

A case study on the endeavour to identify the “unidentifiable” fallen soldiers of WWI on the Italian front

Daniel Gaudio^{1,*} and Andrea Betto²

¹Department of Archaeology, Durham University, Durham, UK

²ArcSAT snc, Padova, Italy

*Corresponding author. E-mail: daniel.gaudio@durham.ac.uk

Abstract

If there is a category of war victims for whom the identification process has been and still remains an extremely challenging issue, it is the soldiers of World War One. There are various reasons for this, including unreliable identity tags, the unprecedented number of casualties, and the level of destruction caused by the massive use of “new” weapons. In Italy, this phenomenon was so severe and well-known that a monument was erected in Rome specifically in memory of those unknown soldiers (“Tomba del Milite Ignoto”). However, modern techniques in forensic archaeology and anthropology can facilitate identification even in this extreme context. In the casework described here, the presence of human remains was reported to the judicial authorities, which were subsequently located and excavated in a remote region of the Italian Alps using a range of techniques, including drone imagery, GPR, and micromorphological surveying. During the archaeological excavation of the human remains, a World War One zinc identification tag in very poor condition was found adjacent to the body. The biological profile was estimated (male, 20–30 years old, 166 cm ± 3.27 cm), and a trauma survey was performed. Thanks to the restoration of the ID tag, parts of the name and enrolment number were found and cross-referenced with the anthropological data of the subject, matching the information in the available military records. The victim had no siblings or offspring, making it impossible to identify descendants. However, the operation led to a contextual/presumptive identification of the soldier and the discovery of his story. He was a native of Tuscany, who died during the “Punitive Expedition” (1916) and was buried, probably by his comrades, in a small flat area hidden from enemy lines. In investigations like this, the involvement of local communities, whether groups or individuals, is crucial. In this case report, it will be shown how multidisciplinary approaches and collective actions can play a pivotal role in resolving highly intricate scenarios, such as those pertaining to armed conflicts.

Keywords: forensic sciences; forensic archaeology; forensic anthropology; WWI; identification; conflict archaeology

Introduction

The identification of soldiers from World War One (WWI) represents a poignant and dramatic testament, and somehow an extreme example, of the complexities and challenges in identifying war casualties. WWI was a conflict characterized by the mass mobilization of millions of soldiers and unparalleled lethal technological innovation compared to previous centuries, combined factors that resulted in an estimated 15–20 million deaths [1, 2].

The massive number of casualties and a mixture of additional factors, such as the inefficiency of the identification tags used at the time, the lack of accurate health records of soldiers, and the activity of relic hunting in search of WWI collectable items, including ID tags, aggravated the difficulty in the procedures of identifying the fallen.

However, this case report aims to show how the convergence of expertise and collaboration among stakeholders can lead to providing identification in an armed conflict characterized by an enormous number of unidentified soldiers. It will highlight the challenges of a case in which location and recovery were made in a remote area of the Alps, based on a few imprecise indications, and the investigation to obtain contextual identification of the soldier.

Challenges in identifying casualties during WWI

One of the main obstacles in identifying soldiers during and in the aftermath of the Great War lies precisely in the deficiencies of the identification procedures employed during the conflict, which are obviously not comparable to modern forensic identification practices. Nonetheless, the issue of soldier identification was already under discussion at the very beginning of the 20th Century. As reported by Ashbridge and Verdegem [3], combatant nations were expected to search for any identifying items on the dead according to the 1906 Geneva Convention, which introduced measures regarding the treatment of war casualties and wounded soldiers. Specifically, Article 4 mandated that each belligerent transmits identifying marks or military documents found on the bodies of the deceased to their respective authorities, thereby facilitating identification and notification processes. In this context, several countries such as Great Britain, the USA, Germany, and France developed their own ID tag (identity disc system) as a measure to implement the identification of military casualties (see [3] for details). The use of fragile identification discs in WWI, despite their inefficiency, marked progress in identifying fallen soldiers. On the Italian front, the Austro-Hungarian

Received: April 23, 2024. Accepted: July 22, 2024

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and Italian armies proceeded in different ways. The Austro-Hungarian Army used identity papers in zinc lockets, initially single-folded but expanded in 1916 [4]. These kinds of papers have a very limited chance of being preserved, resulting in the consequent loss of fundamental information about the soldier. Similarly, the Italian army used elongated slips of paper in their ID tag lockets, which contained detailed soldier records [4]. However, several soldiers in 1916 carried a zinc tag (1892) on which their name, ID number, and class year (year of birth) were written in indelible ink. This Italian tag (“Piastrino di Riconoscimento 1892”) plays a fundamental role in the case reported here.

These ID tags were very fragile, and as explained in Gaudio et al. [5], highly sought after by relic hunters. Thus, human remains found on the Italian front with intact ID tags are extremely rare. In the vast majority of cases, without the ID tag, the process of identification cannot even start. Furthermore, the antemortem data are often limited to age and stature, and potential descendants are very difficult, if not completely impossible, to find.

In Italy, the phenomenon of unknown soldiers left a profound mark, leading to the construction of the “Tomba del Milite Ignoto” (Tomb of the Unknown Soldier) in Rome. This monument serves as a reminder of the cost of conflicts in terms of human lives, particularly for those whose identities remain unknown.

The historical context of this case involves the “Strafexpedition” (Punitive Expedition), a WWI military operation by the Austro-Hungarian army on Italian territory. The operation aimed to punish Italy for joining the Allies in May 1915 by achieving a swift victory through the Asiago Plateau to Vicenza. Despite initial successes, the offensive ultimately failed, resulting in heavy losses for both the Italian and Austro-Hungarian armies [6].

The case of Costa d’Agra

The legal and scientific procedures for the analysis and burial of WWI soldiers on the Italian front are detailed in Gaudio et al. [5, 7]. The following case presents unique characteristics within this framework [8] and culminates in the circumstantial identification of a WWI soldier who disappeared in a remote area of the Italian Alps over a century ago. The multidisciplinary approach to locating and identifying this soldier, particularly the events that led to the identification, has never been described before.

The case begins after a report by a relic hunter to the local “Carabinieri” station and the Vicenza legal medicine office unit, which was appointed, in the context of a provincial project (Vicenza Province 2006–2009), for the recovery and analysis of skeletal remains potentially related to WWI events.

The relic hunter had discovered a bone years earlier while exploring the “Fiorentini” Plateau with a metal detector. Hearing about the Vicenza project, he decided to inform the authorities, noting that the area had seen several battles during the “Strafexpedition” and the bone could be human, though this was uncertain.

The relic hunter remembered the general area where he had spotted the bone, a grassy and rocky zone in Costa d’Agra (~1 700 m, Figures 1 and 2A). However, pinpointing the exact location was impossible due to the passage of time and the lack of distinctive features. To face this challenge, the appointed forensic anthropologist and pathologist enlisted a

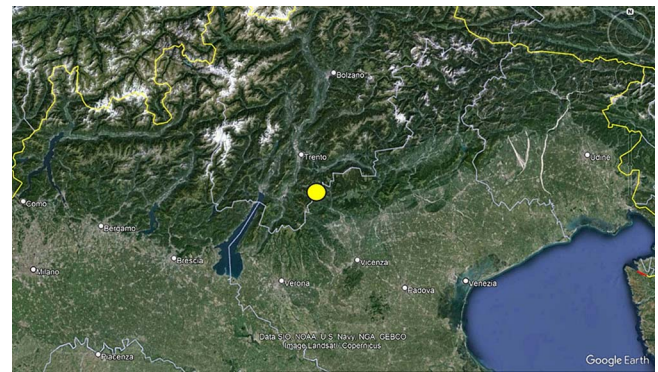


Figure 1 Site location (Google Earth).

team of conflict archaeologists from Padua University to help locate and excavate the potential human remains.

The localization of the area and excavation

The area was investigated through field surveys, and aerial photographs were taken using an unmanned aerial vehicle (UAV). Subsequently, three sectors of potential interest were identified (Figure 2B).

(1) Area A, here, a micro-survey was carried out with the identification of surface anomalies. The metal objects present below the surface were identified with a metal detector, highlighting considerable metal pollution of the area (Figures 3 and 4). Upon evaluation of the 3D orthophotomosaic model of the ground, a specific area (see F1 in Figure 4) was deemed particularly interesting, and indeed, it was within this area that the skeletal remains were located.

(2) Area B, corresponding to the wider flat area occupied by the remains of a dry-stone terrace where there must have been barracks. Here, to verify the possible presence of graves, a ground-penetrating radar survey was conducted. However, this survey did not yield any significant results.

(3) Area C, corresponding to a wide pit containing a large number of gas masks and bottles containing medicine. No human remains were found in this area.

In Area A, after the removal of the topsoil, a concentration of selected limestone grit (in the sense that they were of uniform size, thus presumably “selected” by someone) emerged in an elliptical shape. This elliptical area was filled with limestone grit, and it was then ascertained that a second, lower layer of thicker stone, was laid. A disarticulated left femur was detected first, and eventually, a complete skeleton was found. Once completely exposed, the remains appeared in primary position (*in situ*), with the exception of the left femur displaced during the excavation by the relic hunter. The body was in a supine position, but with the right arm (Figure 5) raised and facing towards the perimeter of the grave, as if the body had been thrown in without careful repositioning of the arms. The left arm, instead, was stretched along the body relatively neatly, but with a noticeable dislocation of the humerus head compared to the diaphysis (Figure 6).

The analysis of the skeletal remains

The skeletal remains located in the single burial were analysed to estimate the biological profile of the subject and to identify any potential presence of trauma. Methodologies for the estimation of the biological profile were primarily selected based on the guidelines to the standards available at the

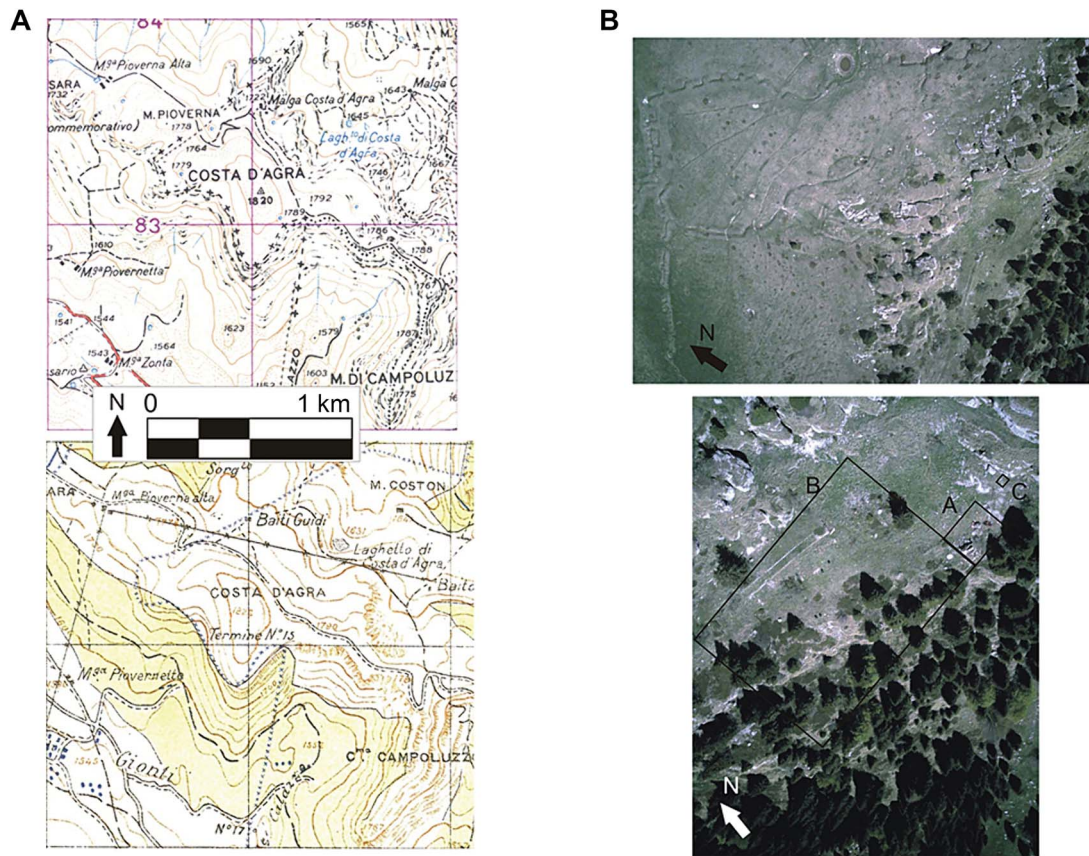


Figure 2 (A) Costa d'Agra, location of the site. (B) Aerial photos taken by unmanned aerial vehicle (UAV), showing the location of the three areas (A, B and C—bottom right image).

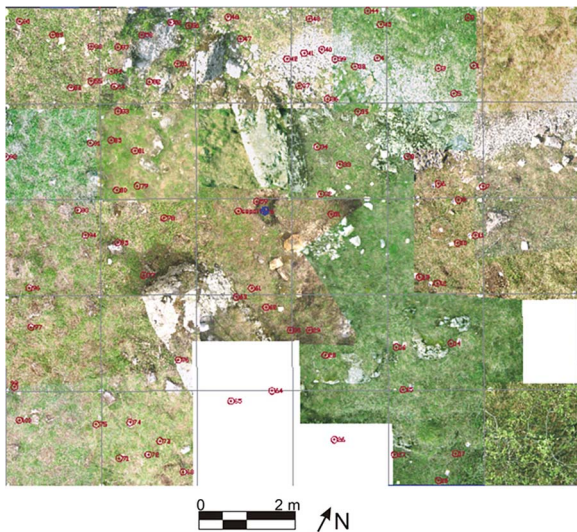


Figure 3 Presence of metal objects (dots in the figure) in the area of the burial.

time of the analysis [10, 11]. This approach was adopted to ensure reproducibility and to facilitate comparisons with other studies. Sex estimation was conducted based on the morphological features of the skull and pelvis, which are the skeletal parts presenting the highest degree of sexual dimorphism [11]. Furthermore, metric parameters were evaluated, specifically the vertical diameters of the humeral, femoral, and radial heads were measured [12]. Population affinity was

estimated using only morphological traits (the skull exhibited taphonomic deformation, making it unsuitable for metrical estimation) following Ubelaker [12]. Age-at-death was estimated following Black and Scheuer [13], Brooks and Suchey [14], Lovejoy et al. [15], and stature was calculated using the Trotter and Gleser [16] regression equation for the femur.

According to the above-mentioned methods, the skeletal remains were estimated to belong to a white male, 20–30 years old, with a stature of 166.00 ± 3.27 cm.

The individual presented with a perimortem comminuted fracture of the proximal third of the left humerus, which was already noted during the excavation (Figure 6): part of the head of the humerus was detached from the proximal diaphysis, and a fragment of the diaphysis was detached from both the diaphysis and the head. The fracture complex is consistent with primary blast trauma, i.e. due to supersonic waves [17], or tertiary blast trauma (e.g. crushing trauma or traumatic amputation) following the impact of various objects or the ground [18]. No other skeletal elements presented evidence of perimortem trauma.

The contextual identification

Several WWI items and personal belongings were found together with the skeletal elements, including coins, a spoon, and even a small glass vial containing perfectly preserved iodine solution. The presence of all these objects allows two different (speculative) hypotheses. First, the soldier could have been buried by comrades—the position of the body was supine, revealing a certain care in how he was buried. However, the right arm was displaced, perhaps suggesting a

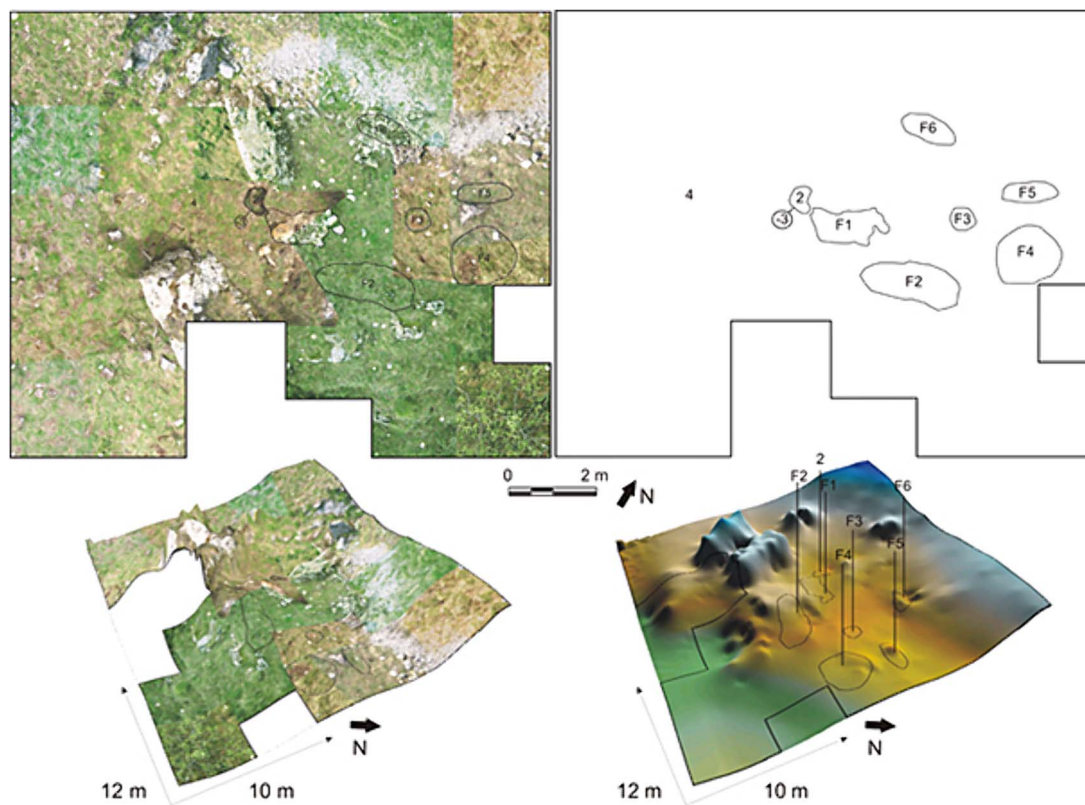


Figure 4 Orthophotomosaic of the area of the burial with the identification of the grave (numbers 2, -3, and Feature 1 = F1) ([9] p. 19).



Figure 5 The skeletal remains *in situ* during the initial stage of excavation. Note the position of the right arm, extended towards the margin of the grave (software Paint).

hasty burial, especially considering that nobody removed the objects, including coins and the ID tags. Or second, the body was in an advanced state of decomposition, and whoever dug the grave was uncomfortable inspecting and searching for items among the human remains. Whatever the reason, during the excavation phase, the abundance of objects found alongside the body suggested the possible presence of the ID tag, which is usually removed by comrades to send to the authorities to notify them of the soldier's death. Indeed, during the excavation, two ID tags were discovered: one was a metal box once containing a paper document, which was not preserved, and the other was the ID zinc tag, the "Piastrino di Riconoscimento 1892" mentioned earlier.



Figure 6 Multiple fractures of the left humerus as found during the excavation: the black arrow indicates the fractured proximal third of the diaphysis, the white arrow indicates the detached head of the humerus, and the grey arrow indicates a fragment of the diaphysis.

The zinc tag, although preserved and intact, was completely illegible. Therefore, a specialized laboratory (Trento Heritage Office) was asked to restore it, which ultimately revealed the following (Figure 7):

The first line reveals part of the surname and name. The second line contains the matriculation number. The third line indicates the year of birth (class), and the last one denotes the category, third in this case. The third category encompasses soldiers and non-combatant military personnel (such as medical personnel, cooks, quartermasters, drivers, etc.).

After the analysis, this information was forwarded to the Historical Office of the Army to verify the presence of one or more names with compatible data in the lists of the deceased and missing of the Italian Army during WWI.

It was then discovered that a soldier named Attilio Cesari, born in 1887 in Gaiole del Chianti (Tuscany), enrolled in the 69th Infantry Regiment, was reported missing in Val d'Astico on 15 May 1916. Val d'Astico is a long valley encircling



Figure 7 Analysis of the ID tag by stereomicroscope.

the mountain area that encompasses the Fiorentini plateau, including Costa d’Agra. The age at death of the remains was consistent with this soldier. The cause of death is generally reported as “combat” and the soldier was declared “Lost in Action”. Additional investigations were carried out to check for the presence of descendants useful for DNA testing, but no data about potential relatives (siblings or otherwise) associated with Attilio Cesari were found. However, considering all the elements available, and in the absence of evident discrepancies, the military authorities recognized this as a contextual identification.

The skeletal remains were buried as Attilio Cesari, with a ceremony to honour the soldier in the Military Cemetery of the Arserio village.

Conclusion

In the case illustrated here, a vast array of archaeological tools and methodologies was utilized, enabling the analysis of the site at various spatial scales, from aerial views to micro-surveys. The burial was eventually contextualized within the site of war; it was situated behind the first line of trenches where structures, likely used as barracks (e.g. warehouses and first aid stations), were present. In addition, this case exemplifies the remarkable and fruitful outcome of collaborative efforts among various stakeholders: members of local communities (including a relic hunter), military authorities (National Army and local police), archaeologists utilizing techniques for locating and excavating remains, forensic anthropologists and pathologists conducting osteological analysis, and restoration technicians.

This collaboration resulted in an identification, albeit presumptive, which, in some aspects, seemed improbable, as it pertained to a soldier born in central Italy who had perished in northern Italy a century before the body’s discovery. The

localization was informed by faint memories of a potential human bone found in a nondescript location in a very remote area of the Italian Alps.

To conclude, the successful outcome of this collaborative endeavour underscores the importance of technological advancements in archaeology and forensic science. The utilization of cutting-edge techniques by archaeologists, coupled with the expertise of forensic anthropologists, can significantly advance the investigation and understanding of recent or historical events.

In addition, local communities, ranging from groups of people to individuals, can play a pivotal role in investigations of this nature. In this instance, the interest in historical artefacts, rooted in local collective memory, acted as a catalyst for collaborative efforts that ultimately led to the identification of the soldier and facilitating the burial with military honours.

However, the main takeaway of this case lies in recognizing that neither a single individual passionate about local history nor advanced technology and scientific knowledge alone can suffice. The convergence of expertise and perseverance underscores the power of collective action: multidisciplinary and collective efforts, as demonstrated, can contribute to solving very complex cases, including those stemming from armed conflicts.

Acknowledgements

We want to thank Dr. Andrea Galassi, forensic pathologist, for his extraordinary insights into the use of forensic archaeology and anthropology techniques in the context of the Great War. Our gratitude also goes to Prof. Armando De Guio (UniPD) for his innovative research in applying archaeology to battlefronts and his numerous pieces of advice. We sincerely thank Prof. Cristina Cattaneo for her invaluable support in analysing skeletal remains throughout the project. We

also thank the Soprintendenza per i Beni Archeologici della Provincia di Trento for their availability and their magnificent restoration lab which restored the zinc ID tag. Thanks to the Italian Ministry of Defence for the splendid ceremony honouring the Fallen.

Thank you to all those who participated in the excavation: Prof. Stefano Vanin (University of Genova), Mattia Pavan (survey; ArcSAT), Guglielmo Strapazzon (geophysical surveys; UniPD), Salvatore Garofalo (UAV; independent researcher), Claudio Bovolato (topography; Geoarcheologi snc). Special thanks to Alice Rosa and Matteo Serena (students at the time at UniPD).

A thought goes to the memory of Adriano Mogentale, a kind and sensitive relic hunter, a special person.

Authors' contributions

Daniel Gaudio conceived the paper. Andrea Betto and Daniel Gaudio collected the data and wrote the manuscript. Daniel Gaudio revised the manuscript. Both authors contributed to the final text and approved it.

Compliance with ethical standards

The work presented was carried out in accordance with the judicial authority. After the analysis and the presumptive identification, the human remains were buried by and under the authority of the Italian Ministry of Defence, which is responsible for all the operation and management related to the human remains of the Italian fallen soldiers.

Disclosure statement

None declared.

Funding

The Authors would like to acknowledge the financial support of Provincia di Vicenza (years 2006–2009).

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