– ARTICLE –

Life, Death and Care on the Otago Goldfields: A Preliminary Glimpse

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ABSTRACT

In 2017 two unmarked historic burials were disturbed in the Cromwell Cemetery, Central Otago, and the authors were engaged to assess, excavate and reinter these burials. Both were of adult males, probably buried in the 1890s. Both were simply buried, and showed evidence of past injuries and heavy manual labour. This paper considers the bioarchaeological and cultural (biocultural) context of these two burials, and raises the concept of the 'bioarchaeology of care' in the New Zealand goldfields. This concept is one that has been explored in prehistoric human populations elsewhere, but has not been applied in a New Zealand historical context before.

Keywords: bioarchaeology, biocultural, goldfields, bioarchaeology of care.

INTRODUCTION

Life on the nineteenth century New World goldfields was tough; this is well documented in both academic and popular literature and has been graphically illustrated in popular media (such as the 'Deadwood' television series). The material culture and technology of the Central Otago goldfields has been extensively studied (eg Petchey 2014; Ritchie 1993; Salmon 1963), and aspects of health and wellbeing have been considered from historical perspectives, such as the typhoid outbreak in Alexandra in 1909 (McCraw 2002:190–197; Ramage 1990:109–112), but until recently the only archaeological investigation that considers the health of the goldminers had been limited to a small excavation at the St. Bathans cottage hospital site (Garland 2012; Smith & Garland 2012). As such, there has been little opportunity to directly study the people who were present in the goldfields and apply modern bioarchaeological research to their remains, but two recent investigations have begun to fill this gap: in October 2017 the opportunity arose to study two individuals who had died in 1890s Cromwell when their graves were accidentally disturbed in the Cromwell Cemetery (Figures 1 & 2), and in April 2018 archaeological excavations in Lawrence, Otago, recovered the remains of 11 individuals (Petchey *et al* 2018). This paper discusses the two Cromwell individuals, and compares them to the Lawrence individuals and to a contemporary rural sample from St. John's Cemetery in Milton, Otago (Petchey *et al* 2017).

The two Cromwell burials were accidentally disturbed by tree clearance at the cemetery in April 2017, and the authors were requested to assess the damaged graves and manage the reinterment of the human remains. While the primary objective of the exercise was to locate the original graves and respectfully reinter the disturbed remains, the secondary objective was to consider the identity and ethnicity of these two individuals, as the location of these graves had been previously unrecognised and it was not known whether they were European, Chinese or Maori (all of whom were participants in the nineteenth century goldfields). This paper describes the two burials, and considers the funerary treatment, material culture and bioarchaeology of the individuals in order to build up a picture of these two men (both were male) and their lived experiences. This evidence is then considered within a wider context, in particular regarding the bioarchaeology of care model which considers the bioarchaeological evidence that past individuals received care from the wider community during periods that they were incapacitated.

The excavation work was commissioned by the Central Otago District Council (CODC) which owns and operates the Cromwell Cemetery, and who gave permission for the results of the study to be published here. The burials were fully exposed in October 2017 by Peter Petchey, Hallie Buckley and Rachel Scott under Archaeological Authority No. 2018/165 issued by Heritage New Zealand (HNZ), and Disinterment Licence No. 54–2016/17 issued by the Ministry of Health.

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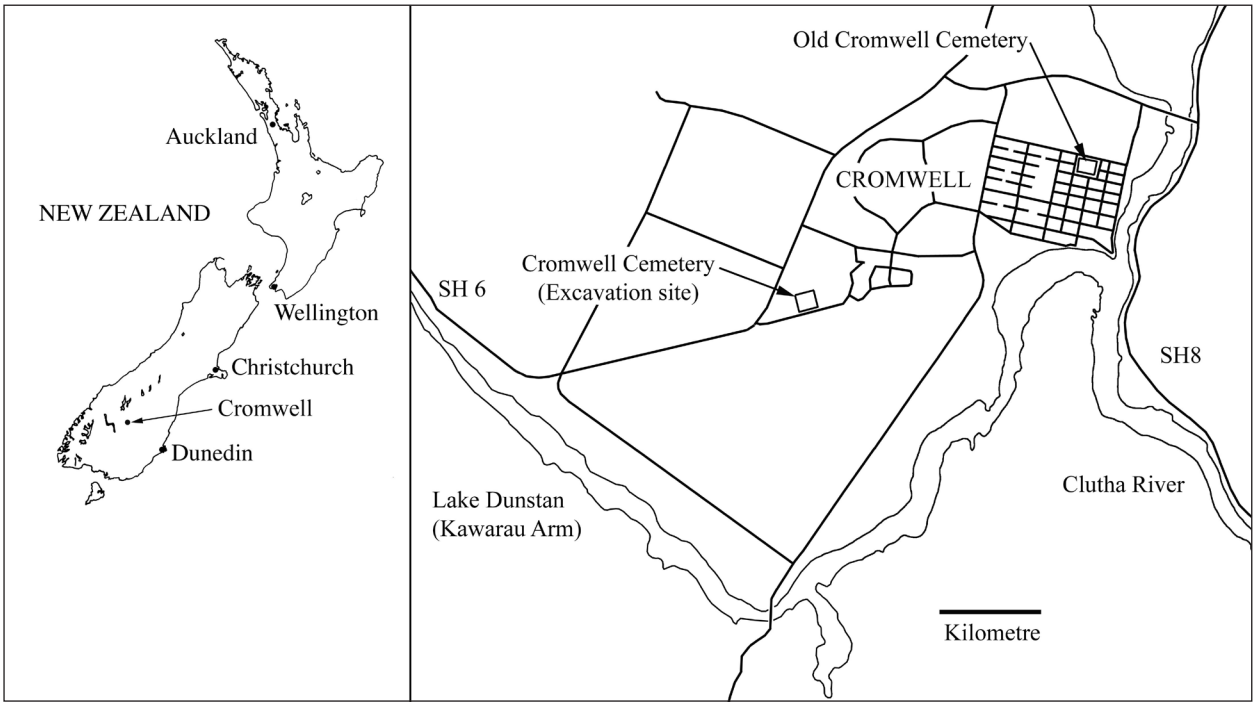

Figure 1. The location of Cromwell, Central Otago, showing the old (Litany Street) and present Cromwell cemeteries. This paper discusses two burials in the present Cromwell Cemetery.

Figure 2. The location of the burials in the Cromwell Cemetery (aerial photograph from Central Otago District Council GIS).

BACKGROUND

In April 2017 a contractor clearing a large tree stump within the Cromwell Cemetery (Figure 3) noticed human bones that had been exposed within the tree roots as it was pulled up. The CODC contacted both the Police and HNZ. The Police inspected the site, temporarily removed the exposed bones and sought advice from the Coroner. The Coroner decided that the bones were historic, and of no further interest to the Police, and the site and bones were released to HNZ. Matt Schmidt of HNZ requested that the CODC immediately address the issue of the exposed human bones and commission an archaeological assessment of the site to allow an archaeological authority application to be submitted for the further work required to restore the affected grave. Accordingly Prof. Hallie Buckley and Dr. Peter Petchey visited the cemetery and reported on the discovery (Petchey & Buckley 2017). Buckley was of the opinion that the bones may have come from two individuals, raising the possibility that two graves had been disturbed (which turned out to be the case). The assessment recommended that the area where the bones had been disturbed be fully excavated to determine the exact location of the grave(s) and to provide possible details regarding the individual(s), especially their possible ethnicity (European or Chinese were the most likely given the context). The disturbed bones should be then placed back in the grave(s) and reburied. Applications for both an Archaeological Authority (under *the Heritage New Zealand Pouhere Taonga Act* 2014) and a Disinterment Licence (under the *Burial and Cremation Act* 1964) were made. There then followed a period of public consultation to determine whether anyone knew who these two people might be, with notices placed on the CODC website and in the local press (*Cromwell Bulletin* 6 July 2017; *Otago Daily Times* 14 July 2017; CODC noticeboard at www.codc.govt.nz). No-one came forward with any new information, there were no records of this area having been used for burial, and the Authority and Licence were both issued in September 2017.

The excavation and reinterment of the burials was undertaken on 24 and 25 October 2017. Upon excavation it was confirmed that two graves had been disturbed by the tree stump removal. In the account below the two Cromwell burials and their context are compared with the sample of nineteenth century burials recently excavated from the St. John's Cemetery on Back Road near Milton (Petchey *et al* 2017) and the two Lawrence Cemeteries (Petchey *et al* 2018), all also in Otago. The Milton individuals were a mixture of farmers, miners, professionals and their families, most of whom were probably buried in the 1870s, while the Lawrence sample consists of unidentified individuals, many of whom were probably buried in the mid-1860s during or soon after the Tuapeka gold rush.

HISTORY OF CROMWELL & THE CROMWELL CEMETERY

In the second half of the nineteenth century there were a series of major international gold rushes, which can be very broadly summarised as California (1840s), Australia (1850s), New Zealand (1860s), and South Africa (1880s). The first three of these are often described as the Pacific Rim rushes, and although the New Zealand experience differed from the earlier fields, it must be viewed in the

Figure 3. The general setting of the disturbed burials (in the area of the temporary fencing), with the main area of marked graves in the background.

context of these earlier events (Morrell 1968; Salmon 1963). In particular, many of the participants in the early New Zealand goldrushes had gained experience in California and/or Victoria.

In Otago and Southland there had been hints of the presence of gold as early as 1849, and small amounts were found throughout the 1850s (*OPC V&P Session XVI* 1862:15–16; Salmon 1963:46). During 1858 Alexander Garvie found gold in the Lindis River, and Edward Peters ('Black Peter') found gold in a number of places, including Evans Flat and Woolshed Creek. The first rush in Otago occurred at the Lindis Pass in 1861 when workmen found gold while building a road, and 300 men were there by the end of April, but winter and the events at Gabriel's Gully brought it to a rapid end (Pyke 1962:22). Gabriel Read was an Australian and a veteran of both the Californian and Victorian goldfields (Hearn in Oliver ed. 1990:358), and while following up on some of Edward Peter's discoveries he made his own discovery of gold at Tuapeka in May 1861 in the gully that was to be named after him. By mid-September 1861 J.T. Thomson estimated that there were 3,000 men in the gully and 6,000 in the overall area (*OPC Gazette* 26th September 1861:238; Salmon 1963:54). Between December 1860 and December 1861 the population of Otago rose from 12,691 to 30,269 (King 2004:209; *OPC V&P Session XVI* 1862:17).

In 1862 an even larger gold rush struck Otago after two Californian miners, Horatio Hartley and Christopher Reilly, deposited in Dunedin 1,047 oz. of gold that they had recovered from the Molyneux (now Clutha) River near where Cromwell now stands (Hearn, in Oliver (ed.) 1990:178; *OPC V&P Session XVI* 1862:18; Salmon 1963:80). By September 5th some 3,000 men had arrived at the Dunstan and the goldfield was proclaimed on 23rd September, following which prospectors quickly moved further afield and found gold in the Nokomai, Shotover and Arrow Rivers (*OPC V&P Session XVI* 1862:19; Salmon 1963:81, 83). By 1869 seven Otago goldfields had been declared: Tuapeka, Dunstan, Teviot, Nokomai, Wakatipu, Mt. Ida and Taieri (Salmon 1963:101). New goldfields continued to exploited in subsequent decades, such as the Carrick quartz mines in the 1870s (Ulrich 1875), and new technologies such as river dredging meant that local gold mining activity continued until the mid-twentieth century (Hearn & Hargreaves 1985).

The goldfields immigrants were predominantly, but not exclusively, of British stock, and most came across the Tasman from the Australian goldfields. They were overwhelmingly male (of those arriving from Victoria, 87 per cent were men), and were generally in their twenties or thirties (Phillips & Hearn 2008:38). After 1866 the Chinese became a significant presence in the goldfields (reaching a peak population of some 4200 in 1872), and despite having been invited by the Otago Provincial Council to boost a declining goldfields population they faced much resistance and racism from the existing miners (Ng 1993). Of course, not all inhabitants of the goldfields were gold miners–storekeepers, hotel keepers, packers, wives, and barmaids all contributed to the mix. After the initial rushes had subsided settlement began to become more permanent and balanced, with wives and families joining the men, and farming and other economic activities became established (some pastoralism pre-dated the goldrushes, but the numbers of people involved were relatively low). Many rush settlements only existed for a short time and disappeared as quickly as they arose (such as German Hills and Chamonix), but others found a permanent role as rural service centres and have survived to the present day (for example, Cromwell, Clyde and Alexandra).

Cemeteries were an essential element of any settlement, and Cromwell has two historic graveyards. The first Cromwell Cemetery was surveyed in 1863 by J. Aitken Connell as part of his survey of the Cromwell Township, and a portion of this was fenced in August 1865 (Parcell 1951:53). As the town expanded, this cemetery on Litany Street was inconveniently close to the growing residential area, and in 1879 a new cemetery site was surveyed further away on the Cromwell Flat (S.O. 3822) (Figure 4). The old cemetery was closed in 1888 and the new cemetery was opened on 1 May of that year (*Cromwell Argus*, 1 May 1888:2): according to Parcell (1951:53) the first burial in the new cemetery was that of Sem Si, a Chinese man. In the 21st century the 'new' cemetery is still in use (marked as 'Cromwell Cemetery' on Figure 1), and is the location of the investigation described in this paper.

During the 1980s Cromwell was extensively remodelled and rebuilt after the low-lying part of the original town was cleared and then inundated during the Clutha Valley Project, which saw the construction of the Clyde Dam and the creation of Lake Dunstan. However, both the old Cromwell Cemetery on Litany Street and the new Cromwell Cemetery on Cemetery Road are above the lake level, and so both survive.

2017 SITE INVESTIGATIONS

The Cromwell Cemetery was visited by Prof. Hallie Buckley and Dr. Peter Petchey in April 2017 to assess the site and human remains after the Police had handed the site back to the CODC. The exposed bones had been returned to the site by the Police, and were on the ground within the temporary security fencing that had been erected around the site. The human bones consisted of a left and a right pelvic bone and a right humerus, and these were temporarily removed to the Department of Anatomy for safe storage before reburial. The area of disturbed ground was inspected for any further human bone fragments, and a sample of the loose soil was sieved using a ¼ inch (6 mm) sieve. No further bones or bone fragments were found.

The excavation of the disturbed area was undertaken in October 2017. The initial excavation was carried out by machine, and proceeded by carefully scraping back the disturbed area with a cleaning bucket (a digger bucket with a wide flat-lipped blade) to look for displaced bones

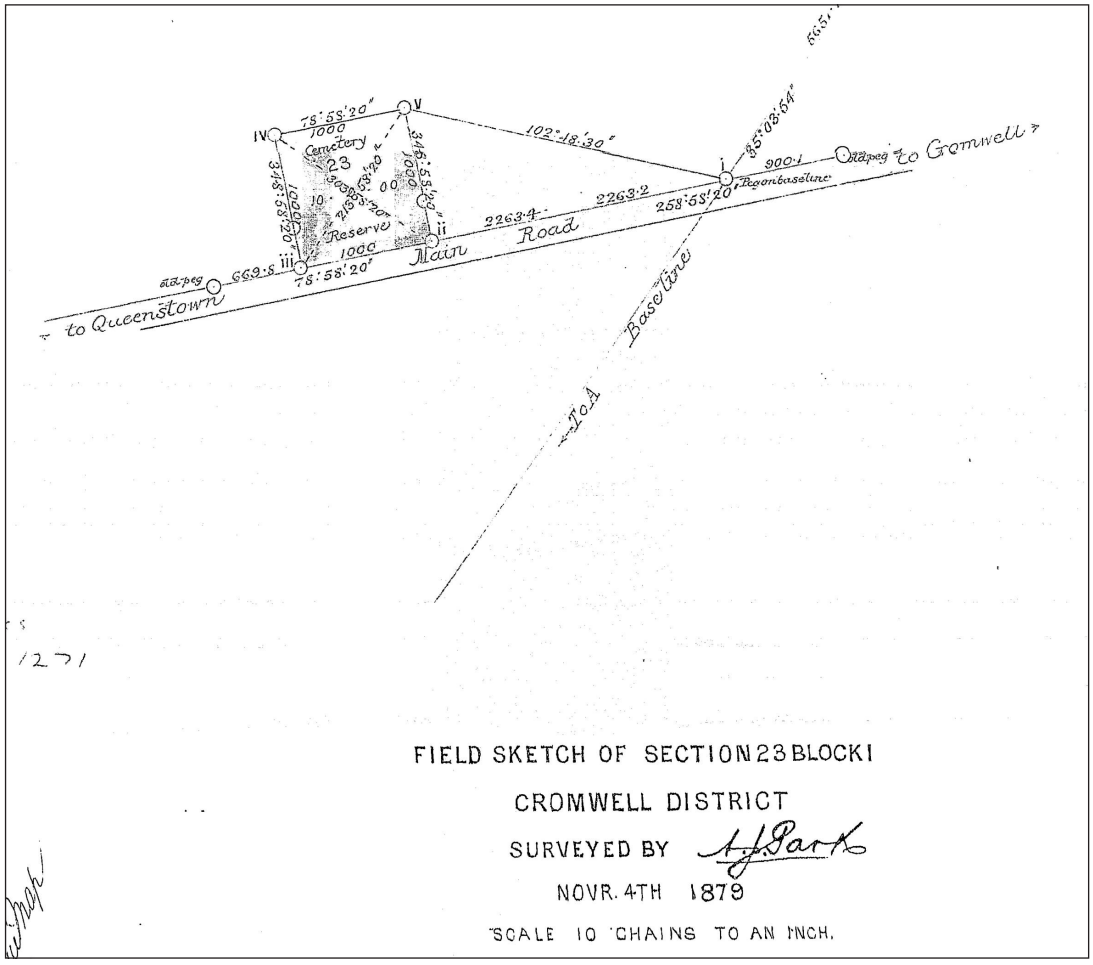

Figure 4. A detail from the 1879 survey of the 'new' Cromwell Cemetery site (Otago SO 3822, LINZ).

and to attempt to locate grave cuts. Two people observed the excavation, and one person observed the buckets being emptied. When bones were found further digging was carried out by hand, and the surrounding soil was sieved. The ground was a loose friable sandy gravel, made looser by having had the pine tree roots disturbed previously. Several displaced human bones were found, mostly remarkably undamaged given that they had been pulled out of their original context by heavy machinery, and the bone was in excellent condition. It seems that the soft, friable nature of the ground helped prevent mechanical damage to the bones. From the discovery and identification of further loose bones it became apparent that more than one individual had been disturbed. This was based on the duplication of some limb elements, difference in morphology of some bones, and the presence of further pelvic bone fragments. For example, a complete femur was found which was more gracile than the complete pelvic bone, making the articulation of the hip joint very 'loose'. The initially disturbed right humerus belonged to one individual whose pelvic bones had been disturbed by root action but were present near the grave. There were further limb bones from a more robust individual to whom the two complete pelvic bones belonged. Further excavation revealed the in-situ remains of the two burials, both in the remnants of wooden coffins, and disturbed by tree roots. In both cases large roots were still in place through parts of the burial, and areas where roots had been pulled out (along with the bones) were evident. No grave cuts were visible, because of the site disturbance in the loose gravels.

Once the in-situ remains were found, further excavation was conducted by hand, and the burials were fully excavated to expose the intact elements of the skeletons. The two burials (Burial 1 to the north and Burial 2 to the south, Figure 5) were both orientated East-West, with their heads to the west, and were 1.5 metres apart. Of note was that neither burial was very deep with the bases of the coffins being only 3 feet 4 inches (1.02 m) below the ground surface.

COFFINS

Both burials were interred in plain wooden coffins, of the traditional 'single break' form; an irregular hexagonal shape with a narrow head and feet and wide shoulders. Because

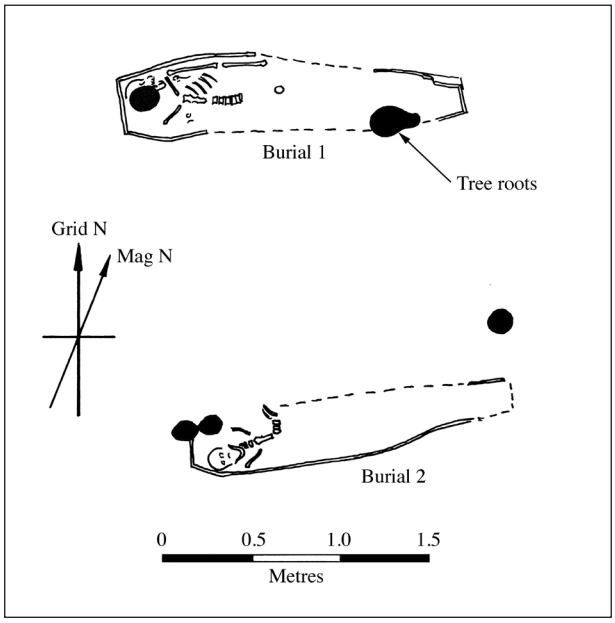

Figure 5. Plan of the two burials.

Figure 6. The Burial 1 coffin as it was fully exposed. The head and foot of the coffin were intact, but the centre section had been disturbed by the tree removal. Large roots can be seen still in place.

of the distortion due to root growth, and damage from the root removal, it was not possible to accurately measure the coffins, although the Burial 1 coffin was more intact than Burial 2, and accordingly the dimensions and description of that coffin are more confident.

Burial 1 Coffin

The burial 1 coffin (Figure 6) was approximately 6 feet 5 inches (1.96 m) long, 13 inches (330 mm) wide at the head, 20 inches (510 mm) wide at the shoulders, and 12 inches (300 mm) deep. It was simply made from rough sawn timber boards; each side was a single 12 inch by 1 inch (300 mm by 25 mm) board, with four parallel kerf cuts at the break (Figure 7) to allow the boards to be bent at this point. The coffin was nailed together, and had no handles or other furniture or decoration. Although the timber was badly

Figure 7. The side of the Burial 1 coffin, showing the kerf cuts in the side plank that allowed it to bend at the shoulders.

decayed, it was possible to identify it as rimu (*Dacrydium cupressinum*) (identification by Rod Wallace, University of Auckland).

Burial 2 Coffin

The Burial 2 coffin appeared to be very similar to the Burial 1 coffin, although it was more disturbed and fewer measurements could be taken. It was made from thinner wood (5/8 inch, 16 mm) than the Burial 1 coffin, and appeared to be the same timber (although it was badly decayed and no good sample could be taken for identification). The coffin was probably approximately 6 feet (1.8 m) long, but although the head end was intact the foot was disturbed, so an accurate measurement could not be made. The coffin lid was a plain rough-sawn board, and it had collapsed down onto the top of the skeleton. The coffin had no handles or other coffin furniture or decoration.

MATERIAL CULTURE

Apart from the coffins, there was very little material culture associated with the burials, the only artefacts being a number of clothing buttons. Three identical shell buttons were found with Burial 1, each 7/16 inch (11 mm) in diameter with four holes (Figure 8). These were probably shirt or nightshirt buttons. A single non-ferrous (probably brass) button was found with Burial 2, over the right clavicle (Figure 9). The copper content in the button had helped preserve fabric in contact with the button, including the fine cotton fabric that it was wrapped in (Figure 10), and a fragment of the woollen garment that it was attached to. This indicates that this was an outerwear button, probably from a woollen shirt or jacket. There was no evidence of shoes or boots.

DATING

There was no artefactual material associated with the burials that would assist with dating them, and the available cemetery records do not assist with either identifying or dating the individuals. The 'new' Cromwell Cemetery was surveyed in 1879, was first used in 1888, and remains in use; consequently there is a mixture of pre- and post-1900 burials present. The best evidence for dating the burials is therefore the age of the tree that was removed. The contractor (Kevin Alexander) who removed the tree counted 120 annual growth rings (Ian Mann, CODC, pers. comm.), indicating that the tree was probably planted in the late 1890s. Based on the location of the centre of the stump (which had grown very large), it is likely that the tree was originally planted about halfway between the two burials, and it is possible that it was placed at about the same time as the burials as a memorial. A direct link cannot be proven, but the presence of a lone tree in the cemetery suggests that it was deliberately planted.

The design of the coffins provides no additional details. The very plain nature of the coffins is likely to have

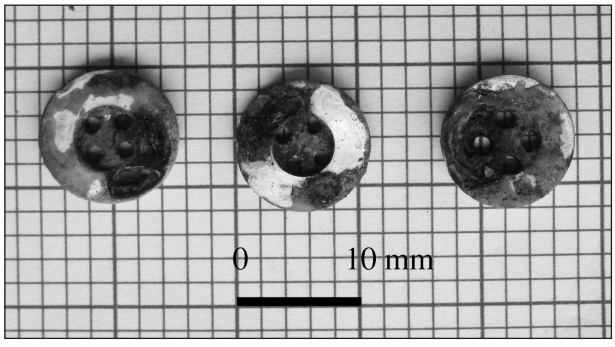

Figure 8. The three shell buttons found with Burial 1.

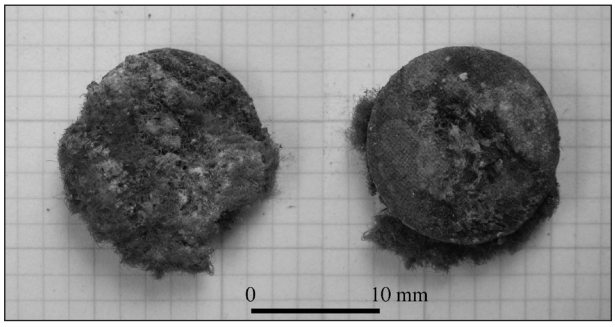

Figure 9. The back (left) and front (right) of the button from Burial 2.

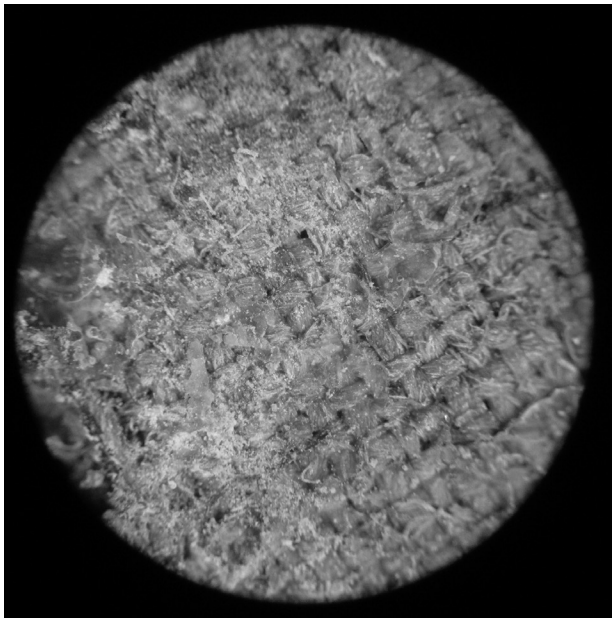

Figure 10. Micrograph of the fine cotton covering of the button from Burial 2, preserved by the copper content in the button.

more to do with these probably being 'paupers' burials, in unmarked and notably shallow graves, than any adherence to the funeral reform movement of the late nineteenth century that advocated simple burial services (Fraser 2012:101) (this point is discussed in more detail below). Similarly spartan coffins recently excavated at Lawrence date to the 1860s, and therefore belong the 'frontier' period of the Otago goldrushes (Petchey *et al* 2018). Burials in the Old Sydney Burial Ground also appear to be similar in nature to the Cromwell burials, with simple unadorned timber single-break coffins nailed together (Pitt *et al* 2017), but as these date to the 1792–1820 period the overall consistency in burial practice is notable, but the time difference is too great to make any direct comparisons. There is nothing in the timber or nails of the coffins that can clarify the date, nor do the fragments of clothing provide any clues, other than being typical of the late nineteenth and early twentieth centuries.

As the cemetery opened in 1888, the burials must postdate that year, counting out a 'frontier' gold rush context, and the balance of probabilities it is that they date to the 1890s when Cromwell had become a more mature and balanced community, with farming and other industries as well as gold mining present.

OSTEOLOGICAL ASSESSMENT OF INDIVIDUALS

The initial discovery of human bones in April 2017 consisted of a complete right humerus (arm bone) of a robust adult, possibly male (subsequently labelled Burial 1), and complete left and right pelvic bones from a single older (estimated 35–44 years) male individual (subsequently labelled Burial 2) (Figure 5). The bones were exceptionally well preserved with remarkably little damage considering the means with which they were exposed. The initial estimation of age of Burial 2 was based on the degenerative changes to the joints at the front and back of the pelvic bones. The pubic symphyseal joints were at Stage 4 (35 years) on the Suchey and Brooks scale for European males. The auricular surfaces were at Stage 4–5 (35–44 years) for males. An internationally recognized standard for sex estimation was used (Buikstra and Ubelaker 1994). Due to the excellent preservation of the bone most features of the pelvis could be used to estimate sex in this individual and were all strongly masculine.

Once they were fully exposed (and it had confidently been established that there were just two individuals involved) the complete burials and anatomical sections of interest were photographed, and samples of bone, a tooth from one burial and hair were taken for further chemical and molecular analyses. Because the primary objective of the exercise was to reinter the disturbed human remains back to the original graves it was decided to retrieve as much information as possible in situ without further disturbance, and the in situ remains were not lifted but were left in the ground. As such the assessment of the quality of life of the individuals is limited to what could be achieved in these circumstances. No radiography of the bones was possible due to time limitations of the excavation and reinterment. The detailed field recording involved noting the presence/absence of elements, the metrics of limb bones for estimation of stature (Trotter and Gleser 1952, Trotter and Gleser 1958), and any pathology that could be observed in situ. The bones that had been disturbed were recorded and photographed on site. All of these observations aided in determining which displaced elements belonged in which grave. As the material was in excellent condition the macroscopic observations, particularly of Burial 1, have allowed some detailed consideration of the lives of these individuals (summarised in Table 1).

Burial 1

Burial 1 was male, 30–40 years old, and approximately 5 feet 5 inches (1650 mm) tall. Based on his cranial morphology he was of Caucasoid (European) ancestry.

All major bones of Burial 1 were located, although the right pelvic bones and some hand bones remain unlocated. The cranium, thorax, including the vertebral column to the mid lumber region and part of the left upper limb remained in the original burial position (Figure 11). The right humerus, left radius, right forearm, pelvis, femora, tibiae

Table 1. *Summary of Cromwell Cemetery burials osteological analysis.*

Burial	Age and death/sex	Ancestry	Stature mm (feet/inches)	Dental pathology	Skeletal pathology
Burial 1	30–40 years old/ Male	European	1650 (5′ 5″)	Slight to moderate attrition. Calculus Periodontal disease. Pipe facet.	Degeneration of both shoulders, possibly secondary to trauma. Healed fracture to left tibial plateau. Trauma to left elbow region. Degeneration in the lower lumbar.
Burial 2	35–44 years old/ Male	Unknown possibly European	1625 (5′ 4″)	Remaining teeth had extreme wear including pipe facet. Massive caries in remaining teeth.	Degenerative changes to lower neck cervical vertebrae. Diffuse periosteal reaction to left tibia – possible infection.

Figure 11. The intact upper body of Burial 1, showing the large tap root that had grown down beside the skull.

and fibulae had been disturbed and pulled out of the grave by the tree roots. The feet remained in situ and in articulation within the coffin.

This individual was a man of slight build with well developed muscle attachments. He had suffered a number of traumatic injuries during life, all of which had healed. There were degenerative changes of the right shoulder joint potentially associated with a poorly reduced shoulder dislocation and continued heavy use of the limb (Figure 12). Extensive degeneration was also apparent in his left shoulder. In his left elbow there was a possible healed fracture of the humerus (medial epicondyle) and possibly the neck of the radius that eventually led to severe degeneration of this joint. However, without radiographs of these bones it is difficult to say with certainty that these changes are due to bone fracture. The possible elbow injury most commonly occurs in children, with concurrent elbow dislocation, and is usually caused by falling onto an outstretched arm (Forthman *et al* 2007). Finally, he had a healed fracture to the top of his left tibia (a split fracture of the tibial plateau) that may have occurred from a blow to the outside of the lower leg (a so-called 'bumper fracture') or during a fall from a height, which would also have caused ligament damage at the time of injury (Figure 13) (Koval and Zuckerman 2002; Lubowitz *et al*. 2004). Other pathology noted with this man was degeneration of the lower lumbar vertebrae possibly associated with heavy lifting and manual labour.

It is not possible to determine whether his injuries were caused at the same time or due to multiple traumatic events, but along with the spinal degeneration, the fractures are a testament to the rigours and dangers associated with the hard physical work that was typical in rural and mining communities in the nineteenth century (Mumford 1934: 68). Similar healed fractures associated with extreme trauma were also noted in a sample of an 1870s farming population recently excavated in Milton (Petchey *et al* 2017). While his broken bones had healed he would have suffered a period (and possible multiple periods) of extreme pain and prolonged disability. It is likely that the severity of these injuries left him with chronic pain and some disability particularly in his shoulders and elbow.

His oral health was generally good with no apparent signs of decay, although it should be noted that without lifting and cleaning of the skull it was not possible to observe all of the tooth surfaces. He had slight to moderate tooth wear with some signs of chipped teeth. There was some evidence of calculus (calcified dental plaque) and erosion of the bone around the tooth roots caused by periodontal disease (Hillson 2014). These factors together suggest he ate mostly soft foods with a starchy content but likely very little refined sugars (Hillson 2014). The lack of dental decay is very different to what was observed in Milton where most of the adults lost all of their molars to decay and/or periodontal disease by middle age. A pipe facet was present in his teeth on the left side (a pipe facet is the groove worn in opposing teeth by habitually grasping a clay pipe stem) (Alt & Pichler 1998).

Burial 2

Burial 2 was male, 35–44 years old, and approximately 5 feet 4 inches (1625 mm) tall. Based on his cranial morphology he was possibly of Caucasoid (European) ancestry, but his facial bones were not well enough preserved to assess whether he was Asian or not. He was not of Polynesian ancestry.

The burial of this person had been extensively disturbed by the growth of the tree and the later pulling out of the roots. The cranium and pectoral girdles were in situ and in articulation. Due to the collapse of the coffin around the bones it was not possible to completely uncover these elements. The entire thoracic spine had been bent to the north and upwards by root action but was still in articulation. The two pelvic bones disturbed in April 2017 belonged to this individual, as did the left forearm, left tibia and right femur that were disturbed and found during the October excavation. The rest of the lower leg, feet and upper limbs had either not been recovered or were still in situ under the collapsed coffin wood. The skeletal material that could be observed was in excellent condition. This individual was a

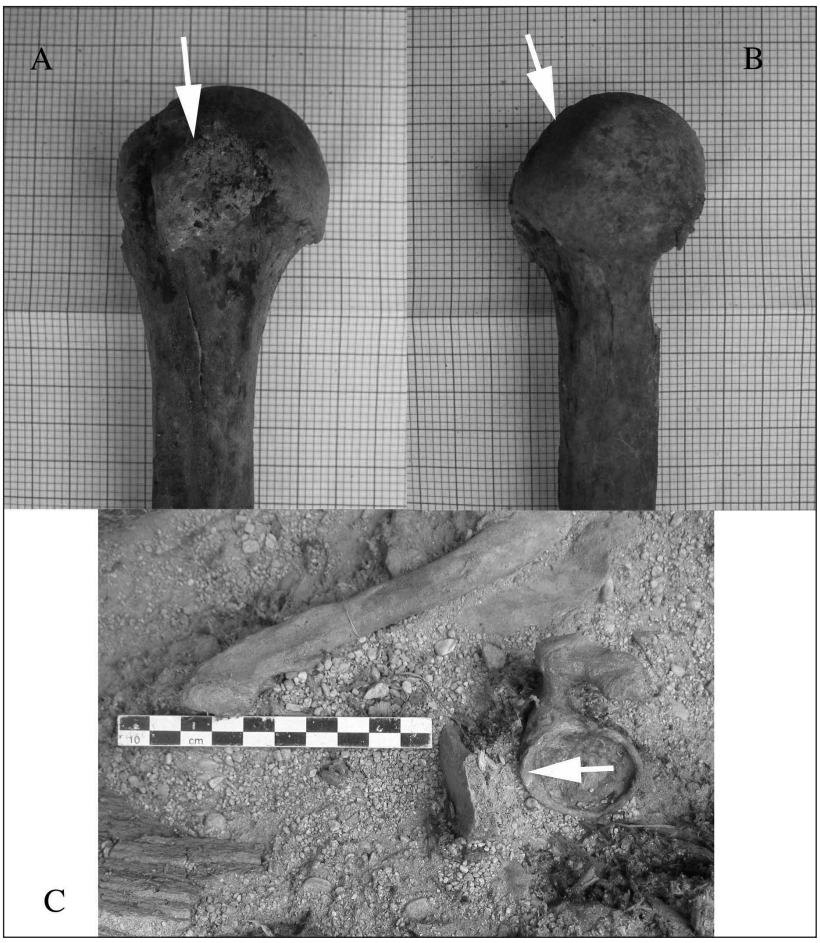

Figure 12. The right proximal humerus (lateral [A] and anterior [B] views) and scapula of Burial 1, showing the degeneration due to the dislocation of the joint (arrows).

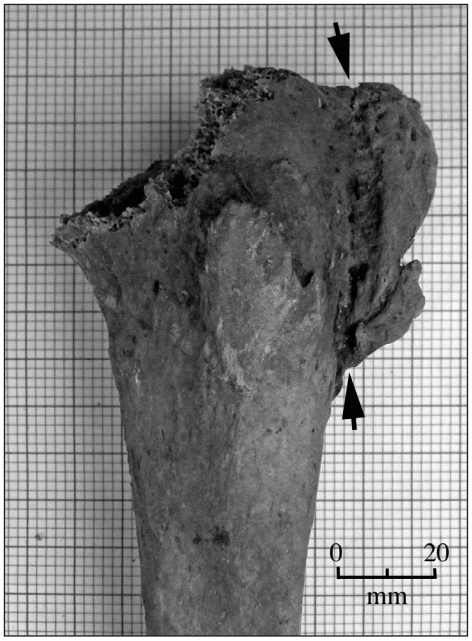

Figure 13. The proximal end of the left tibia from Burial 1, with the healed 'bumper' fracture arrowed.

man with extremely large robust bones with well developed muscle markings. He was not particularly tall but he would have been very 'stocky.' He had calcified laryngeal (throat) cartilages which is not necessarily associated with illness and can be a sign of advanced age (Mupparapu and Vuppalapati 2005). He also had extensive bony remodelling of his lower neck (Figure 14) that may have been related to localised traumatic injury, as the rest of his spine was free of degenerative changes.

There was diffuse sub-periosteal bony reaction on his left lower leg but with the right tibia not located it is not possible to determine the cause of this pathology. Possible causes may be a systemic infection of unspecific origin or trauma (Ortner 2003). Due to the diffuse nature of the periosteal reaction it is more likely this was caused by infection.

His oral health was very poor with the loss of all of his molars most likely attributed to decay and 5 of the remaining 7 teeth in his lower jaw had massive cavities (Figure 15). This extreme decay may reflect a difference in refined sugar consumption between him and Burial 1, or another cariogenic cause. There was also a very large pipe facet on the right hand side of this lower jaw (Figure 15). The upper jaw and teeth were not well preserved.

Figure 14. Bony bridges between cervical vertebrae of Burial 2.

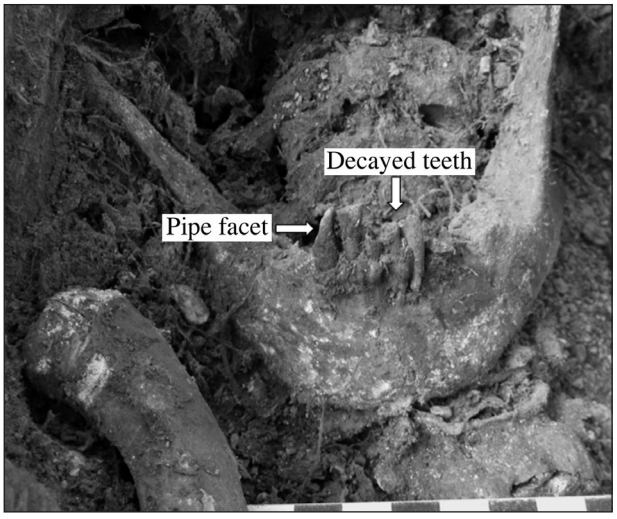

Figure 15. The mandible from Burial 2, showing the pipe facet, dental decay, and extent of tooth loss.

REBURIAL

After the two burials had been exposed and recorded on 25 October 2017, the displaced bones were placed back in the appropriate graves in anatomical position (Figure 16). The identification as to which bones belonged to which burial could be done with confidence by Buckley and Scott, based on the duplication of elements, morphology and relative robusticity between the two individuals. A waratah was temporarily placed at the head of each grave to enable the CODC to accurately record the locations of the graves with GPS to enter into their GIS. The burials were each then covered in a white cotton sheet and covered with soil by hand. They were then machine-covered with a further 300 mm of soil. The following morning the local Presbyterian minister visited the site and gave a brief service, and the excavation was then fully backfilled by machine.

DISCUSSION

The two burials and their archaeological context allow some detailed considerations of their social and historical contexts and aspects of their life experiences. The two burials were very similar, and may have been interred at about the same time; it is possible that the tree between the graves was planted as a memorial to one or both of these individuals. As discussed above, the age of the internments is uncertain, but the available evidence (tree ring estimates and the material culture associated with the burials) suggests a most likely date of interment in the 1890s; certainly both burials were comparable in terms of their context in the roots of the tree, in their coffins, and in the level of preservation of the bones and coffin wood. The unmarked and shallow nature of the graves and the very basic construction of the coffins suggest that the two Cromwell funerals were carried out at a minimum cost.

Several other excavations of historic cemeteries in New Zealand provide useful comparisons. The recent excavation of eight graves at the old Lawrence Cemetery showed very similar simple unadorned funerary treatment in five of the six adult interments (Petchey *et al* 2018), but those burials were in a 'frontier' 1860s goldfields context (in the after-

Figure 16. Burial 1 prior to reburial, with the displaced elements returned to the grave and laid out in anatomical position.

math of the Tuapaka rush) where simple funerary practices might be expected in newly established settlements. More elaborate coffin treatments have been recorded in a number of historic cemeteries where members of evolving rural communities were buried: At St. Johns Cemetery in Milton, South Otago (a rural framing community), a sample of 27 individuals who had been buried in the 1870s had more elaborate coffins that were simply constructed from sawn timbers nailed together, but were then covered in black woollen fabric, decorated with embossed zinc or tin strips, pressed and painted iron coffin plates, and in many cases were fitted with cast iron handles (Petchey *et al* 2017: 26–27). Three burials from the 'new' Lawrence Cemetery also followed this more elaborate practice, and while their dates of interment have not been determined, they post-date the 'old' Lawrence Cemetery graves, and possibly died in the 1870s or 1880s (Petchey *et al* 2018). In Christchurch the Withell's Road Cemetery was in use from the early 1860s until the 1880s, and the 13 graves (some of which held double interments) included seven coffins that were covered in fabric and adorned with embossed metal strips (Trotter & McCulloch 1989). In Auckland at the Westney Road Denominational Graveyard in Auckland, which also catered to a small rural population, black cloth covering and embossed metal strip edging was also recorded on 16 of the 29 interments, mostly from the 1890s but with examples as early as 1862 and as late as 1925 (Best & Furey 2006).

The more elaborate coffin treatments (particularly the cloth covering, decorative metal strips and coffin plates) seen in these sites fit within the 'Beautification of Death' movement of the nineteenth century, whereby funerals could involve considerable ostentatious rites and ornamentation, and is consistent with funerary traditions in other parts of the British Empire and Anglo-world (eg Miles & Connell 2012). In the Milton sample different levels of wealth and/or social status appear to have been expressed in the degree of ornamentation, especially in the coffin plates and handles, rather than the general approach of using cloth covering and ornamental edging (Petchey *et al* 2017). A counter to the Beautification of Death movement was the Funeral Reform movement that advocated for simpler funerals that did not place such a financial burden on the bereaved (Fraser 2012: 101). This debate was present in New Zealand, as it was discussed in newspaper articles of the time (eg *Bruce Herald* 15 June 1875; *Otago Witness* 21 November 1874). The two simple Cromwell burials are in contrast to many other examples given above, and bear the greatest similarity to the 'frontier' period burials at the 'old' Lawrence Cemetery. However, Cromwell of the 1890s was no longer a 'frontier' town as it was by then 30 years old, and while it is possible that the two Cromwell burials could have been influenced by the Funeral Reform movement, it seems more likely that they were what was at the time termed 'paupers burials,' whereby they were interred in a coffin within a formal cemetery, but with little other expenditure. This interpretation is supported by the lack of coffin handles (the coffins were little more than simple wooden boxes) and lack of any grave markers (other than possibly the pine tree) in an area of the cemetery with other unmarked graves. The choice of rimu for the coffins is not unexpected, as this was a widely available building timber at the time, and the simple butt-jointed nailed construction appears to have been ubiquitous for coffin construction (Best & Furey 2001; Petchey *et al* 2017). The burial depth (3 feet 4 inches, 1 metre) was considerably shallower than the traditional 6 feet (1.8 m) depth, and shallower than the average 5 feet (1.5 m) depth found in both the St. Johns Cemetery and Westney Road Cemetery samples, and may also indicate poor/low status burials (although there are no comparative data from other nineteenth century burials in Cromwell to determine what depth was standard in that graveyard). The presence of clothing buttons indicates that the men were buried in their clothes, but without their shoes or boots. This is generally consistent with the findings at the two Lawrence Cemeteries: four burials were found with well-preserved clothes (one in the old cemetery, three in the new cemetery), one of which also had boots, while buttons on two other burials indicate that clothes were present but did not survive (Petchey *et al* 2018).

The pipe facets in the teeth of both burials indicates that both were smokers, as appears to have been common in this period. Similar facets were found on all the adult males in the St. Johns Milton population sample (Petchey *et al* 2017), and have also recently been observed in two individuals in the Old Sydney Burial Ground, Australia although in the latter case both were female (Donlon *et al* 2017: 49).

Both Cromwell burials were probably European; there was a conspicuous Chinese presence in the Otago goldfields from the mid-1860s onwards, and although the face of Burial 2 was too badly damaged to assess whether or not he was Asian, the Chinese section of the cemetery is in the opposite (NW) corner, so it is most likely that he was European. The evidence of physical strength (muscle markings in both burials) and multiple injuries (particularly in Burial 1) suggests that both men led lives that involved physical labour, with the risk of major and minor injuries. It is of course tempting to suggest that both were gold miners, and this may in fact be true, but there is no way of proving it in the absence of confident individual identifications: many nineteenth century jobs involved hard physical work, and Garland found in her analysis of reported injuries for St. Bathans (another Central Otago goldfields town) between 1866 and 1921 that most resulted from mining accidents and accidents involving horses and transport (Garland 2013: 24 and Table 1). In the Cromwell case under consideration the combined evidence of heavy labour, with high risk of injury, and poorer burials does suggest that these men were manual workers and not affluent.

THE BIOARCHAEOLOGY OF CARE

The archaeological evidence from the Cromwell Cemetery also suggests that some form of social support networks were present to allow injured individuals to recover. Both Cromwell burials had evidence of past injuries, and Burial 1 had been so badly injured during his life (his fractured knee and elbow and dislocated shoulder) that he would have been incapable of working for a period (and by the very nature of his injuries it is likely his occupation involved risky manual labour) but he had recovered. The 'bioarchaeology of care' is a growing area of interest, whereby archaeological evidence of community care of ill or injured individuals is studied in order to examine past behaviours and communities; archaeological evidence of past care can indicate a socially stable and cohesive society experienced in nursing the sick (Tilley 2015; Tilley & Oxenham 2011). The approach has great potential but it has yet to be applied to an historical archaeological context in New Zealand.

The most likely source of care for an injured or sick individual would be their immediate family, but the goldfields were initially occupied by an itinerant and mostly male population. As the rushes gave way to more settled and gender balanced communities, family care would have become more likely, but in a world without social welfare, extended periods out of work would have been a real hardship. The nineteenth century ideology of self-help in terms of health care has been discussed by Garland in relation to the establishment of the St. Bathans Cottage Hospital (Garland 2012). The Goldfields provided a particular boost to the establishment of hospitals, which were constructed at Frankton (est. 1863–64), Arrowtown, Dunstan (est. 1863), Mt Ida/Naseby and Tuapeka/Lawrence (est. 1862) during the 1860s and 1870s (Garland 2012:17). The Cromwell Hospital opened in 1875 after some years of pressure by the locals (*Cromwell Argus* 30 June 1875:5). These hospitals were funded through a combination of Government contribution and a subscription system under the 1862 Hospital Ordinance, which required hospitals to be managed by committees of subscribers with each subscriber having the ability to recommend two people for charitable aid (Angus 1984; Garland 2012).

The self-help ideology was also reflected in the establishment of various 'friendly societies,' which acted both as a source of community security and identity, and as private insurance providers; for a regular weekly contribution, members were eligible for financial support should they be unable to work and funeral expenses would be covered in case of death (*Bruce Herald* 14 August 1872; Carlyon 2001). At the St. John's Cemetery (Milton) it is known from historical sources that some invalided individuals were supported through their membership of the Ancient Order of Foresters (AOF), and the graves of the surgeon, secretary and a beneficiary of the local branch were all identified during the 2016 excavations (Findlay *et al* 2015; Petchey *et al* 2017 and work in progress). In Cromwell the AOF was the first such society to be established when the Star of Cromwell Lodge opened in March 1868, to be followed in 1870 by the Manchester Unity Independent Order of Oddfellows, and in 1874 by the Robert Bruce Lodge of the Good Templars (Parcell 1951:319). Two important considerations of the existence of the Friendly Societies within the bioarchaeology of care model are that individuals assumed responsibility for their own care (the self-help ideology, expressed through the choice to join a society), and that forward planning that anticipated illness was involved (support depended on prior membership of a society).

It is not possible to determine how Cromwell Burial 1 received the care required to recover from his injuries, but some mechanism must have been present for this care as it is clear that he did survive and regained his mobility. It is always possibly that his injuries were suffered somewhere other than Cromwell, but the same points of discussion for his care would apply.

CONCLUSIONS

After the inadvertent disturbance of the two burials in the Cromwell Cemetery, the primary considerations were for the remains to be appropriately handled, for the original graves to be located, and the disturbed bones to be returned to their respective graves. All of these aims were achieved within suitable legal, ethical and professional frameworks. The excavation also presented the opportunity to consider aspects of the individuals lived experience and their cultural context in order to find out more about them and some aspects of their lives.

While it has not been possible to identify the two people, it has been possible to determine their approximate date of interment (ca. 1890s) and to determine that both were probably physically active manual labourers. While it is not possible to say whether they were gold miners, they certainly were resident in the goldfields. Both had health issues; Burial 1 had numerous injuries that he had recovered from (although undoubtedly left with some discomfort and restricted movement); and Burial 2 had very poor dental health, a stiff neck, and possibly a serious infection. Both were simply but respectfully buried in plain rimu coffins, wearing simple clothes (but no shoes or boots). The evidence of healed injuries, especially in Burial 1, provides the opportunity to consider aspects of health care and community support for injured/incapacitated individuals in a period where there were few formal governmental social support services. A number of alternative care mechanisms were present in this place and period, including family care, the hospital and various friendly societies. Excavations at the Cromwell, St. John's and Lawrence cemeteries raise this question of care in nineteenth century New Zealand society, and provide a potentially fruitful course of investigation within the developing 'bioarchaeology of care' model.

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Maps & Plans

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