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Recognition of Cemetery Remains in A Forensic Context

ABSTRACT: The purpose of this paper is to provide guidelines for the recognition of human remains from modern and historic cemeteries found in a forensic context. Three avenues of evidence may be pursued to confirm the origin of cemetery remains: context, condition of the body, and associated artifacts. This article outlines types of North American cemeteries, demonstrating how land use over time has resulted in many being closed, moved, or forgotten, leaving only the context to indicate their presence. The condition of human cemetery remains varies considerably depending on cultural practices and burial environment, but many exhibit combinations of the following traits: dried or embalmed tissue; erosion of bony pressure points; cortical bone flaking; and bone damage due to autopsy or embalming. Examples of artifact types useful in recognizing cemetery remains are also provided. Two cases from British Columbia, Canada are presented to demonstrate the diagnostic features of a disturbed cemetery burial.

KEYWORDS: forensic science, anthropology, cemetery, human remains

According to Berryman and colleagues (1), 7.62% of 3386 forensic cases examined by anthropology diplomates of the American Academy of Forensic Sciences between 1985 and 1989 were historic in origin. The term historic varies according to jurisdiction as settlement patterns differed throughout the world. In North America, "historic" is typically used to refer to the period after European contact, but not extending into the modern era (often designated as the beginning of the 20th century). "Historic burials" can refer to remains interred in cemeteries or in other contexts, e.g., single burials of railroad workers located next to train tracks. In this paper the word cemetery used as a modifier, e.g., cemetery remains, indicates the body was originally buried in either an historic or modern cemetery. It does not refer to homicide victims dumped at a cemetery, nor to archaeological burials.

Of the 59 forensic cases examined by this author between 1996 and 2003, historic, non-cemetery skeletal material accounts for 5%, while cemetery remains (historic and modern) account for 6.7%. Human remains from both historic and modern cemeteries are becoming a routine part of the forensic anthropology caseload as a result of erosion, vandalism, construction and cemetery rezoning. Time and money can be saved on investigation if the cemetery origin of found human remains is recognized expeditiously. Three avenues of evidence can be used to confirm their nature: the context, the condition of the remains, and the associated artifacts.

Context

Cemetery Classification

Cemeteries may be divided into several categories, depending on the person or agency responsible for their upkeep. They may include: government (federal, provincial/state, regional district, improvement district, municipal), religious (often located adjacent to a

place of worship), undenominational (operated by trustees), fraternal orders, ethnic, private or family, commercial, historic, unclassified (in which the organization responsible cannot be determined—often small and run-down) and closed (2). Laws and conventions for the closure of cemeteries and use of cemetery land vary by region and over time. The type and location of the cemetery will influence the degree of upkeep, decision to close the facility, and the future use of the land, ultimately creating the circumstances responsible for the exposure and disinterment of human remains.

Before the inception of municipal cemeteries, the dead were buried in family graveyards in rural areas, churchyards/fraternal cemeteries in town, or institutional burying grounds such as hospitals or almshouses, as their circumstances warranted. In North America, family cemeteries were used for a limited period of time and, as a result, contained only a small number of individuals (2,5,6). Urban expansion into rural areas, the rise of municipal cemeteries, the partitioning, and the sale of family property are responsible for limiting the size of family graveyards (5). The history of the land has a significant impact on the fate of a family cemetery. Some are maintained for decades (6), while others are quickly forgotten (5). Today, home burial is still permitted in rural areas in many U.S. states. Cremated remains may be buried on private property in all states, and in all but California, cremains may be scattered at will, or with the landowner's permission (3).

The churchyard has always been a favored final resting place for its members. Since most churches were built near the centre of town, land allocated to the cemetery was limited. Many churchyard properties are now desirable real estate. Given the changing needs of modern congregations, it is not unusual for sections of church cemeteries to be closed and the bodies moved to the municipal cemetery, to provide space for new parish buildings or to generate income through land sales. In some cases all graves are relocated, in others only the burials in the partitioned area are removed (7–9).

Institutional burying grounds were often used for a limited duration. Many ceased operation when municipal cemeteries were established and over time were largely forgotten. The size of institutional cemeteries varies, ranging upward to several hundred burials

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(10,11). Cemeteries associated with hospitals may also have acted as disposal sites for amputated limbs and diseased tissues (12). In one instance, the basement of the old Medical College of Georgia became the repository of hundreds of skeletonized body parts from dissection classes held at the college (13).

In contrast to religious and institutional burial grounds, municipal cemeteries are usually established at the edge of town. The initial burials often include remains relocated from other cemeteries, as well as the recently deceased (2,7,9). Municipal cemeteries have not always been large enough to accommodate growing populations, or to handle the effects of demographic tragedies, such as epidemics, natural disasters and war. In some areas unsanitary conditions in municipal graveyards led to the creation of commercially owned cemeteries (4).

As early as 1850 in Ontario and 1879 in British Columbia, Canada, legislation was enacted to provide a means by which community-minded people could establish public cemeteries. Corporations formed under this legislation were never intended to become profit-making businesses. Entrepreneurs found a way around this difficulty, converting cemeteries into major financial enterprises by forming and contracting a second company to manage the cemetery for the original non-profit corporation. Similar arrangements are common in the United States (2,3).

Some commercially owned cemeteries, such as the Western Cemetery at Highgate in London, England, have suffered economic difficulties, making upkeep impossible. This has led to the closure and transformation of the cemetery into a heritage site and managed woodland, valued for its historic and architectural qualities (4). To prevent cemeteries from falling into disrepair, current legislation in many countries requires cemetery owners to set up perpetual care funds. Recently, cemetery companies in the United States have come under criticism for misuse of these monies (2,3).

The fate of a cemetery and its occupants depends largely on its nature and the person, institution, or corporation legally responsible for its upkeep.

Legal Exhumation and/or Relocation of Remains

Cemeteries fall out of use or are closed for a variety of reasons. One of the most common is lack of space. In anticipation of this problem, active cemeteries are seeking solutions for their space requirements. In some instances the issue can be resolved by purchasing new land. In others, it has meant decreasing the spaces between new graves, converting pathways to burial plots and even recycling graves (2,3). By 1974, Mountain View cemetery in Vancouver, Canada was selling 40-year licenses on plots, with an option to renew. At the end of the term, given the soil conditions at the cemetery, very little was expected to be left of the remains. Before the plot was reused, the headstone was to be moved to the perimeter of the cemetery, the remains collected and reburied in a portion of the grave (2). Similar arrangements are currently the focus of attention in parts of England and the United States (3).

Canadian legislation also allows for the disinterment of a body if: (a) it is buried in the wrong plot; (b) it is the focus of an investigation, usually at the request of the coroner or family member; (c) there is a desire on the part of the next of kin to move the body to a different cemetery; or (d) the cemetery is officially closed. The legislation does not state how the exhumation is to be accomplished, nor is it written in a manner that ensures all skeletal elements and associated materials are recovered (14).

Cemetery Closure and Disposition of Remains

Most jurisdictions have legislation to govern the closing of a cemetery, the use of its land, and the disposition of remains. In British Columbia, Canada, closed cemetery property may be sold or used for some other purpose, only if the remains are exhumed and relocated; with one exception. If the land is converted into a public park it is not necessary to disinter the remains (14). While such regulations are effective in the present, closing a cemetery was less systematic in the past.

Even when authorization to close a cemetery was sought and received, the disposition of the remains and subsequent use of the land was somewhat capricious. The intention was usually to move remains to municipal facilities or nearby locations, but there are numerous examples in which this process was only partially completed (7–10). In some cases, tombstones were removed, but remains were left in place (6–9,11). In one example, the land was subdivided, sold and paved over to create a parking lot (8).

Given the way in which cemeteries have been abandoned and land transferred or put to new use over the years, the disinterment of some cemetery remains is inevitable. The context in which the remains are discovered may be the first clue to their nature. In rural areas, or on land that has recently been subdivided for development, family graveyards can be expected. They are frequently found at the top of a hill, or overlooking water. Churchyards and properties located next to religious structures are also potential cemetery sites. Investigators should consider the possibility of a cemetery origin for remains found at these locations, even if the land is currently being used for secular purposes. Public buildings with long histories may once have housed a facility that maintained its own cemetery. The adjoining land is a likely site for such a purpose. The probability of finding a cemetery next to a public facility is increased if the land is now in use as a park or public greenspace. Municipal and commercial cemeteries tend to retain their character even after they have been closed, although some may be converted into public parks.

The nature of the site and its history can be established through land titles and property tax records. Provided the age of the cemetery is consistent with the condition of the remains, the context affords the first line of evidence to support a cemetery origin for the remains. Analysis of surface features and the use of ground penetrating radar (GPR) can be used to estimate the number of graves at the site. This information is useful in determining the size of the cemetery, and will help the landowner decide how to proceed if (s)he plans to develop the property. With a large burial ground, the owner may decide to section the property in such a way that the cemetery is left undisturbed. It may be more cost-effective to legally close a smaller cemetery, disinterring the bodies for reburial at another site.

Condition of the Body

The condition of cemetery remains can vary considerably depending on physical, chemical and biological factors, including: structures in which the body was buried, type of soil, drainage of ground water, practice of embalming, time since death, cause of death, and age-at-death of the individual. Thorough discussions of taphonomic factors affecting decomposition are presented elsewhere (15–18,19). In general, decay is slower and less complete when: burial structures do not create aerobic, acidic or wet environments; the soil is neutral (not acidic nor basic); there is good water drainage; the remains are embalmed; the death is recent, and was not due to wounds, injuries or diseases which ravaged the body; and, the individual was an adult.

The appearance of the body can be extremely variable, ranging from complete skeletonization to virtually intact with soft tissues, hair, finger and toe nails. The key factors influencing the degree and presence of soft tissue are time since death and the practice of embalming. Embalming fluid preserves, dehydrates, and hardens tissue by coagulating protein and impeding bacterial growth (1). The presence of embalmed tissue and the effects of embalming are indicative of a cemetery origin. Yet, the absence of embalmed tissue and embalming artifacts cannot refute the possibility of a cemetery burial, as embalming is not a ubiquitous practice. It is common only in North America, and is a relatively recent development. As late as 1900, embalming was the exception, not the rule. Today, embalming is not required by law, except in special circumstances (3). It may be more or less common in certain locations, depending on the ethnic or religious composition of the community. Some religions, Judaism and Buddhism for example, do not encourage embalming.

When present, embalming leaves characteristic effects on the remains and is associated with several distinct artifacts. The decomposition rates of embalmed bodies versus nonembalmed remains have been reported by Bass and colleagues (20) and Meadows and colleagues (21). The procedures involved in embalming, the artifacts associated with the process, and the physical characteristics of embalmed remains have been thoroughly described by Berryman and colleagues (1).

Given the variety of burial customs and burial environments, cemetery remains can exhibit a range of physical characteristics. Modern bodies may show evidence of autopsy, including the removal of the calva to facilitate examination of the brain, and ribs sectioned with the sternum to produce a breastplate that can be removed for access to the heart and lungs. During embalming of the brain, the cribriform plate may become fractured. Embalming may also delay decomposition of tissues, resulting in cracking and flaking of the skin (1). If make-up is used for open-casket viewing of the corpse, mold may form on the affected tissues (1). Fabric

impressions left by clothing, coffin lining and the coffin pillow may be observed on the skin (1).

The condition of bones will be significantly affected by water drainage. Where coffin construction and soil composition allow for drainage, bones will be in good macroscopic condition (6,7). Poor drainage and standing water contributes to the production of adipocere, while repeated wet and dry cycles can result in cortical flaking (1). In all cases, patches of eroded bone may be observed at pressure points of the body; the back of the skull, scapular spines, vertebral spinous processes, and os coxae, resulting from minor, repeated movement of the body against the hard surface of the coffin over time (1).

Associated Artifacts

The list of burial artifacts provided by Berryman and colleagues (1): coffin handles; hinges; nails; screws; ornamental coffin trim, such as cap lifters, cap plates, and decorative thumb screws, has been expanded by Kogon and Mayer (8). Their comprehensive list and descriptions of coffin hardware include stylistic information that can be used to date the artifacts to provide a time frame for the burial. Artifact dates may be used to establish whether the remains are modern or historic, as well as to link the remains to a specific grave to ensure proper reburial. Neither source describes the modern economical caskets frequently used for unclaimed bodies buried at the municipality's expense. These are of simple construction, made from particleboard, nailed or stapled together, affixed with metal looking, plastic handles (Fig. 1).

Two additional artifact types, designated by the author as grave artifacts and mourners' artifacts, may be associated with modern cemeteries. Grave artifacts include objects that are placed at the grave as part of the burial process, including tombstones, plaques, statues, mausoleums, fences, and other permanent fixtures (Fig. 2). Mourners' artifacts include nonpermanent objects periodically brought to the site by mourners to honor the dead. These



FIG. 1.



FIG. 2.

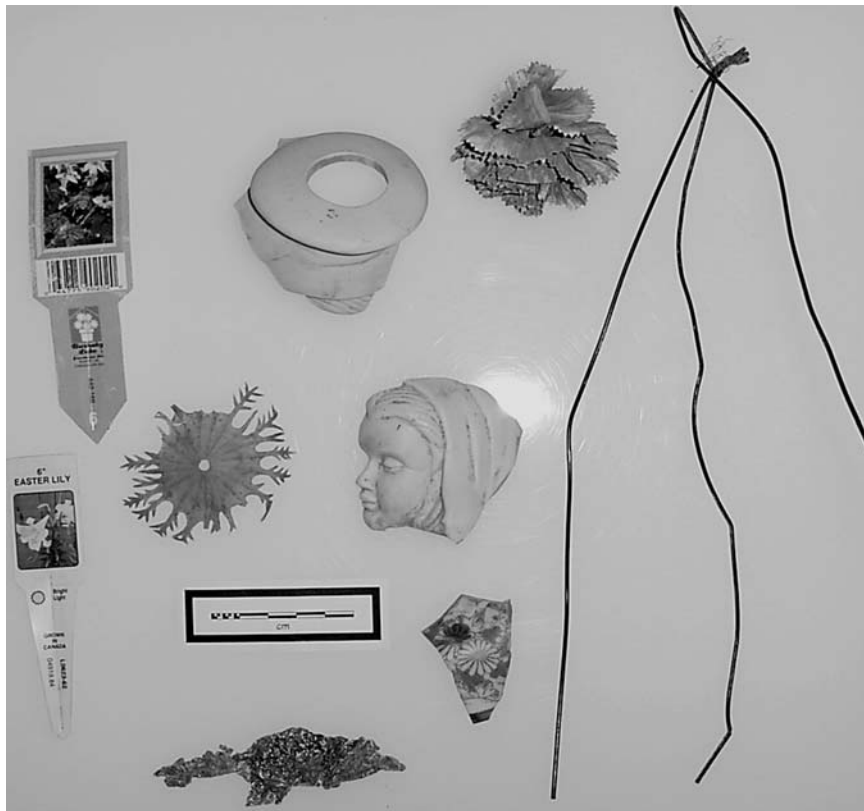


FIG. 3.

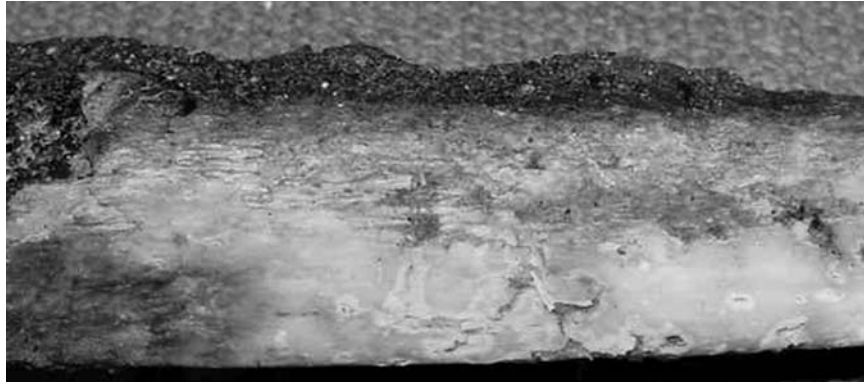


FIG. 4.

include intentional items such as flowers in pots, vases, jars, or other containers, as well as incidental objects, such as the plastic information strip found in potted plants, or the colored foil that covers the exterior of potted plants (Fig. 3).

Case Examples

In 1997, a human cranium and left tibia were found near a municipal cemetery in British Columbia, Canada. Circumstances suggested the remains were accidentally disinterred from one of the graves. Inspection of the tibia revealed cortical flaking (Fig. 4) consistent with the wet/dry cycle frequently experienced in coffin burials (1). Examination of the cranium revealed the presence of an eye cap (Fig. 5 *a,b*); a plastic disk, smooth on the concave surface to give shape to the eye, and spined on the convex surface to secure the eyelids closed (1). Because the remains were consistent with a cemetery origin, the police and coroner were satisfied the bones were of no forensic significance.

In the summer of 2000, owners of a townhouse complex in British Columbia, Canada purchased clean fill from a cemetery to build bicycle paths along the back of their property. Halfway through, the project was halted due to rain. Once the skies cleared, the homeowners went out to examine the paths. The trail was intact, but a human maxilla with articulated facial bones was discovered on the surface. The remains presented two possibilities. Either they came from the so-called clean fill, or they were unassociated with the formation of the path and were dropped or placed there sometime during the rainstorm. The forensic odontologist who examined the dental work stated the modifications in question have not been used in Canada for more than 30 years.

The author was contacted by the investigating officer and the coroner's office and asked to examine the facial skeleton to confirm or refute a cemetery origin and to examine the remaining dirt and paths to ensure no additional skeletal material was present. The bone was dry and brittle; no tissue or periosteum remained; dirt was adhered to the bone, filling some of the sockets of teeth lost postmortem. None of the postmortem damage was recent; the edges were soil stained to the same degree as the rest of the bone. The condition of the maxilla indicated it had been buried for an extended period of time (Fig. 6).

The fill was screened and the paths were shovel tested. No additional skeletal material was recovered, but several items commonly associated with cemeteries and burials were located. The artifacts were divided into four categories: grave artifacts (primarily fragments of tombstones) Fig. 2; mourner's artifacts (pieces of vases, plates, jars, plastic flowers, plant pots, wire plant hang-

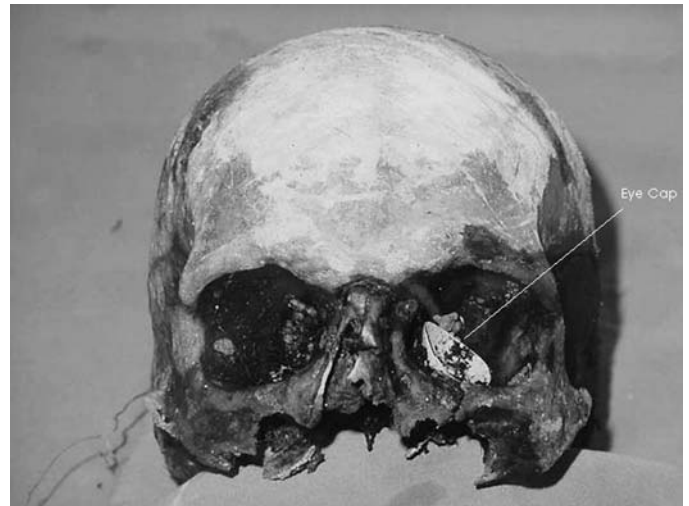


FIG. 5.

ers, and foil from plant pots) Fig. 3; construction artifacts (nails, hinges, particle board, etc.); and miscellaneous artifacts (fragments of textiles, electrical light fixtures, coins, etc.). Although the fill was sold as "clean," it contained several items intimately associated with cemeteries. The context and condition of the remains were consistent with a cemetery burial and were deemed "of no forensic significance." The unusual nature of the discovery led to a



FIG. 6.

coroner's investigation to determine the circumstances and person(s) responsible for depositing the remains in the fill, and the identity of the individual to facilitate proper reburial.

Discussion and Conclusion

Cemetery remains come to the attention of the police and local coroners on a regular basis through the development of land containing religious, institutional, or family burial grounds, as well as through deliberate and accidental disturbance of graves in modern cemeteries. Clues to the nature of cemetery remains may be subtle, requiring different lines of evidence to support the assessment. The physical condition of the skeleton may not be diagnostic, as several of the characteristics common to cemetery remains may be observed in forensically significant cases, e.g., cortical flaking, and pressure point erosion. Similarly, the context on its own is not sufficient to confirm a cemetery origin, since a killer could dispose of a body at, or near a cemetery. Embalming artifacts, in contrast, are highly consistent with a cemetery origin.

The nature of the site may not be immediately apparent, as many historic cemeteries have been forgotten over time and the land used for other purposes. The location, current use of the site, and the proximity to churches and public buildings are indicators of a potential historical cemetery. Early recognition of cemetery remains by a forensic anthropologist will provide direction for the police and coroner's investigations, forestalling an unnecessary homicide investigation.

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