gradually miners became emancipated and this enabled them to form associations of 'free' miners which would lease a mine from an overlord and work it for the joint benefit of the association's members. Later, as mines increased in depth, associations were obliged to admit wealth non-working partners to obtain development capital, and in the 15th and 16th centuries mining developed into a fully capitalistic industry in which mineworkers were reduced to the status of wage earners."

The institution of serfdom was not abolished in Britain until 1381. Under serfdom or domestic slavery, serfs were bought and sold with the estate on which they had to work for a fixed number of days a year without payment; they could not marry without the lord's consent, could not leave the estate, and had few legal rights. As they could not be easily replaced, they were not as physically abused as African slaves a few centuries later in the *North Atlantic Slave Trade*. There, the slaves had no legal rights, were not regarded as human, were often worked to death, were not allowed to marry, and couples and their children were sold off separately.⁴⁸

MOVE TO DEEPER MINES

A detailed review of mine ventilation through the ages was provided by Campbell-Pitt in 1949.⁴⁹ Roman mines were deeper than those of their Greek predecessors. The deeper the mines, the greater the danger for the miner, including increased problems of drainage and ventilation. With the growth of commercial enterprise in the 15th and 16th centuries, there was an increased demand for gold and silver as currency and capital, and mines in Central Europe were deepened. Rosen commented that the necessity for deeper mines affected the health of miners, and the appearance of the first books concerned with accidents and diseases of miners reflects these circumstances.⁵⁰ This included a pamphlet on the occupational hazards of goldsmiths by Ulrich Ellenbog in 1524, the first great textbook on mining, *De Re Metallica*,⁵¹ written by Georgius Agricola (1494-1555) and published after his death in 1556 and, despite scattered references in the literature of antiquity, the first monograph devoted exclusively to the occupational diseases of mine and smelter workers in 1567 by Paracelsus (1493-1541).⁵⁰ Book VI by Agricola covers mine ventilation and the maladies of miners.^{49,51} Paracelsus, unlike Agricola, did not pay any special attention to dust as a causative factor in miners' diseases although it is possible that some of his references to vapours in his treatise may be allusions to dust.⁵²

RESURGENCE OF EUROPEAN SLAVERY IN MINING

Agricola commented that there are those who speak abusively of mining because of the previous use of slaves *"But to-day the miners receive pay, and are engaged like other workmen in the common trades."*⁵¹ By the 15th century ancient slavery was dead in England, and moribund on the continent of Europe.⁵³ However, a half century before the birth of Agricola, 10 African slaves, men and women, were taken by sea from the west coast of Africa to Portugal in 1442.⁵⁴ At the birth of Agricola, Columbus had just returned from his great discovery. These two events, viz. the European transport by sea of slaves from the west coast of Africa, and the 'discovery' of the Americas, would lead to slavery again becoming an important part of European commerce, with slaves being hunted, captured and sold where there was a demand for cheap labour. The European greed for gold^{6,55-58} would lead to the deaths of tens of millions of native Indians through fighting the European invaders, massacres, genocide, mistreatment, torture, famine, suicides, forced work on mines, farms and plantations, and European diseases. Millions of Africans would also suffer an early death during capture, transport, or subsequent work on the mines or plantations of the New World of the Americas.

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