



# The Land of Opportunity: Bioarchaeological Perspectives of Women's Lives in the Industrial Expansion into the Western UNITED STATES (1850–1915)

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## Abstract

Taking a bioarchaeological approach that puts human skeletal remains in context with historical records, we reconstruct the experiences of three women who lived in the West during the 1800s and early 1900s. Telling the stories of one woman from a homestead outside the city of Las Vegas, Nevada and two women recovered from a sand dune near Walters Ferry, Idaho, we offer insight into what life was like for those who ventured west in search of new identities and roles in developing industries. Our analysis includes documentation of pathological conditions, activity-related changes, and trauma in comparison to other historic cemetery samples from communities growing in this region. Through examination of the skeletal data from these diverse data sets, patterns emerge regarding the health profiles of these women. In particular, the results show that the pathological conditions observed on the three women from Nevada and Idaho align with those documented in the published literature and provide insight into their risk of morbidity and trauma.

**Keywords** Bioarchaeology · Western USA · Industry · Stress

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## Introduction

Traditional accounts of early life in the western portion of the United States of America, defined here as the area west of the Appalachian Mountains, between the mid-1800s and early 1900s are akin to the stories told in the dime novels of the day. These stories were written to entertain people not living in the area, likely the eastern Americans who were reading stories about heroes and legends like “Young Wild West” who tamed the unruly frontier (LeBlanc 1996:18). We deconstruct this negative or uninformed stereotype and suggest that life in the historic region in the US referred to as the “West” a definition that changed over time to mean all land west of the Appalachian Mountains, the land west of the Mississippi River, and eventually the land west of the Rocky Mountains (Onion et al. 2009). The West was like any other place in the world or time in history; people’s daily lives were often routine. Discussing the West, Athearn (1986:189) states that “[t]his western story, chanted over and over like a mantra by the American public, began with the tales of James Fenmore Cooper and flourished in thousands of variations during the era after the Civil War.” These old, sensationalized accounts also focus primarily on men. In the opening paragraph of her book *The Female Frontier: A Comparative View of Women on the Prairie and the Plains*, Glenda Riley (1988) highlights the lack of representation of women living in and helping to settle the western portion of the US. While she may have been talking about Euroamerican women, the reality is all women are missing or misinterpreted in the historic narrative. “Until the mid 1970s, frontierswomen appeared in histories of the West only as one-dimensional stereotypes or not at all” (Riley 1988:1). Here we focus on the lived experiences of select women who migrated west and their contributions to the diverse economies emerging in the region. We highlight the lives of three women who migrated westward and died but were later disinterred and analyzed by anthropologists.

Historical records of developing towns and their cemeteries provide contextual information for population growth, the expansion of industry, and the experiences of those who helped build the West. Through a bioarchaeological approach, we use these historical records to better interpret the lives of three women of different ages who died in Idaho and Nevada. The skeletal remains of these individuals tell the story of their lives and can provide some insight into the experiences of those who ventured west. We present our observations of their bodies as a way of offering a glimpse into life along migration routes to the West, including the routes like the Mormon, Old Spanish, Oregon, and Overland trails, the realities of living in communities in the West where people worked as farmers, loggers, miners, and ranchers, and the challenges faced in new landscapes.

## Expansion West

Here, we interpret human skeletal remains recovered from communities in the western US. Based on the mortuary context, we argue that these individuals were either living in or making their way to areas of the country that were founded because of their proximity to natural resources and developing industrial economies. Archaeological sites in North Las Vegas, Nevada, and Walters Ferry (also identified as Walter Ferry

Bridge) crossing near modern-day Melba, Idaho, were where the individuals were interred. Both locations served as stopover points during the early days of migration and settlement in the western US by people from the eastern states and west-coast cities like San Francisco. They were looking for opportunities, especially those who were more recent immigrants to the country. For example, while discussing the mining town of Silver City in southwestern Idaho, Derig (1951:86) states “The population of Silver City appears to have been a mixed one, composed of the Irish, Swedes, Norwegians, Germans, and a few persons of Jewish descent. The most conspicuous foreign element, however, was the Chinese, of whom Silver City absorbed a substantial number. At the height of mining activity, in 1874, they numbered at least 700, and boasted a thriving Chinatown” at a time when this section of the country was still part of what people in the cities back East and in the dime-store novels referred to as the Wild West or American Frontier (Athearn 1986; Christensen 2002; McWilliams 1931; Slatta 2010; Slotkin 1998; Smith 1978). We would caution that these areas were not “wild” or “frontiers,” as they had been inhabited by Indigenous groups for thousands of years and the history of the region is complex and diverse. Driven by different industries and economies, the towns of southwestern Idaho and southern Nevada were places where people from the East migrated to seek a more prosperous life. These settlements (Fig. 1) were important places that acted as oases in dry landscapes for generations to follow. For example, Leroy Hafen and Ann Hafen describe the expedition of John C. Fremont as he crossed the Nevada landscape on the Old Spanish Trail in May of 1844 and entered the area that would become Las Vegas:

An early eighteen-mile ride the next day across the eastern plain, and they arrived at welcome Las Vegas (the Meadow) – present site of Las Vegas, Nevada. Here big springs of warm water boiled up into large basins that over-



**Fig. 1** Map of western US showing the locations of Kiel Ranch, North Las Vegas, Nevada, and Walters Ferry, Idaho. Created by Harrod in 2021 using WorldMap

flowed to form a fine stream. This creek watered a meadow that gave the name of this famous way station of the desert trail. Fremont and his men found the spring basins delightful bathing pools, the water boiling up with such force that the bather was kept suspended in the water. (Hafen and Hafen 1954:295)

North Las Vegas and Walters Ferry were places of refuge for travelers and families who were colonizing the West in the late 1800s (Derig 1951). Because of this, these sites present an opportunity to explore questions related to the intersections between migration, industry, and health during this time period.

## Migration and Industry

Westward expansion in the USA had a significant impact on the landscape during the nineteenth century that was driven by Manifest Destiny (Cheung 2002:48). In his prologue of *Manifest Destiny: American Expansion and the Empire of right*, Stephanson (1995: xi) states “It is nevertheless to this same O’Sullivan that we owe the phrase “manifest destiny,” which he coined in 1845 to signify the mission of the United States “to overspread the continent allotted by Providence for the free development of our yearly multiplying millions.” From 1800 to 1900, the land area of the USA increased from fewer than one million square miles (2,589,988 km<sup>2</sup>) to approximately three million square miles (7,769,964 km<sup>2</sup>), which led to considerable growth in the amount of productive land (Vandenbrouke 2008:81). This expansion also coincided with shifts in the geographic distribution of the population, as the proportion of the population living in the West increased from 7% in 1800 to approximately 60% in 1900 (Vandenbrouke 2008:81). These migrants, including many coming from other countries, were driven west in the hopes of achieving prosperity in the new industries and economies that were developing, as well as the opportunities to acquire land (Vandenbrouke 2008:81–82).

Migration to the West came with considerable risk. Traveling was dangerous and sometimes other groups of people, such as bandits, other settlers, or Indigenous peoples would attack travelers (Heilen et al. 2012). Derig (1951) discusses attacks by Indigenous peoples living in southern Idaho who were trying to protect their land from the immigrating settlers. Attacks on migrants were not always by Indigenous groups. The Mountain Meadows Massacre is an example where one settler group killed another group trying to settle in the region. In 1857, 120 migrants from Arkansas were murdered in Mountain Meadows, Utah Territory by militiamen who were fighting with the US Government during the “Utah War” (Bigler and Bagley 2011; Novak 2014:477). In addition to violence, harsh environmental conditions posed a risk to travelers. For example, the Donner Party was trapped by a snowstorm in the Sierra Nevada mountains for the winter in 1846 and struggled to survive (Dixon et al. 2010; Hardesty 1997; McGlashan 1966 [1879]). Once they arrived at their destinations, migrants also faced danger in their new communities as some of the towns in the West were lawless (e.g., Heilen et al. 2012:100; Staton 2018). Tucson, Arizona, for example, had a reputation for gun violence, although this may have been exaggerated to some degree. Even so, those living in isolated areas such as farms, mines, and

ranches, as well as those traveling on the roads outside Tucson were at risk for theft, raiding, kidnapping, and murder (Heilen et al. 2012:100).

Migrants, particularly those who were migrating for the first time, and those moving from rural areas were also more vulnerable to disease (Lee 1997:50). Transportation over long distances as well as contaminated resources and poor sanitation contributed to the spread of disease. Cholera was a problem during the nineteenth century and was spread through contaminated food and water (Heilen et al. 2012:110; Roth 1997). For example, immigration to California due to the gold rush in the mid-nineteenth century led to severe outbreaks of cholera in San Francisco and Sacramento (Roth 1997). Rushton (2005:137) describes the toll cholera took on Latter Day Saints migrating to Utah: “The Overland Trail, rather than the Mormon Trail, was used for 20 to 25% of the Saints who traveled west between 1849 and 1868. . . Though there were a number of reasons Latter-day Saint migrants used the Overland Trail instead of the Mormon Trail, one goal was to avoid cholera along the North Platte River.”

Strenuous physical work would have been a regular feature of life for many migrants in the West during the nineteenth and early twentieth centuries. Occupations included laborer, farmer, seamstress, domestic servant, carpenter, teamster, blacksmith, miner, brickmason, cook, homemaker, mule packer, and silversmith (Heilen et al. 2012:122–123). Other activities included constructing and maintaining homes, other buildings, and defensive structures, collecting wood and water, making tools, and processing food (Heilen et al. 2012:122).

Men’s occupations during this period also included soldiers, merchants, artisans, and many others (Blackburn and Ricards 1993; Davidson et al. 2002; Heilen et al. 2012; Novak, 2008). Men involved in the ranching industry would have spent significant time on horseback (Heilen et al. 2012: 122) and many of the occupations listed for men are labor intensive. In Owyhee County, Idaho, occupations were similarly diverse and often labor intensive with the most common being the mining industry (with a little over half of all males employed in this industry) and the army (Blackburn and Ricards 1993:35). In a letter to relatives in 1849, Jerusha Merrill (1998 [1849]:17), who migrated to San Francisco, California with her husband and three children during the early gold rush, describes the difficult labor associated with the mining industry: “Many of our acquaintance have been at the different diggings some have dug one hundred a day upon an average others less some have retired with disgust but let me tell you it is a good deal like work to dig gold those that have been hard labouring men say they have never worked as hard before.

Occupation also varied by ethnicity. For example, economic opportunities were severely limited for African Americans and Chinese individuals and most occupations available to them involved physical labor (Blackburn and Ricards 1993; Davidson et al., 2002).

Employment opportunities were more limited for women as well and, in general, were structured by race and class (Blackburn and Ricards 1993). Approximately half of women in Owyhee County listed occupations mostly related to domestic work but also as boardinghouse keepers and laundresses (Blackburn and Ricards 1993:33–34). Women in Tucson, Arizona would have been engaged in many domestic activities, such as grinding corn, preparing food, washing clothes, sewing, and raising children

(Heilen et al. 2012:122). These activities are also labor intensive and it appears that both men and women were equally expected to perform physically demanding work.

## Women in the West

Women were often unaccounted for in historical documentation of expansion into the American West (see, for example Brown 1981; Faragher and Stansell 1975; Jensen and Miller 1980; Riley 1988). Women were not absent from the industrial booms, and it is important to account for their roles and experiences. Bioarchaeological analyses of the remains of women from this era can assist in the reconstruction of the historic West in a more complete way that is often included in written records. Their lived experiences are “written” on their bodies and tell a story of how they interacted with this new territory.

Expansion westward into California and the Pacific Northwest served as the first opportunity for many women to explore new roles and identities in society. Beginning in the 1840s, families from all over the South, Midwest, and East Coast endeavored to find new homes and economic opportunities by traveling for months on the long and arduous trail westward from the Mississippi River toward the Pacific Coast. As the journey continued and became more difficult in new terrains, women took on more and more of the labor tasks typically done by men, all the while still tending to the more domestic and care tasks (Bledsoe 1984; Faragher and Stansell 1975). Their work was physically taxing and constant, leaving everyone perpetually exhausted. As Faragher and Stansell (1975:151) describe:

As this journey progressed, bare necessity became the determinant of most of each day's activities. The primary task of surviving and getting to the coast gradually suspended accustomed patterns of dividing work between women and men. All able-bodied adults worked all day in one way or another to keep the family moving. Women's work was no less indispensable than men's; indeed, as the summer wore on, the boundaries dividing the work of the sexes were threatened, blurred, and transgressed.

Beyond the basic labor needed to continue the movement westward, people on the trail encountered illness, injury, and death often (Bledsoe 1984; Carter 1995; Faragher and Stansell 1975; Olch 1985). Women, as the caretakers of children and husbands, would have been exposed to infectious disease frequently (Carter 1995). The Overland Trail was rampant with diseases like cholera, measles, and smallpox (Molen van Ee 2019). Women also would have been tending to broken bones, violence-related injuries, and trying to avoid starvation during the leanest times (Levy 1990). Additionally, women would have themselves been at risk for all of these ailments as well as complications from childbirth in remote areas with few to no resources (Carter 1995; Molen van Ee 2019; Olch 1985). Patricia Molen van Ee (2019) summarizes much of what women experienced while traveling westward: “Women ... experienced birth, miscarriages, and death; few females traveled outside of their family unit; there were hardships, deprivation, and continual exposure to extremes in tem-

perature and weather conditions; and the women were expected to cook, wash the clothing, nurse the sick, and carry and tend to their children.”

The numerous gold rushes across the West were another major motivator for migration. While the California Gold Rush is the most famous example, major finds of gold and silver deposits brought people to Owyhee County in Idaho (Debig 1951) and the Comstock Lode in northern Nevada (Bastin 1922), among other areas in the region. Men far outnumbered women as mining towns boomed across the region. Demographic records (Jensen and Miller 1980; Walsh 1995) and census records from Idaho and Nevada show variability in the sex ratios but women were always the minority. For example, there were 1,226 men for every 100 women in California in 1850 at the peak of the gold rush but there were still 149 men for every 100 women in 1880 (Walsh 1995). Men outnumbered women 5:1 in Nevada and 8:1 in Idaho in 1870 as the mining industry and overland trails continued to bring people west (Jensen and Miller 1980). The large lack of women in mining towns fostered an enormous opportunity for women to venture into entrepreneurship. Domestic skills such as cooking, laundering, and sewing were in very high demand and women could make large sums of money by offering these services to the local miner population, who was often male and single or living there without their wife (Hine and Mack Faragher 2000). Some women also found quick work as prostitutes or barmaids (MacKell 2004; Rutter 2005; Yamin and Seifert 2019).

Following the gold rushes, some mining towns died out, but others flourished with the expansion of the railroad and continued migration along the overland trail (Pierce 2016; Tuck 2018). Communities became more established with families and that also offered a new opportunity for women and children with the development of churches and schools (Debig 1951:81; Jensen and Miller 1980). Young, unmarried women often went west as teachers but only remained in those roles for a short time before inevitably marrying one of the numerous eligible bachelors. Their experiences as teachers would not have been as physically demanding as other jobs and their migration there helped to slowly balance the sex ratio (Walsh 1995).

The experiences of women from this time and region of America can vary in presentation skeletally and in their mortuary contexts. Women who died on the overland trails would presumably have been buried expediently near the trail. Thus, their graves may be forever lost. For those in mining camps and towns, death would have occurred more regularly and necessitated graveyards that have offered greater opportunities for future analysis and possibly better preservation of the remains.

Mining towns and associated industries would have exposed women to a wide range of morbidity risks. Those who opened up boarding houses and cooked encountered large crowds of different people all the time, leaving them susceptible to infectious disease given the influx of people passing through (Ballou 1977). Women working as laundresses needed physical strength in their arms as they scrubbed clothes by hand all day (Levy 1990). Women working as prostitutes would have been susceptible to both crowd diseases and sexually transmitted infections, plus violence because fights were quick to occur in these areas (MacKell Collins 2022). Finally, domestic violence was always a risk for women, but especially for those who made a lot of money in these roles because their husbands would often become jealous of their higher-level of success (Levy 1990).



## Bioarchaeological Approach

The goal of this research is to highlight how bioarchaeology can provide insight into the lives of women in the West in the late nineteenth and early twentieth centuries. We do this by examining biocultural identity through the creation of osteobiographies (Robb et al. 2019; Saul 1972). These biographies are constructed through examination of skeletal indicators of health and activity, which may or may not be supplemented with historical information, and reveal “a history of the body as a locus of appearance and social identity, work, health, and experience” (Robb et al. 2019:16). Robb et al. (2019:16) argue that osteobiographies offer more complete biographies than those based solely on texts and are less affected by bias related to gender and class. Our current examination of human skeletal remains, and past research with additional collaborators (e.g., Harrod and Tyler 2008; Harrod et al. 2008, 2013), focused on reconstructing each individual’s lived experience, which included observations about nutrition, pathological conditions, activity-related changes, and trauma (Table 1).

The first step of any analysis of human skeletal remains is to reconstruct the context within which the burials were located and the demographic profile of the sample. This generates a biological profile for each individual, which includes age-at-death and sex estimates using standard osteological techniques (i.e., Bass 2005; Buikstra and Ubelaker 1994; DiGangi and Moore 2012; White et al. 2011). Disease and illness can be identified by observing pathological alterations on bones. Some lesions, such as periosteal reactions (Buikstra 2019), indicate that an individual experienced inflammation that is nonspecific in nature. In other cases, the patterning of lesions can be used to diagnose the presence of specific conditions such as scurvy, syphilis, or tuberculosis. Physiological stress can be examined by measuring the growth and development of individuals and making comparisons with known standards of human growth (Steckel 1995; Vercellotti et al. 2011; Watts 2011). For example, disruptions in the formation of teeth, known as enamel hypoplasias, are frequently used to measure physiological stress during childhood and adolescence. Paired with other indicators of disease and growth stunting, enamel defects have been used to show how diet affects health during childhood and can impact lifelong wellness. Individuals who exhibit these dental defects generally have a decreased life expectancy and

**Table 1** Biocultural Identity

	Biocultural Identity
Nutrition and Health	<ul style="list-style-type: none"> <li>● Stature</li> <li>● Enamel hypoplasia</li> <li>● Porotic hyperostosis</li> <li>● Cribra orbitalia</li> <li>● Periosteal reactions</li> </ul>
Activity-Related Changes	<ul style="list-style-type: none"> <li>● Robusticity</li> <li>● Entheses or Musculoskeletal markers (MSMs)</li> </ul>
Trauma	<ul style="list-style-type: none"> <li>● Antemortem (non-lethal) trauma</li> <li>● Perimortem (lethal) trauma</li> <li>● Repeat trauma (injury recidivism)</li> </ul>

Modified from (Harrod et al. 2013:64; Harrod and Martin 2014:64)



are often more susceptible to future disruptions of their body's homeostasis (Armelagos et al. 2009; Goodman and Armelagos 1989).

In addition to these, other skeletal markers can aid in the development of an individual's biocultural identity (see Table 1). These include evidence of degenerative diseases like osteoarthritis, pathological conditions, traumatic injuries, and differences in the degree of development of enthesal (musculoskeletal) sites that commonly impact people, especially laborers. Analyses of degenerative joint disease, the collapse of vertebrae in the spine, or the buildup of abnormal bone at muscle attachment sites throughout the body can all shed light onto the biomechanical stresses faced by past people (Burt et al. 2013). The presence of certain pathological conditions or traumatic injuries can also be useful for identifying patterns of illness, nutritional stress, violence, and repeat exposure to injury, whether accidental or via occupational activities. When contextualized, data on differences in enthesal development can be used to understand how subsistence changes, economic shifts, or transformations in industry differentially impact subgroups within communities (Alioto 2020; Becker 2020; Karakostis and Harvati 2021; Karakostis and Hotz 2022). The importance of developing a biocultural identity for each individual in this study is that it can provide insight into their social status, indicators of dietary access and quality of that diet, and the ways that intersections between industry and environment during the late nineteenth century in the West impacted each person and how these experiences were written on their bodies.

### **Comparative Sites in the Western USA**

For this research, we examined three individuals from two sites in the western portion of the US because each location offers a unique glimpse into industry and lifestyle in this challenging world. These three individuals are women who had migrated to the West during industrial expansion and their osteobiographies shed light into their lives and experiences. The first analysis from North Las Vegas, Nevada, examines Euroamerican settlement, the development of the ranching industry, and disputes over land, which are an integral part of the Western narrative (Cortese 1976). From books like *The Virginian* to movies like *Shane*, *Chisum*, and *Open Range*, stories of range wars and feuding families have captured the imagination of audiences for decades. The second analysis of two burials from Walters Ferry, Idaho, explores the risks that people faced as they attempted to take part in the expansion of the West. In 1863, gold was discovered southwest of Boise, Idaho, in what would become Owyhee County, and Walters Ferry was the point where people crossed the Snake River as they traveled south from the Oregon Trail to Silver City, Idaho.

Following our analysis of these three women, we assess published data from four cemeteries in the western US for comparison with our own data. These cemeteries include the Alameda-Stone cemetery (Tucson, Arizona), Cedar Grove cemetery (southwest Arkansas), Freedman's cemetery (Dallas, Texas), and the Legion of Honor cemetery (San Francisco, California). All of these report skeletal data for both males and females, which allows for comparisons across sites. The addition of the osteobiographies will help contextualize the published data sets and demonstrate

the ways in which migration and industry were embodied by individuals during the western expansion.

## North Las Vegas

Though occupied by archaic hunter-gatherers for millennia, agriculture was not introduced to the Las Vegas, Nevada, area until the Basketmaker II period (approximately 300 BC – 400 CE) by the Virgin Ancestral Puebloan people, though agriculture was not ever intensified due to poor environmental conditions (Lyneis 1995). Historical Paiute populations continued to use the land until the western expansion of settlers (Kelly 1934). The first Euroamerican settlement in Las Vegas was a Mormon Fort established in 1855 near Las Vegas Creek to cater to travelers on the “Old Spanish Trail” and then the Mormon Trail (Myhrer et al. 1990) to support their conversion mission (Schoenwetter and Hohmann 1997). Their efforts included transformation of the local landscape into agricultural fields for a wide variety of grains, fruits, and vegetables. Further development of nearby lands into agricultural fields and cattle ranches continued into the 1860s and 1870s as the area became more desirable for northern and eastern groups (Schoenwetter and Hohmann 1997). Irrigation of these fields was instrumental in their success and contributed to the prosperity of ranch operations that raised cattle (Myhrer et al. 1990). During the 1870s and 1880s, ranching became more common as the region grew and nearby mining workers demanded food and supplies.

Kiel Ranch was one of the largest ranches in the Las Vegas Valley in the late 1800s. The property was sold by the Kiel descendants in 1901 following the tragic deaths of Edwin and William Kiel (Crandall et al. 2014; Crandall and Harrod 2014). It was then resold numerous times for the next 75 years; all the while portions of the land were transformed into industrial and residential lots. In 1975, the city of North Las Vegas purchased the remaining Kiel Ranch property in preparation for its Bicentennial celebration. Working with Richard and Sheilagh Brooks from the University of Nevada, Las Vegas, the burials of Conrad, Edwin, and William Kiel, along with Mary Latimer and an unidentified infant were exhumed at that time (Escobar 2005). Latimer, one of the focal individuals of our analysis, had been a dressmaker and family friend of the Kiels. She lived on the property and was buried there following her death in 1894 (Martin 1988).

Between 2011 and 2014, the human skeletal remains recovered from Kiel Ranch were reanalyzed with a focus on the violent deaths of brothers Edwin and William Kiel (Crandall et al. 2014; Crandall and Harrod 2014). For this current project, we have shifted our focus away from the men and violence to explore the life of Mary Latimer, the only woman recovered from the site. Osteological data from Mary’s remains collected by Anderson in 2016 was used to create an osteobiography to better understand her life experiences. In prior publications, Mary is often just a footnote (Crandall et al. 2014; Crandall and Harrod 2014). Historical records on Ancestry.com (and the old database RootsWeb they acquired) and other family history resources have helped us discover more about her life’s experiences.

## Osteobiography of Mary Latimer

Mary Latimer.

Age: 60+.

Sex: Female.

Height: 5ft 4in – 5ft 8in (164.74–172.18 cm).

Historical documents provide some insight into the life of Mary Jeanette Latimer which, when combined with the osteological data, allow us to construct an osteobiography. Mary Latimer was born in 1827 in New York. She married William A. Latimer, who worked as an engineer and a laborer, and had four children. Migration was an important feature of Mary's life and she had moved out west by the 1850s and was employed in both California and Nevada. For example, in 1870 her occupation was listed as a dressmaker in San Francisco and by 1880 she had moved to Pioche, Nevada, in Lincoln County, where she is listed as the head of household in the Pioche Mining Camp census (Fitch 2015). Mary was a friend of the Kiel family and she lived on the ranch with them for several years. The Kiels were involved in the ranching and agricultural industries, as evident by the contents of Edwin Kiel's estate at the time of his death in 1900. This included one horse, ten cattle, farm equipment, 50 ac [20 ha] of agricultural land, and 190 ac [77 ha] of undeveloped desert land (Townley 1974:11–13).

The human skeletal remains of Mary Latimer, which were housed at the University of Nevada, Las Vegas, until 2019 and since reburied, were analyzed by Anderson using standard osteological methods of estimating age-at-death, biological sex, and stature or height (Buikstra and Ubelaker 1994; Trotter and Gleser 1958; White et al. 2011). Dental information including caries and linear enamel hypoplasia (LEH), the presence or absence of traumatic injuries, pathological conditions including cribra orbitalia, osteoarthritis, and porotic hyperostosis, as well as enthesal changes on the long bones were recorded.

Age-at-death was based on the pubic symphysis (Brooks and Suchey 1990) and the auricular surface (Lovejoy et al. 1985). The age ranges reported here are large due to the degree of variability between individuals, particularly at older ages (White et al. 2011). Mary Latimer's pubic symphysis was scored as phase 6, which has a mean age of 60 years and a range between 42 and 87 years (Brooks and Suchey, 1990; White et al. 2011:399). The auricular surface was scored phase 8 because the surface was irregular and there was microporosity (Lovejoy et al. 1985). The age estimates generated from these two methods are consistent with the known age at death for Mary Latimer, who would have been 68 or 69 years of age when she died.

Biological sex was estimated using the cranium (Walker 2008) and pelvis (Phenice 1969). However, historical records indicate that Mary Latimer was the only female buried at the site, so identification of sex was mostly to confirm her identity. Both the skull and the pelvis were scored as female.

Dental, traumatic, and pathological conditions associated with Mary included five carious lesions, periodontal disease, an abscess associated with the upper right second molar, but no linear enamel hypoplasias. She had lost many teeth antemortem (before death), and only 14 remained. This may be influenced by diet, for example one rich in sugar and carbohydrates, which affect acid production by cariogenic bac-

teria (Featherstone 2008), and limited access to dental care. Mary had one healed fracture on her right clavicle, but it is unknown when she sustained this injury or what caused it. She also had atypical curvature of the sacrum and a curved left fibula compared to the right side, but the causes of these are not clear. In terms of pathological conditions, Mary had osteoarthritis in multiple areas of her body. She had lipping on multiple vertebrae including eburnation on the facet for the dens on the first cervical. There was also lipping on the left and right femoral condyles, the left and right glenoid fossa of the scapula, the left and right processes of the ulna, and the left and right patella. The patellae have severe lipping, osteophytes, and slight eburnation. The presence of osteoarthritis may be a feature of her advanced age and therefore it is not possible to make inferences about activity based on these stress markers.

Most of the enthesal changes were slight to moderate with the exception of a few moderate to severe attachment sites, but attachment sites become more robust with age (Cardoso and Henderson 2010). Because of this, as with the evidence for osteoarthritis, it is not really possible to draw inferences about activity patterns based on these data because they may be more influenced by her age than any occupational activities in which she participated. However, when the evidence for severe arthritis, located in multiple areas of her body, is considered along with the evidence for a healed fracture and extensive dental pathology, it may provide some insight into her life and living conditions. We know that migration to the West was a major feature of her life, where she was employed as a seamstress, and she eventually ended up as a single woman living on a ranch in Nevada (Fitch 2015).

### **Walters Ferry**

Located southwest of modern-day Boise, Idaho, was the town of Silver City, an important community in the region following the discovery of gold in 1863. Silver City had many advantages compared to other communities, including ample space, a reliable water supply, and close proximity to mines rich in resources. The city's location was not always pleasant, however, as it is at an elevation of 6,000 ft [1,829 m] and affected by cold, snowy winters. Because of its remote location, wagon trains had to traverse difficult mountain terrain to transport supplies and export ores from the local mines. This transportation was expensive and burdensome for those living in the area (Blackburn and Ricards 1993:21).

Despite the challenges of living in Silver City, there were many economic opportunities available to those in the region. Prospectors found gold and silver ores that were assayed at high values and, by 1871, the three main mines in the area employed almost 400 miners and produced more than \$1 million in bullion per year. In addition to mining, Silver City had a diverse array of social institutions. These included churches, schools, a newspaper, an opera house, a sheriff's office, fraternal societies such as the Masons, a joss house for Chinese community members, and a Fernian society for Irish residents (Blackburn and Ricards 1993:22–23).

Walters Ferry is located in southern Idaho where Canyon and Owyhee counties are separated by the Snake River (Boise State University Center for Idaho History and Politics n.d.). It was one of many ferryboats operating along the Snake River and had an important role in Owyhee County's history. One of the reasons that it was

well known in the region is that it was located on the most direct route between the Boise Basin and the Owyhee mining camps, continuing on to Nevada and California. Originally established by John Fruit in 1863 and later called Walters Ferry Bridge, the crossing was a “toll road” from the Owyhee mountains and gold mining camps in Silver City to Boise and the Oregon Trail (Sparling 1974:17–18). The Fruit’s Ferry, initially comprising logs and ropes, was rowed across the river using oars (Huntley 1979). In total the ferry operated for 58 years, from 1863 to 1921 (Huntley 1979; Jones 1982).

In June 2006, two historic-period burials were discovered near Walters Ferry, located at the base of a sand dune on the northeastern side of the Snake River (Harrod et al. 2008). These burials were exposed by erosion and an active sand mining operation at the site. The original find included scattered skeletal remains, which led to an investigation by the Archaeological Survey of Idaho and the Canyon County Sheriff’s Office that was headed by State Archaeologist Ken Reid. This resulted in the excavation and recovery of two historical burials interred in wooden coffins. The remains of these individuals have varying levels of completeness with one individual (Individual A) being much more complete than the other (Individual B). The burial position of Individual A was extended and supine with the head facing toward the east. Artifacts found associated with the remains were mainly clothing related items as well as the remains of the coffins themselves (Harrod et al. 2008). Additionally, a newspaper clipping dating to December 21, 1888, provides an approximate time period for which the burials were likely interred (Harrod and Tyler 2008). Other than the approximate date, there is no information that provides clues about their identities and their causes of death are unknown.

Several skeletal analyses have been conducted on these two individuals since their discovery in 2006 (see Blatt et al. 2017; Drahold-Cross et al. 2010; Harrod et al. 2008). The results of these analyses agree that both individuals have an age-at-death of over 30 years and are likely of European ancestry. One area of disagreement has been the estimated sex of Individual A, with some studies concluding that this individual is a male (Drahold-Cross et al. 2010) while others argue that this individual is female (Blatt et al. 2017; Harrod et al. 2008). Blatt and colleagues (2017) and Harrod and colleagues (2008) both noted that the pelvis morphology and metric measures of other skeletal remains were indicative of female, and that the some of the associated grave goods were more likely to be worn by a woman, especially the boots. According to Blatt and colleagues (2017:11, fig. 9), “leather mid-calf boots. : 22.5 cm in length, equivalent to a U.S. size six boot. : were first thought to be men’s, but the

**Fig. 2** Boot from Walter’s Ferry Burial A. Photo taken by Jared Norman, permission granted



soles of both were decorated with inclusions or small tacks made of oxidized copper and an unidentified white material in a floral-like pattern suggestive of Victorian femininity.” The patterning on the boot was also noted by Harrod and colleagues (2008) and they provided a color photograph (Fig. 2). Women wearing boots and more clothing traditionally associated with men is not uncommon in Western communities, including the nearby mining community of Silver City, Idaho.

Scots-Irish immigrant Jean Bruce “Jeannie” Heazle cut timber, mined, and operated a dairy and cattle ranch on par with her male relatives. At her homestead in DeLamar on Louse Creek, Jean kept her hair cut short and dressed in men’s Levis, denim shirts, and boots for the job of felling timber to sell as mine supports (Snodgrass 2015:73).

## Osteobiography of Individual A

Individual A.

Age: 30+ years.

Sex: Probable female.

Height: 5ft 4in – 5ft 7in (162.56–170.18 cm) from Blatt and colleagues (2017:10).

The name and identity of Individual A is unknown but they likely died along the Boise-San Francisco Stage Route during the winter of 1888 (Blatt et al. 2017). Inferences about their lived experiences and activities are based upon skeletal evidence as well as their location on a major route for migration, trade, and industry in the West. The analysis will focus on the skeletal evidence due to the lack of historical records for this individual.

The human skeletal remains of Individual A, which are under the care of the Idaho State Historic Preservation Office, were examined by Harrod in 2008 and reanalyzed by Anderson in 2018 using standard osteological methods of estimating age-at-death and biological sex (Bass 2005; Buikstra and Ubelaker 1994; White et al. 2011). The results of the most recent reanalysis by Anderson are presented here and include presence or absence of traumatic injuries, pathological conditions including osteoarthritis, and enthesal changes on the long bones. There are no cranial or dental remains clearly associated with this individual so the morphology of the skull and teeth could not be observed.

Age-at-death was based on the pubic symphysis (Brooks and Suchey 1990) and the auricular surface (Lovejoy et al. 1985). The pubic symphysis was scored as phase 4 (Brooks and Suchey 1990), which has a mean age of 38.2 yr with a range of 26–70 yr (White et al. 2011:399). The auricular surface was scored phase 5 (mean age of 48.1 yr) (Lovejoy et al. 1985) but the presence of lacquer made scoring this feature difficult.

Additionally, sex estimation was performed utilizing updated methodologies for a revised visual method (Kenyhercz et al. 2017; Klales et al. 2012) and FORDISC 3.1 discriminant function analysis (Ousley and Jantz 2005) in an attempt to resolve whether this individual is male or female. One factor that complicates the ability to estimate sex for this individual is asymmetry in the features of the pelvis, with the left os coxa displaying a female morphology while the right appears intermediate. Utilizing, Kenyhercz and colleagues’ (2017) and Klales and colleagues’ (2012) method-



ologies to calculate probabilities, the results suggest that Individual A is more likely to be female than male (probability female for the left os coxa=76.34%, probability female for the right os coxa=42.00%) (Kohler et al. 2022).

The postcranial long bones typically used for stature estimation were too damaged to measure maximum length at the time of the analysis, so stature estimation was not attempted by Anderson. Blatt and colleagues (2017:6) provide a stature estimate of 162.56-170.18 cm (5ft 4in – 5ft 7in) based on a combination of methods.

In addition to information about the biological profile of this individual, pathological conditions were also noted and were in agreement with several previous studies. These included ossified cartilage on the sternal end of one of Individual A's ribs (Blatt et al. 2017; Drahold-Cross et al. 2010), which Blatt et al. (2017:7) argue may indicate healed trauma, and Schmorl's nodes on the thoracic and lumbar vertebrae (Blatt et al. 2017; Drahold-Cross et al. 2010). The Schmorl's nodes may indicate physical stress or strenuous activity (Blatt et al. 2017; Drahold-Cross et al. 2010). It is possible that these may be related to occupational activities performed by this individual, although the ossified cartilage could be age related, but without additional information it is difficult to specify what kinds of activities were performed.

Analysis of enthesal markers for this individual was performed following Cardoso and Henderson (2010) in order to investigate activity patterns. Individual A had mild to moderate enthesal scores and was somewhat more robust with more development for some enthesal markers compared to Individual B but still did not display any extreme examples of enthesal development. Overall, there is very little enthesal data available for this site, which makes comparisons difficult. This also limits the ability to make inferences about activity patterns and behaviors at this time.

## Osteobiography of Individual B

Individual B.

Age: 18+ years.

Sex: Female.

Height: 5ft 0in – 5ft 4in (154.94–162.56 cm) from Blatt and colleagues (2017:10).

Similar to Individual A, the identity of Individual B is unknown. They likely also died during the winter of 1888 while traveling on the Oregon trail. Because of the lack of historical records, the focus for this analysis is on skeletal evidence. While the reasons why Individual B was traveling on this road are unclear, many people who took this route were either traveling to or from Nevada and California or involved in local industries in Boise or Owyhee based on personal communication with local historians that know the Walters Ferry crossing.

The human skeletal remains of Individual B, which are under the care of the Idaho State Historic Preservation Office, were analyzed by Harrod in 2008 and reanalyzed by Anderson in 2018 using standard osteological methods of estimating age-at-death and biological sex (Bass 2005; Buikstra and Ubelaker 1994; White et al. 2011). The results of the recent reanalysis by Anderson are presented here, which recorded the presence or absence of traumatic injuries, pathological conditions including osteoarthritis, and enthesal changes on the long bones. This individual is less than 50% complete, with only a partial right arm, both legs, and both feet available for analysis.



There are no cranial or dental remains clearly associated with this individual so the morphology of the skull and teeth could not be observed.

Age-at-death estimation was difficult as the skull and areas of the pelvis examined for this, such as the pubic symphysis and auricular surface, are absent for this individual. All observable epiphyses are fused and osteophytes are evident on some of the remains (see Blatt et al. 2017 and discussion below). This individual is over the age of 18 years and potentially over the age of 30 years, as suggested by Blatt and colleagues (2017).

Estimation of sex for Individual B was based on measurements of postcranial remains, following Bass (2005), as the skull and nearly all of the pelvis is absent. Measurements indicate that this individual is quite gracile and consistent with a female sex.

Due to poor preservation and postmortem damage to the bones, stature estimation was not attempted by Anderson because a maximum length measurement could not be obtained for any of the long bones. Blatt and colleagues (2017:6) provide a stature estimate of 154.94–162.56 cm (5ft 1in – 5'7]ft 4in) based on tibial length.

Individual B had even more pathological conditions than Individual A, including either a fracture or an infection on the right femur (Blatt et al. 2017; Drahold-Cross et al. 2010; Harrod et al. 2008), lytic lesions and osteophytes on both feet, and fusion of intermediate and distal phalanges on one of the left toes (Blatt et al. 2017; Drahold-Cross et al. 2010). The combination of these foot pathological conditions led Blatt and colleagues (2017) to suggest that Individual B was very active and may have also sustained an injury to her foot at some point, although there are other potential explanations for fusion of the phalanges. In addition to the pathological conditions present on the feet, the pathological condition on the right femur demonstrates that this individual sustained a very serious injury. In contrast to the pathology data regarding the feet and leg, examination of enthesal development (following Cardoso and Henderson 2010) showed that Individual B was quite gracile with very little development at the muscle attachment sites examined. So, it is possible that whatever activities this individual performed in their daily life, they may have involved certain areas of the body more (such as the lower limbs) compared to others (such as the arms).

## Comparative Samples

In order to explore the ways that migration and industry impacted health during the mid to late nineteenth and early twentieth centuries, published health data from four well-documented historic Western cemeteries are examined: Alameda-Stone cemetery, Cedar Grove cemetery, Freedman's cemetery, and Legion of Honor cemetery. These four sites were chosen as they report the types of health indicators of interest for this research and report frequencies for each sex category. These indicators include: (1) living stature (height), (2) porotic hyperostosis, which can be caused by a variety of conditions including anemia and respiratory infections (Buikstra 2019; O'Donnell et al. 2020; Oxenham and Cavill 2010), (3) cribra orbitalia, which can also result from anemia, respiratory illnesses, and other causes (Buikstra 2019; O'Donnell et al. 2020; Oxenham and Cavill 2010), (4) periosteal reactions, nonspecific stress markers that may indicate disease or trauma (Buikstra 2019), and (5) trauma. These

stress indicators all reflect some form of pathology or injury and can provide insight into the relative risks of disease and nutritional stress related to sex, location, and occupation in these samples. These comparative samples also have detailed information that has been recorded regarding who was buried in the cemetery and what types of industries they may have been involved in. These samples are diverse and represent people of different backgrounds and circumstances. The published data from these four cemeteries is used for comparisons of female health in the West and to assist in the interpretation of the case studies from North Las Vegas, Nevada, and Walters Ferry, Idaho. Unfortunately, it was not possible to include all indicators of stress and activity due to differences in how those data were reported. Osteoarthritis, for example, could not be compared across samples as some authors reported prevalence by individual while others reported prevalence by area of the body. IBM SPSS Statistics was used to run Pearson's Chi-square tests comparing frequencies of pathological conditions by sex, and by cemetery. When sample sizes were below 40 or expected counts were less than 5, a Fisher's exact test was used.

The Alameda-Stone cemetery, located in Tucson, Arizona, dates approximately 1860–80. The cemetery originally contained the burials of 1,800–2,100 individuals, most of whom were buried in the civilian section between the 1850s and 1875. Additionally, approximately 100 individuals were interred between 1862 and 1881 in the military section of the cemetery (Heilen and Sewell 2012:73). While not all of those originally buried in the cemetery were available for examination, the skeletal analysis reported by Heilen and colleagues (2012) includes 1,386 individuals representing female and male adults as well as juveniles. The individuals buried in this cemetery were diverse and came from a variety of cultural backgrounds. Many of them came from the Tucson area while others had migrated from locations including Canada, the Caribbean, Europe, Mexico, the Middle East, South America, and other parts of the United States. These individuals would have worked in a variety of industries as domestic workers, seamstresses, laundry workers, miners, farmers, laborers, ranchers, merchants, craftsmen, and soldiers (Heilen and Sewell 2012:100).

Located in southwest Arkansas, the Cedar Grove cemetery is a rural burial ground associated with the Cedar Grove Baptist Church that was in use from 1881 to 1927. In 1982, a portion of the cemetery (about 28%) was relocated and during that process skeletal analysis was performed. A total of 80 individuals were examined and they likely date to approximately 1900–15. This includes 21 females and 15 males, all of whom are African-American (Davidson et al. 2002). The economy in this area during the beginning of the twentieth century was primarily based on sharecropping, so the people buried in this cemetery were likely involved in the agricultural industry (Davidson et al. 2002; Rose 1985).

Freedman's cemetery is a historic African-American cemetery located in Dallas, Texas. In use from 1869 to 1907, this was the primary burial location for almost all of the African-American individuals living in Dallas and it was the only public cemetery available to this community in the area until 1902. Because of this, the individuals interred at this site reflect a variety of economic backgrounds, including economically disadvantaged individuals as well as those who were wealthy. The individuals buried in this cemetery in the earlier period (1869–84) were likely involved in the agricultural industry, similar to those in Cedar Grove cemetery. However, in

**Table 2** Stature data

Cemetery	Females ( <i>n</i> )	Female Stature (cm)	Males ( <i>n</i> )	Male Stature (cm)
Legion of Honor	20	161.36	45	170.97
Freedman's	84	159.30	98	171.10
Cedar Grove	19	162.80	14	177.80
Alameda-Stone		156.20		167.33

Published data on stature from Buzon et al. 2005; Davidson et al. 2002; Heilen et al. 2012

**Table 3** Pathology data

Cemetery	Legion of Honor % ( <i>n</i> )		Cedar Grove % ( <i>n</i> )		Freedman's % ( <i>n</i> )		Alameda-Stone% ( <i>n</i> )	
	F	M	F	M	F	M	F	M
PH	5 (1/20)	1.9 (1/52)	23.8 (5/21)	35.7 (5/14)	9.6 (21/219)	4.1 (9/221)	1.72 (3/174)	3.37 (8/237)
CO	0 (0/20)	10.2 (5/49)	4.8 (1/21)	21.4 (3/14)	9.6 (9/94)	9.0 (10/111)	3.43 (5/145)	4.12 (8/194)
LEH	60 (9/15)	46.3 (19/41)	---	---	---	---	22.4 (37/165)	26.9 (61/227)
PR	22.7 (5/22)	20.4 (10/49)	45.0 (9/20)	66.7 (10/15)	50.5 (108/214)	52.3 (126/241)	40.0** (44/111)	60.0** (67/111)
Caries	45 (9/20)	41.8 (23/55)	85.7 (18/21)	80.0 (12/15)	83.2 (223/268)	81.3 (226/278)	---	---
Trauma	37.5 (9/24)	39.3 (22/56)	---	---	42.1*	19.8*	30.7*	54.6*

Prevalence of pathological conditions by sex. Pathological data collected includes porotic hyperostosis (PH), cribra orbitalia (CO), linear enamel hypoplasia (LEH), periosteal reactions (PR), dental caries and trauma. Published data from Buzon et al. 2005; Davidson et al. 2002; Heilen et al. 2012; Leher et al. 2010; Lincoln-Babb and McClellan 2010

\* - reported as a percentage but the number of individuals is not provided

\*\* = reported as percent of all individuals with periosteal reactions not the percent of all observable individuals so not directly comparable to the numbers reported at the other sites. The difference between the sexes at Alameda-Stone is statistically significant (Leher et al. 2010:514)

the middle and later periods (1885–1907), most of the individuals buried here likely would have worked as domestic workers and laborers. In all of the periods of use, many of those interred in Freedman's cemetery were likely employed in occupations that included physical labor as this was a common element of employment options for African-Americans during this time period (Davidson et al. 2002). The skeletal data from this site are reported by Davidson and colleagues (2002) who examined a total of 1,157 individuals. This includes 278 females and 288 males.

The final cemetery included in this analysis, the Legion of Honor cemetery, is located in San Francisco, California. This cemetery dates to approximately 1868–1906 and contains individuals who were poor. Records suggest around 18,000 people were originally buried in the cemetery (formerly known as the Golden Gate cemetery) and included paupers, victims of smallpox, and people of Chinese ancestry (Buzon et al. 2005). The skeletal sample reported by Buzon and colleagues (2005) includes 90 individuals, many of whom were working-class people of European ancestry. Female ( $n=24$ ) and male ( $n=56$ ) adults comprise the skeletal sample, which does not contain any juveniles (Buzon et al. 2005).

**Table 4** Comparisons between sites

Cemetery	PH	CO	LEH	PR	Caries
LOH/CG	0.184	1.00	---	0.192	0.009
LOH/FM	0.704	0.356	---	0.014	<0.001
LOH/AS	0.355	1.00	0.003	---	---
CG/FM	0.060	0.686	---	0.816	1.00
CG/AS	<0.001	0.562	---	---	---
FM/AS	0.001	0.049	---	---	---

P-values for comparisons of pathological indicators for females between sites

**Table 5** Comparisons within sites

Cemetery	Legion of Honor	Cedar Grove	Freedman's	Alameda-Stone
PH	0.481	0.474	0.022	0.368
CO	0.311	0.279	0.889	0.749
LEH	0.311	---	---	0.315
PR	1.000	0.306	0.699	Significant*
Caries	1.000	0.677	0.559	---
Trauma	1.000	---	---	---

P-values for comparisons of pathological indicators between males and females at each site

\* See Leher et al. 2010

When comparing the stature and pathology data (Tables 2, 3, 4, 5), both within sites and between sites, some interesting patterns emerge. First, comparisons of females between sites (see Table 4) shows that there are considerable differences in the frequencies for some pathological conditions. For example, the prevalence of porotic hyperostosis is 1.72% at the Alameda-Stone cemetery (Leher et al. 2010) but at Cedar Grove cemetery it is 23.8% (Davidson et al. 2002:250) and the statistical analysis shows that this association is significant ( $p < .001$ ). Rates of linear enamel hypoplasias also varied with 60% (Buzon et al. 2005:5) of the female sample from the Legion of Honor cemetery displaying one or more LEH while only 22.4% (Lincoln-Babb and McClelland 2012:661) of females at Alameda-Stone had this condition and this was also significant ( $p = .003$ ). Other signatures of health tended to be somewhat more consistent, however. For example, while there were differences in average female stature between sites, these differences were not that substantial. Average female stature ranged from 156.2–162.8 cm (5ft 1in – 5ft 3in) across the four sites (see Table 2), with only about a 5.1cm (2-in) difference between the site with the highest average stature and that with the lowest average stature. The differences between sites may be explained by population variation or may reflect different living conditions and associated stressors affecting their skeletal signatures of health. Unfortunately, it was not possible to perform statistical analyses on the stature data given limitations in how the published sources reported this information.

In contrast to the considerable differences in biological stress markers between sites, within site comparisons between males and females showed much more consistency for the most part (see Table 5), with only two examples of a significant association between sex and a pathological condition. For example, rates of porotic hyperostosis were generally similar for males and females buried in the same cem-

etry, except for at Freedman's cemetery where there was a significant association between sex and prevalence of PH ( $p = .022$ ). Rates of dental caries, cribra orbitalia, and linear enamel hypoplasia were not significantly associated with sex at any of the sites for which these data were reported. The only other example of a significant association between sex and pathology is at Alameda-Stone, where Leher and colleagues (2010) state that there was a significant difference in prevalence of periosteal reactions, but they do not report the p-value and we were unable to perform statistical analyses due to limitations in how the data was reported. At the other sites there was no significant association between sex and periosteal reactions.

Trauma data, which tended to be more difficult to compare due to differences in how the data were reported between studies, showed within site variability in some locations but not others. For example, at the Legion of Honor cemetery rates are very similar for males and females but at the Freedman's cemetery prevalence of trauma was higher for females compared to males, although this could not be tested statistically as the sample sizes were not reported. In contrast, trauma prevalence was higher for males at Alameda-Stone cemetery and also higher for males at Cedar Grove in all areas of the body except the arms with females having higher rates of arm injuries (Davidson et al. 2002). Trauma data for Cedar Grove is not included in Table 3 as it was reported by area of the body and not by individual. These sites also did not report the sample numbers so statistical analyses were not possible. Overall, the general trend suggests that, when located at the same site, females and males often experienced similar risks of disease and trauma. This is important to consider then when making inferences about health during the western expansion period. However, it appears that different communities of migrants, who may have had differences in living and working conditions, experienced different risks that shaped their lives and bodies, regardless of biological sex. Examples of this might include the relatively high prevalence of PH at Cedar Grove and the increased rates of LEH at Legion of Honor. While it is not possible to determine whether these differences occurred prior, during, and/or after migrating west, these differences suggest variation in exposure to stress and how that variation was embodied.

## Discussion

When we consider these three osteobiographies together, we see trends emerge that illustrate the ways in which industry, occupation, and identity shaped the health outcomes of these individuals. These complement the skeletal data reported for the comparative cemetery samples and illustrate that life was difficult for all who ventured into new landscapes, attempted to find success in work alongside developing industries, and took on new identities in western territories. The osteobiographies also allow us to look more closely at the women from Kiel Ranch and Walters Ferry to explore their individual lived experiences.

Agricultural and ranch life in the Las Vegas Creek Valley during the late 1800s would have been difficult given the level of transformation needed to modify the desert landscape into land that could support crops and herds of cattle. The body of Mary Latimer offers a glimpse into the lived experiences of early expansion into

southern Nevada. The Las Vegas Creek Valley presented opportunities for new but difficult lives in the late 1800s. Through musculoskeletal stress, arthritis, tooth loss, and accidental injury, Mary Latimer's body showed that life required hard physical labor in an unforgiving landscape.

When examining Walters Ferry, we also see signs of the difficult landscape of the West on the bodies of Individuals A and B. The evidence for this primarily comes from pathological data, with both individuals displaying pathological conditions that may be consistent with high levels of physical activity. Additionally, there may be evidence for healed trauma on at least one, if not both, of them. While less is known about the lives of the individuals from Walters Ferry compared to Mary Latimer at Kiel Ranch, their location along the Boise-San Francisco Stage Route and traveling through difficult terrain would have potentially exposed them to harsh conditions. Whether or not they lived or spent time in one of the remote mining towns is not known but both of these individuals participated in some form of physical labor throughout their lifetimes.

The pathological conditions present on the bodies of these three women were not unusual for individuals living in the West during the late nineteenth and early twentieth centuries. As the comparative data from the sample cemeteries show, dental pathology and nonspecific stress indicators were common for both men and women. The presence of high rates of trauma in the Legion of Honor, Freedman's, and Alameda-Stone cemetery samples demonstrate high risk in daily or occasional circumstances. All four of the cemetery samples had moderate to high rates of periosteal reactions as well. These skeletal lesions can result from injuries, but it is quite likely that poor sanitary conditions in early Western communities contributed to exposure to bacteria, parasites, and other pathogens. Finally, each cemetery sample demonstrated high frequencies of dental caries which is consistent with a lack of dental or health care professionals in new areas. Mary Latimer was similarly affected by carious lesions, as she had several, in addition to antemortem tooth loss, periodontal disease, and an abscess. There were no cranial or dental remains discovered for the individuals from Walters Ferry, so it is unknown if these two individuals had similar rates of carious lesions.

The Walters Ferry and North Las Vegas individuals align closely with the patterns of skeletal lesions and defects observed on the cemetery samples. For women, in particular, new territories and industries opened up a world of new opportunities for work that resulted in morbidity risk that was written on their bodies. Historical literature provides evidence for equal exposure to hardships for both women and men (Moynihan et al. 1998:xii), which is evident from the skeletal data from the four comparative cemeteries. These records also document the independence, strength, and bravery of women living in the West, as well as their failures and misfortunes. Disease, accidents, and unassisted childbirth were all dangers associated with these lifestyles and occupations. Contrary to ideas about women being dependent on men, women were often wage earners in addition to their many household and community contributions (Moynihan et al. 1998:xii-xvii), and participated in physically demanding labor, which is also reflected in the skeletal data. Though their ages spanned many decades, each of the women

from our osteobiographies tells a story of similar hardships in newly developing regions of the Western US.

## Conclusions

Our work demonstrates that bioarchaeology can offer a glimpse into the lives of some of the people who lived or traveled near North Las Vegas and Walters Ferry. Skeletal analysis reveals that life in the Western US was difficult at times and that the individuals in these very diverse communities experienced a life that was challenging and sometimes dangerous. Their bones reflect the daily and accumulated stresses of their lives. We, thus, provide insight into the ways that the expansion of industry led to new experiences, hardships, and adaptations in challenging physical and social environments. Each body reveals a story about the pursuit of the American Dream reflected in skeletal changes related to settling in new landscapes where agriculture, mining, railroad labor, and ranching were booming new industries. Bioarchaeology is uniquely situated to offer a more holistic understanding of the complicated lives of people in the past that no western myths, popular literature, or movies can portray. Through the integration of human skeletal data, archaeological context, and historical written sources, these three osteobiographies help to form a more complete picture of the multifaceted experiences for women in the late nineteenth century in Nevada and Idaho.

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## Declarations

**Conflict of interest** The authors have no conflicts of interest to declare.

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