CHAPTER 2

Documenting Context at the Outdoor Crime Scene: Why Bother?

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Introduction

Law-enforcement protocols for processing indoor scenes are well established (DeForest et al. 1983; Fisher and Fisher 2003; Gardner 2005; Miller 2003; Saferstein 2009; Swanson et al. 2006) and provide scientifically validated, courtroom-defendable reconstructions of past events. Law-enforcement protocols for processing outdoor scenes, however, are basically nonexistent. The reasons for this situation are unclear. Perhaps there is a sense that outdoor scenes contain too many variables, including the size of the scene, that do not easily allow for distinguishing forensically significant evidence from natural artifacts. Perhaps too many "agents," such as animals, rain, snow, and even gravity have conspired to modify the scene since the time of the original deposition of the body. These factors often make it seem to be nearly impossible to accurately reconstruct events surrounding the incident. Whatever the reasoning, it is clear that outdoor scenes are not processed with the same high standards as indoor scenes. Before we give up, we must make an effort to find a method or practice that attempts to produce comparable results. If the results are not found in modified indoor scene methods, then we must look elsewhere to see if other methods can produce results comparable to indoor investigations.

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The Forensic Death Investigation

In the typical investigation of a suspicious human death, a multidisciplinary approach is utilized to answer four universal questions: (i) Who is the victim?; (ii) How did they die?; (iii) What are the circumstances leading up to and surrounding the death; and (iv) Was anyone else involved and, if so, who were they? Each law-enforcement agency and forensic specialist has a specific role to play. The investigation is conducted at the crime scene as well as beyond the initial scene through interviews and background research (Swanson et al. 2006).

Data-collection episodes

A typical forensic investigation of a recently deceased individual includes three distinct episodes of data collection: at the scene, at the autopsy, and in the laboratory. The information collected at the crime scene (data-collection episode 1) regarding how the body is situated relative to other evidence is of benefit to the analysis and interpretation of the condition of the remains at the autopsy table during the postmortem examination (data-collection episode 2). The final data collection (data-collection episode 3) involves the analysis in the laboratory of the forensic evidence related to the body and the scene. The coroner or medical examiner considers data collected during all three stages in the final determination of cause, circumstances, and manner of death. Importantly, the success in each stage is strongly influenced by success in previous stages. If the initial stages are improperly documented or analyzed, subsequent stages suffer in a domino effect.

Protocols for forensic pathological examinations and most laboratory analysis of forensic evidence are well established (DeForest et al. 1983; James and Nordby 2003; Spitz and Spitz 2006; Swanson et al. 2006) and are beyond the scope of this chapter. The focus, instead, is on the processing of the crime scene, specifically the outdoor crime scene. However, before we consider outdoor scene recovery protocols and determine whether they are worth the time and effort, let us examine what is expected of a rigorous indoor scene recovery and determine whether we can apply lessons learned to the outdoor scene recovery.

Criminal Investigations and Processing of the Indoor Scene

At indoor crime scenes, well-trained crime scene investigators conduct the documentation of evidence and reconstruction of the circumstances of death. All potential evidence in the room is left undisturbed prior to notation of its precise location and orientation relative to the body, other evidence, and to features of the room. The focus is not just on the recognition and collection of physical evidence at the scene, but on the careful notation of the precise relative position of physical evidence. The *context* and *association* of the evidence is considered just as important as the evidence itself. The working assumption is that if context is carefully noted, then very accurate, very precise, scientifically defensible reconstructions of sequences of past events can be created. Notation of context takes the form of written notes, photographs, and sketches of the scene. Likewise, *chain of custody*, the detailed, recorded path of

evidence through the hands of law enforcement, forensic scientists, and the legal system, begins with the description of the evidence *in situ* at the scene (Saferstein 2007). It continues through the postmortem examination of the body, the laboratory analysis of the evidence, and eventually the presentation in court. The best example of "out-of-context" evidence is evidence that has been moved prior to full documentation at the crime scene. This transgression of proper recovery protocols could result in dire consequences for the successful litigation of the case since the potential exists for the evidence to be considered inadmissible in court.

In conclusion, we see that *much* is expected of the indoor crime scene recovery. The goal of these recoveries is not only to document the final position of physical evidence relative to other evidence and to the scene (context and association), but also to attempt to accurately reconstruct events and any modification to the scene. These scenes are handled by forensic investigators who routinely receive extensive training in the documentation and collection of physical evidence from indoor crime scene contexts. Additionally, much law enforcement and forensic science research and literature is devoted to this topic.

Following the recovery at the scene, the remains of the victim are taken to the morgue for forensic pathological examination (termed the *forensic autopsy*) with the express goals of providing an identity for the victim through unique soft-tissue characteristics such as fingerprints, tattoos, etc. (Spitz 2006) and determining a cause of death (Wright 2003a). Cause of death refers to the specific cause or sequence of events leading to the death of the individual; hundreds have been described (Spitz and Spitz 2006). Final assessment of identity and cause of death is often aided or corroborated by analyses conducted by experts in other related forensic fields, such as forensic odontology and fingerprints (for victim identity), forensic toxicology, ballistics, forensic entomology, and even forensic anthropology. These analyses have scientific validity because the context of the evidence is well documented and well known. In addition, the location, position, and orientation of the body at the scene play an important role in final determination of cause of death.

The coroner or medical examiner must then assimilate all of the information gathered by law enforcement, the forensic pathologist, and the various forensic experts in order to provide a feasible and defendable determination of victim identity and *manner of death*. The options available to the coroner/medical examiner for manner of death include *homicide*, *suicide*, *natural*, *accidental*, and *unknown*. Again, context of the body is paramount to proper determination of manner of death (Wright 2003b).

Finally, it is the District Attorney or prosecutor who then determines whether societal laws have been broken, which specific laws are involved, and what the appropriate course of action is for addressing these transgressions. The decision to try accused perpetrators in a court of law, however, often comes down to the "weight of the evidence"; that is, how much evidence is available and whether it has been collected, documented, and analyzed appropriately and can be used effectively in court.

In summary, the key to a properly functioning chain of investigation and prosecution is that complete information has been appropriately collected and analyzed during *all investigative levels*, beginning with the proper processing of the scene. It is clear that investigative protocols employed during the processing of the victims found at indoor crime scenes typically yield successful results.

Law-enforcement Perception of the Outdoor Crime Scene

When the crime scene is located outdoors, however, there are a vast number of extrinsic factors that can affect the crime scene and potentially lead to a sense of futility in any attempt to fully document and, ultimately, interpret the scene (Figure 2.1). These factors may include geological, environmental, plant, and animal disturbances that can alter the scene and the final disposition of evidence. Long-term exposure of the human remains to the environment and to animals inhabiting that environment can lead to the assumption that the range and depth of comparable information that is

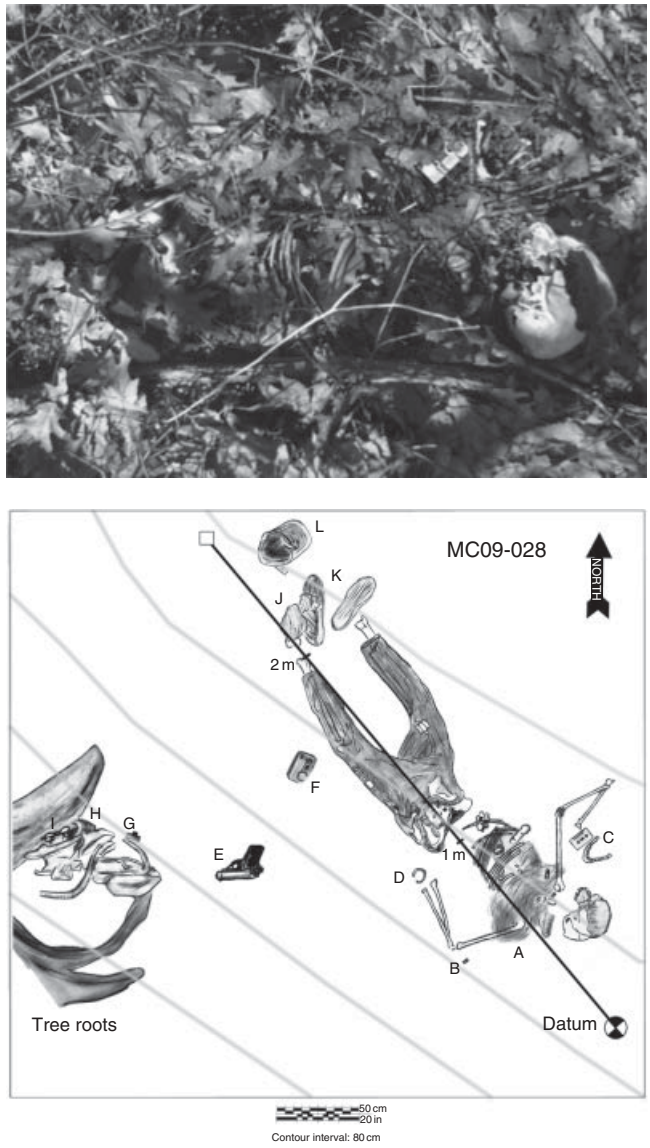

Figure 2.1 Superior view of human remains prior to recovery (top) and plan-view map of remains (bottom).

retrievable at the indoor scene was long ago swept away in the outdoor scene. Animals may have eaten biological tissues or dragged the bones away. Rain and snow may have washed away evidence or shifted it from its original position. This means that the original context of the remains at the time of emplacement has been altered. Why bother then? Significant or useful patterns to be revealed from the remains dispersal are not discernible to the naked eye. The perception is, therefore, that they are either irretrievable or not there at all. Thus, any extensive effort with regard to carefully clearing the site and carefully noting the location of evidence would likely be a waste of time and a waste of limited resources. As a result of this line of thinking, the processing of the outdoor scene often boils down to taking a series of photographs of the body or body parts, followed by the random collection within a reasonable time frame of as many of the bones as are visible on the surface. Often, this is done without knowing which skeletal elements were left behind or assuming that missing elements were removed by animals. In some cases, buried bodies are removed using shovels or a backhoe. Additionally, even though the body may have been at the scene for months or years, there is an overwhelming desire to get the remains to the morgue as quickly as possible.

In these cases, the remains are then taken to the morgue for postmortem examination, and various evidentiary materials collected at the scene are distributed to the laboratory departments as necessary. However, in this case, unlike the indoor scene, very little hard data are available for the reconstruction of the circumstances of death since little or no information regarding context was collected at the scene. Anecdotal reconstructions of what happened at the scene tend to replace defendable event reconstructions that are typically provided by thorough indoor-scene processing protocols.

Can Indoor Recovery Methods Apply to Outdoor Scenes?

Let us assume, however, that there are actually useful and significant patterns in the seemingly disturbed jumble of bones in the outdoor context. Can we apply indoor recovery methods to outdoor scenes and expect the same results as we do of indoor scenes? A search of the law-enforcement literature (e.g., Gardner 2005; James and Nordby 2003; Saferstein 2007, 2009; Swanson et al. 2006) and training regimens reveals, however, that there are no comprehensive recovery protocols derived from the well-developed indoor methods. Aside from a few references to outdoor searches, which are outdated and ineffective, and discussion of how to process footwear and tire impressions (Bodziak 2003a, 2003b), there is no specific discussion of the outdoor scene; it is largely ignored.

Why Not Forensic Archaeology?

There is a discipline outside of law enforcement that actually attempts to derive vast amounts of data from outdoor scenes. That field is *archaeology*. Archaeology is the "study of the human past, the basis of which is material evidence (artifacts, ecofacts, human remains) and its context" (Stewart 2002: 2). Interestingly, the goals of crime

scene processing and archaeology are identical: *reconstruct and understand past events.* This is accomplished in both disciplines through a careful consideration of the context of the evidence relative to the scene (Dirkmaat and Adovasio 1997; Fisher and Fisher 2003; Hester et al. 1997; Hurst Thomas 1998; Joukouwsky 1980; Stewart 2002).

It has been suggested that effective and efficient protocols drawn from archaeology can be effectively applied to outdoor crime scenes (Connor and Scott 2001; Dirkmaat and Adovasio 1997; Haglund 2001; Hochrein 2002; Krogman and İşcan 1986; Sigler-Eisenberg 1985; Skinner and Lazenby 1983; Stoutamire 1983) in the discipline that melds both forensic anthropology and archaeology. That discipline is *forensic archaeology*. It is time to evaluate these claims. Rather than present a list of activities that should be completed at the outdoor crime scene, it is necessary to justify the use of these methods and compare the resulting outputs with those derived from the proper processing of the indoor scene.

Contemporary Archaeological Principles

As described above, the primary goal of archaeology is to "obtain valid knowledge about the past" (Shennan 2004: 3). In practice as well as in theory, both archaeology and criminalistics share the common goal of systematically documenting, collecting, and interpreting physical evidence for the purpose of understanding the factors that affected the depositional history of that evidence (Dirkmaat and Adovasio 1997).

David Hurst Thomas has suggested that archaeology operates at three hierarchical "levels of archaeology theory": high level, middle level, and low level (Hurst Thomas 1998). The first level, termed low-level theory, can be created after basic archaeological data sets – the "material record" (Shafer 1997) – are recovered. These data are used to address questions such as: (i) *Who* was involved in creating the situation?; (ii) *What* are the material signatures of those individuals?; (iii) *How many* data sets (e.g., artifact, ecofact, paleoclimatic information) of these activities are available?; (iv) *Where*, specifically, did the event occur?; and (v) At what particular point in time (*when*) did these events transpire? Middle-level theory (Shafer 1997) attempts to address how the archaeological record was formed by the human actors, an approach championed by Binford (1983) (e.g., how did things transpire at a particular locus and time?). The link between human behavior and the resulting material culture occurs at this level. Finally, the third level (high-level theory) asks why did the event occur, searching for underlying processes and explanations. The goal is to identify generalized laws (termed *nomothetic patterns*) that can be used to explain the past (Hurst Thomas 1998; Shafer 1997).

Addressing low-level questions always begins with good, exacting archaeological excavation techniques that are used to recover evidence *in situ*. This methodology permits a thorough understanding of the relationships (spatial and temporal) between evidence, scene, and environs. James Adovasio (personal communication; Dirkmaat and Adovasio 1997) suggests that proper archaeological excavation has three primary and interdependent responsibilities:

1. *Defining site stratigraphy and stratification*. Stratification refers to the actual observed sequential layering of deposits (i.e., the pages in a book) while stratigraphy is the sum total of the processes that produces these accumulated layers

(i.e., the story). All stratification adheres to certain basic "rules" or laws, often called Steno's principles, which include the laws of superimposition, original horizontality, lateral continuity, and intersecting relationships (see Dirkmaat and Adovasio 1997). The key to understanding stratigraphy is the successful identification and differentiation of individual stratum. This requires excavation skills and attention to detail. For example, most of the individual stratum within the deposits at Meadowcroft Rockshelter, Avella, PA, were very thin and required excavation with razor blades (Carlisle and Adovasio 1982).

2. *Establishment of "context."* Context is an object's place and time in space and includes both physical and temporal coordinates. Documenting and understanding context is critical. It begins with the careful documentation of the position of any and all objects within a stratum relative to all other objects in all other strata (Joukowsky 1980).
3. *Demonstration of "association."* Association means that two or more objects entered the archaeological record at or about the same time as a consequence of the same process, event, action, or activity. Association is the most difficult concept for an archaeologist to prove. Only after context has been established via precise manual or computer-aided mapping is it possible to establish which items entered the depositional record as a result of the same process, and hence which items are associated.

These three responsibilities absolutely require good archaeological excavation methodologies, principles, and practices. Once context and association have been satisfactorily established, the archaeologist can then move on to addressing middle-level questions and, finally, generate high-level theories.

This perspective on how to extract information and answer "how, when, and where" questions from outdoor contexts that usually contain only very ephemeral evidence of past activities is of obvious value when considering how to extract information from outdoor forensic scenes with evidence of relatively recent events. Each set of questions can only be answered reliably if the questions of the previous level have been properly addressed.

In summary, comprehensive scene documentation and recovery methodologies are routinely employed by archaeologists at outdoor sites to maximize the efficient and accurate collection of a wide variety of data. The goal of the excavation and recovery efforts is not simply the exposure and collection of the artifacts, but the detailed reconstruction of past behaviors. As such, it is imperative to properly document the contextual setting of each and every artifact, as well as to document and collect more minute evidence of the environmental and climatic setting. Only then can associations of artifacts be established and the story constructed. There are lessons here for the processing of outdoor forensic scenes.

The Outdoor Forensic Scene

Many questions need to be answered when a body is found in an unexpected location: How and when did the body get to the scene?, Were there other individuals involved?, If so, how many?, Who were they?, Did they come back to modify or disturb the remains?, and If the person was murdered, were they killed at the scene and left there,

or were they killed elsewhere? The recovery of a set of human remains at any crime scene must be undertaken with the express purpose of answering as many of these questions as possible. Again, in the same way as archaeology, this boils down to efforts to reconstruct and understand past events.

It is also clear that, in both archaeological and forensic investigation, the objects themselves recovered from these scenes (artifacts, human remains, evidence) cannot answer any of these questions without a thorough understanding of their contextual place in time and space. From a forensic perspective, evidence taken from an indoor crime scene without careful notation of *in situ* placement and position within the scene has very little prosecutorial value. It is surprising that this central tenet is misunderstood or dismissed at the outdoor scene.

It will be argued here that, in nearly every instance, comprehensive notation of context at the outdoor scene, especially in the form of carefully drawn maps of the spatial distribution of evidence, will provide significant information with respect to the original position and orientation of the body at the time of deposition, time-since-death estimates, and identification of factors altering the body since death. Such notations go a long way toward answering the important questions discussed earlier.

Defining Context at the Outdoor Scene

The use of the word "context" at the outdoor crime scene relates to: (i) the primary objects of interest (i.e., physical evidence, including the body and associated items); (ii) the surrounding biotic (plants and animals), geophysical (soils, geomorphological features, and water), and climatic environs (temperature, precipitation, and humidity); and (iii) the passage of time since the evidence entered the scene (the temporal context). There must be an attempt to document the interplay of these factors at the forensic locale from the time the victim and, if relevant, the perpetrators entered the scene, to the time that the body was placed at the scene, to the time of recovery.

It is emphasized in both criminalistics and archaeology that the recovery process of artifactual or physical evidence effectively destroys context. As a result, it is imperative that comprehensive and accurate documentation of the contextual setting of each artifact be completed during the recovery. Standard documentation procedures in the archaeological investigation of a site or scene include descriptions of the geophysical, biotic, and environmental setting, as well as specifics of the associations of all of the physical evidence to the entire contextual setting. These details are documented via written notes, photographic and videographic images, and detailed maps (plan view and profile) of the spatial distribution of evidence relative to topographic and other features of the physical setting. The documentation protocols and methodologies clearly parallel those required for accurate processing of forensic scenes. Such procedures yield a wealth of information that is often crucial to the resolution of the case.

Forensic Archaeology

Archaeology, as applied to crime scenes and the processing of the recently deceased, has been termed *forensic archaeology*. Serious discussion of the components and the utility of forensic archaeology has been in play since the 1980s (Lovis1992; Morse et al. 1983;

Skinner and Lazenby 1983) and has proven beyond doubt that there is always important information to be gathered at the outdoor scene (Dirkmaat and Adovasio 1997; Dirkmaat and Cabo 2006; Dirkmaat et al. 2008; Dupras et al. 2006; Galloway et al. 2001; Komar and Buikstra 2008). Further, reconstruction of past events at outdoor crime scenes can be as thorough and far-reaching as indoor crime scenes. It is the contention and experience of this author that when efforts are made to carefully document an outdoor scene, especially with regard to mapping procedures, previously unnoticed patterns of spatial distribution of evidence will always be revealed, and significant information regarding the events at the scene will become available.

The types of evidence and information that can be obtained from employing forensic archaeological protocols include: (i) the original location and position of body at time of emplacement at the scene, (ii) the identification of taphonomic agents responsible for dispersing remains and explanation of why remains are not where they should be, (iii) the maximum of skeletal elements and evidence, and (iv) a more informed idea of how long the body has been at the site. Is this done through magic and a cast of thousands? No! Forensic archaeology, as a conceptual discipline, is based on proven contemporary archaeological principles that have been developed and used by archaeologists over the course of the past 100 years. In order to reconstruct past events in outdoor forensic settings, some modifications are required due to the nature of the evidence and legal considerations.

A Case Example

Perhaps the best way to illustrate how important context is to the final interpretation of the outdoor crime scene is to describe a recent forensic case (Figure 2.2). We will compare and contrast the outcomes of two potential scene-recovery options that law enforcement could have taken. Although details have been changed to protect the innocent, the components of the case are not atypical.

In the late spring in Pennsylvania, police were led to a scene where the body of a teenage girl had purportedly been dumped 15 summers earlier (Figure 2.2a). Wading through an overgrown patch of thick brush along a country road on private farm property, a police officer saw what looked like part of a human skull. The immediate area had also served as a dumping ground for road-kill, butchered white-tailed deer (*Odocoileus virginianus*), and other animals. Sun-bleached bones and carcasses with dried tissue were strewn all along the edge of the road. Two major options were available to the officers at this juncture.

Option 1: nonarchaeological recovery

The first option is to clear the major brush from above the body without worrying about any grass undergrowth or leaf litter covering the remains. Pictures of the bones visible on the surface around the skull are taken, after which any bones in the immediate area are collected. This bone collection likely includes animal bones as well, due to the unskilled bone collectors who are unable to differentiate between human and nonhuman elements. All evidence is then be placed in a body bag and sent to a forensic pathologist for an autopsy.

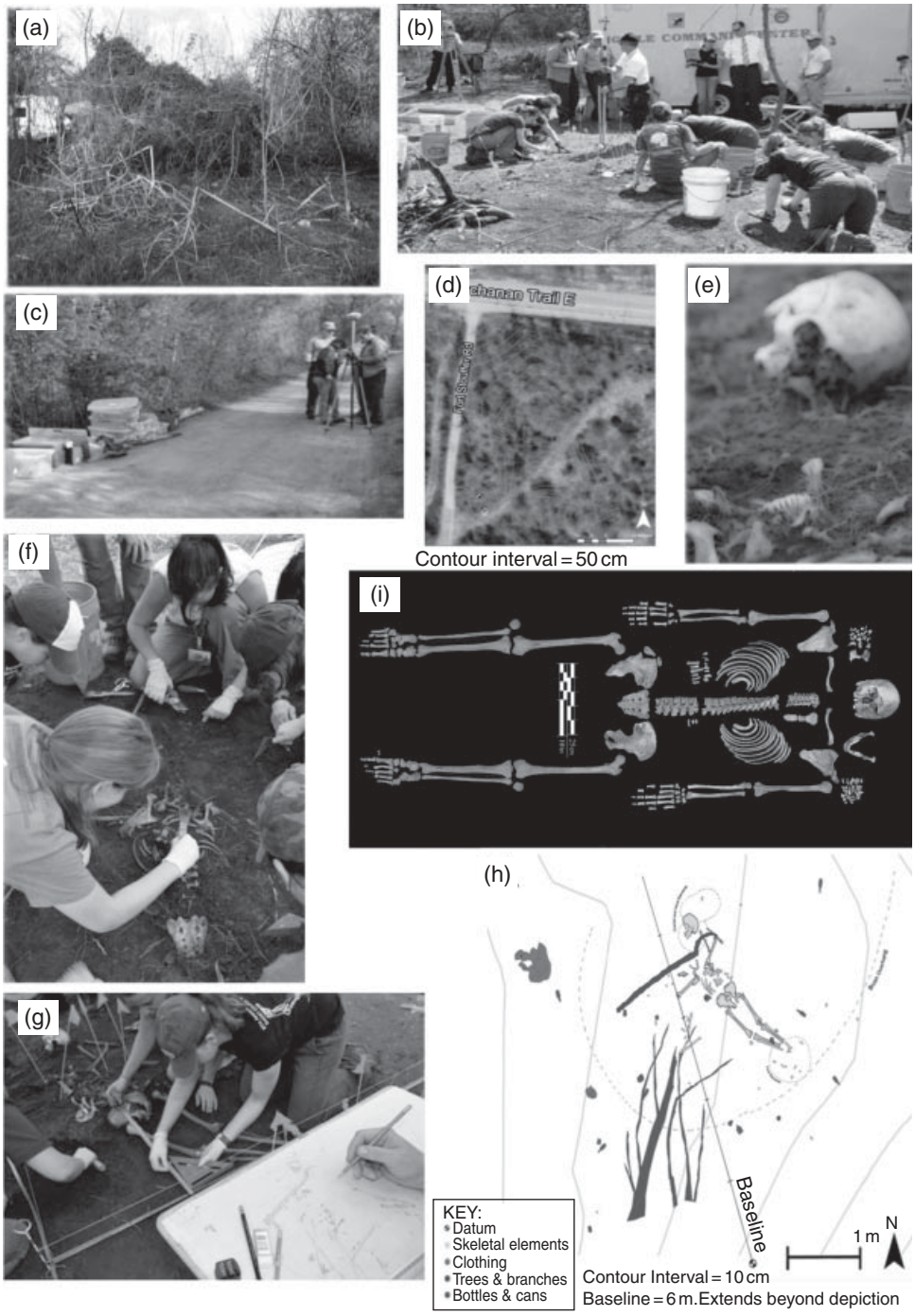

Figure 2.2 Details of case study. (a) General view of site prior to forensic archaeological recovery; (b) clearing the site of surface debris and exposing human remains; (c) taking provience data with survey-grade GPS unit; (d) geographic information system map of site; (e) close-up of skull (exhibiting trauma) and mandible; (f) final exposure of remains; (g) mapping procedure; (h) final map; (i) skeletal remains in the laboratory.

The forensic pathologist then sorts out the human bones from the animal bones (although they are not quite sure about a few of the bones, especially the broken ones) at the postmortem examination. The focus is on the skull. Many of the bones of the face are separate from the cranium and exhibit significant fractures (Figure 2.2e). Unfortunately, not all of the bones are present in the assemblage on the autopsy table. The forensic pathologist asks the police whether the bones were separate at the time of discovery, or whether they may have been broken when the skull was picked up, or during the transport in the body bag to the autopsy. No one can answer with 100% certainty.

Given the epiphyseal lines on some of the bones, the pathologist indicates that the remains are likely those of a juvenile. However, in terms of sex determination, the small size of the bones may be due either to youth or to the female sex. One important characteristic that could have been used to positively identify the individual was two distinctively chipped upper incisors noted antemortem on the suspected individual. No previous characteristic dental work had been completed on the individual. The incisors were not present in the recovered remains. Likely, they were left at the scene, given that they are single-rooted and easily fall out of their alveolar sockets during decomposition. Since possibly 15 years have elapsed from the time that the body was deposited at the site to discovery, mitochondrial DNA testing may be required, an expensive and time-consuming proposition.

However, before sending the bones away for DNA testing, the investigators determine that fine-tuning of the biological profile would be helpful. The bones are boxed up and sent to a forensic anthropologist, who may turn up some other useful information.

The box of bones arrives in the laboratory of the forensic anthropologist. The main question still regards the identity of the individual. The bones reveal that the individual was a white female, 15–20 years of age, with a stature of 162 to 172 cm (Figure 2.2i). This fits the profile of the person for whom the police were searching. However, the issue of positive identification remains, and mitochondrial DNA analysis is still required.

What about these questions…?

In addition to addressing the biological profile, other questions will be asked: Were the remains totally on the surface since the time of deposition, or might they have been partially or wholly buried?, Could the bones have been at the site for 15 years?, Did someone come back to the site and disturb the remains to hide evidence?, Does the fact that there are missing elements indicate removal by the perpetrator?, Could the body have been elsewhere for a time before being dug up and taken to this site, thus indicating a secondary burial/deposition?, and How was the body placed at the site: face up, face down, extended, or in fetal position? These are all important questions since the perpetrator provided a description of the events.

And can these questions be answered from the bones in the box?

All of these questions relate to what happened to the body during and since placement at the scene. The study of the manner in which these postdepositional factors affect the remains has been termed *forensic taphonomy* (described more fully in Chapters 1, 24, and 25 in this volume). Forensic taphonomy requires analysis of the bones *plus* evaluation of the contextual setting from which they were recovered.

In this scenario, *none* of the forensic taphonomy questions can be answered with any scientific backing; we are forced to rely on conjecture and anecdotal evidence.

Option 2: forensic archaeological recovery

Instead of hastily removing the remains with very little consideration for documenting context, law enforcement has decided to enlist the help of a forensic anthropologist or forensic archaeologist to conduct the processing of the outdoor scene. Although each scene is unique, certain basic procedures are common to every forensic archaeological outdoor scene recovery.

Step 1: clearing the scene of overlying debris unrelated to the incident

The first step of the process would be to clear all of the vegetation and debris overlying the remains (Figure 2.2b and f) in order to see the position and orientation of the bones and evidence. This includes clearing the major brush over the remains, as well as sticks and leaf litter. None of the evidence is moved at this point. Forensic anthropologists are also valuable during this process for their role in the evaluation of significance. In this case, human remains were separated from animal remains at the site and in real time. This "ability" thus increases efficiency of the process effort since extraneous evidence (in this case, animal bones) does not enter the chain of custody process.

Throughout the process three types of information are routinely collected to document context: (i) written documentation, (ii) photographic documentation, and (iii) detailed mapping of the scene and the spatial distribution of evidence.

Step 2: documenting context through written and photographic protocols

Written documentation serves as a journal of events associated with the recovery: *who is doing what*, *at what time*, *and what was found*. The second role of written documentation is to fully note the general contextual setting of the scene including topography, vegetation, amount of shade, etc. The collection of this data is best done through standardized forms so that the same information is collected for all sites. This will allow for intra- and intersite comparisons that will reveal previously hidden patterns in much the same way as crime mapping reveals patterns. Photographic protocols now include exclusively digital images, useful because of the imbedded metadata related to the image (such as camera settings, date stamp, etc.). Documentation of activities plus *in situ* images of the scene and evidence are obtained.

Step 3: documenting context through mapping protocols

The third type of context notation is through the three-dimensional mapping of the scene and surrounding area. This is done at the global level through global positioning system (GPS) units. The immediate area around the scene is documented through more sophisticated mapping instrumentation, including the electronic total station and survey-grade GPS units. Geographical information systems (GIS) software can also be used to produce a contour interval map of the scene (Figure 2.2c, d). The third level of mapping is through the production of hand-drawn maps showing the position and orientation of each element and piece of evidence found *in situ* at the scene.

The precise mapping of the scene is one of the most important parts of the recovery. The focus is to produce an accurate depiction of the scene via a plan-view map, noting where every piece of evidence is located relative to other evidence, and also to elements of the scene. This can be approached a number of different ways. If the remains are close together, a baseline or grid system can be used. If the remains are widely scattered, as in a plane crash, a total-station or survey-grade GPS can be used to piece plot each skeletal element and piece of evidence (Dirkmaat and Hefner 2001). Each evidentiary item is given a unique identifier at the scene so that the location and orientation of every bone is known and the pattern of spatial distribution of elements can be analyzed. In this particular case, a baseline mapping protocol was followed to produce the plan-view map (Figure 2.2 g, h).

Summary of the recovery

After 5 h, the scene was cleared of vegetation and all human remains (in this case, only bones) were found. The position of each piece of evidence was noted *in situ*, via a detailed plan-view map of the scene. A link between each bone and the map was established, as was the proper chain of custody.

Scene and events interpretation

The forensic archaeological recovery described above, in combination with the analysis of the bones themselves, detailing any surface modification, trauma, etc., in the laboratory, provides the only path to conducting a detailed forensic taphonomic analysis of the scene and the remains. As noted above, *forensic taphonomy cannot be completed solely on the basis of the bones.* Only with the coupling of context with bone analysis can interpretations of how the body was placed at the scene, identification of taphonomic agents modifying the remains, and production of scientific-based estimates of postmortem interval, be produced.

The vast majority of the remains were still in relative anatomical position, indicating that the individual was placed at the site shortly after death and that decomposition occurred at the scene. It became clear that the victim was placed face down on the surface at the site. The body was oriented with the head to the northwest and feet to the southeast. The legs were fully extended and the arms bent at the side of the body. There is no indication that the body had been disturbed by humans after placement to hide evidence or otherwise. There is evidence that animals were involved in moving a few bones of the hands and feet from their original position.

All of the fractured bones of the face were recovered *in situ*. Because of the forensic archaeological recovery protocols employed, no subsequent postmortem damage was inflicted on the bones after discovery due to poor excavation, collection, or transport factors. This allowed for a comprehensive trauma analysis to be conducted, which revealed multiple blunt-force blows to the face and head at the time of death.

Most of the bones were in good shape and exhibited very little surface erosion. They were stained to a consistent dark brown color. However, one element did show much more advanced degradation in the form of sun-bleaching, surface cracking, and outer-layer bone exfoliation. This one piece suggested that the postmortem interval was much longer than the 2–5 years indicated by the better-preserved bones.

The forensic osteological analysis of the bones produced the same results with respect to the biological profile as described in Option 1. However, the isolated upper incisors were recovered and led to a positive identification based on forensic odontology the day after recovery. Mitochondrial DNA identification, which may take months, was not required.

Discussion

It is likely that most human remains situated in outdoor settings and discovered by other humans will be disturbed in some way. This could happen either through the curiosity or ignorance of the discoverer. However, further disturbance by law enforcement and forensic specialists prior to recovery must be prevented. In many cases the modus operandi has been the rapid removal of the remains, often crudely conducted using shovels and even heavy machinery, and accompanied by only cursory *in-situ* documentation of the crime scene. The removal of the evidentiary material from its primary depositional context with very little associated documentation severely limits the resultant analysis and interpretation of past events.

Although it is generally assumed that information relevant to reconstructing the past is very limited at the outdoor scene, it can be shown that this is quite erroneous. Applying the proper recovery method to the outdoor scene results in the emergence of a scientific, evidence-based story. Simply put, we must expect the same standard of forensic recovery of evidence and event reconstruction at the outdoor crime scene as we do at the indoor scene. However, indoor scene recovery protocols applied to outdoor scenes are not effective. Furthermore, as there are no law-enforcement protocols specific to outdoor scenes, we must turn to other disciplines. Forensic archaeology provides the solution. From effectively and efficiently locating the forensic site to the rigorous collection and documentation of all relevant evidence, standard forensic archaeological methodologies enhance and maximize the amount and quality of data retrieved at the scene. Better understanding of the context of the body certainly helps law enforcement and forensic specialists conduct their analyses and interpretations. Ultimately, the determination of cause and manner of death by the coroner or medical examiner is enhanced as well. As has been described more fully elsewhere (Dirkmaat and Adovasio 1997; Dirkmaat et al. 2008) these protocols are effective at all outdoor scenes, from surface scatters (as described above) to clandestine graves (Dirkmaat and Cabo 2006; Hochrein 1997, 2002), and from mass graves (Dirkmaat et al. 2005; Tuller et al. 2008) to fatal fire scenes (DeHaan 2008; Dirkmaat 2002), to mass disaster sites (Dirkmaat and Cabo 2009, 2010; Dirkmaat and Miller 2003; Kontanis and Sledzik 2008).

Although the law-enforcement and medicolegal communities have long recognized the value of physical anthropologists in the comprehensive analysis of human skeletal remains, especially for identification of unknown individuals (Spitz 2006), forensic anthropologists have tended to enter forensic investigations *following the removal* of human remains from the scene, or have only rarely (usually in cases involving buried remains) visited the scene during recovery (Haglund 1991; Wolf 1986).

Today, however, more sophisticated questions regarding peri- and postmortem events are asked of anthropologists, and it cannot be overstated that these questions

can only be addressed when well-documented contextual information is gathered along with the physical evidence during the recovery phase of the forensic investigation. The obvious solution is, when partially decomposed human remains are suspected, to bring into play the full array of data recovery techniques in a highly integrated fashion during the investigation's incipient stages. The forensic anthropologist who is well trained in archaeological techniques is indispensable in integrating and fulfilling these objectives.

The primary physical outputs of these forensic archaeology protocols are very robust and accurate maps of the scene, detailing topographic features and patterns of the spatial distribution of physical evidence. The combination of (i) precise maps, (ii) comprehensive documentation, analysis, and interpretation of context, and (iii) well-documented recovery protocols that maximize evidence recovery and establish strong "chain-of-custody" linkage of evidence to the scene provides effective courtroom presentations of evidentiary value. More compelling reconstructions of past events and the possibility of corroborating witness testimony leads to a greater potential for eventual prosecutorial success. This methodology is also much more solidly entrenched in the scientific method, allowing for effective protocol testing and comparison, as well as more powerful and straightforward analyses of the evidence.

From the standpoint of forensic anthropology itself, it is rather surprising that the discipline is often portrayed, and even defined, as being laboratory-based. It is not uncommon for skeletal remains to be brought to the forensic anthropologist without detailed notation or documentation of evidence location within the scene, and therefore, totally out of context. It is time to pay more attention to the *contextual setting* of the human remains found at outdoor scenes. Blindly accepting a box of bones without discussing the consequences of a poorly recovered scene endorses substandard recovery principles. Limited assessment and analysis to determine a biological profile or heading to the coroner or medical examiner's office for a few hours is not a good recipe for producing a quality, scientifically valid interpretation of the recovered remains.

Without an understanding of where the remains were found and in what condition, questions regarding taphonomic issues or interpretations of bone surface modifications, especially with respect to differentiating postmortem from perimortem trauma, cannot be answered with any degree of *scientific justification*, *backing*, or *certainty*. With the eventual and inevitable implementation of the federal Daubert standards for the admission of expert witness testimony in state courts, forensic anthropology interpretations that do not consider context have the potential to be dismissed in a court of law, severely jeopardizing many cases.

On the other hand, suggesting that forensic archaeology merely involves showing up at a scene and making sure all the human bones are located is ill-founded. Archaeology and forensic archaeology operate under certain principles, methods, and practices that ensure that the context is comprehensively documented. Importantly, a detailed map of the remains identified individually, showing their spatial distribution at the scene, is the key product, the successful production of which requires training and experience. If the forensic anthropologist lacks either, an archaeologist can be enlisted to help.

Finally, when an outdoor crime scene is processed poorly (e.g., when shovels and even heavy equipment are used as the primary excavation tools), excuses related to

ignorance of methods available outside of law enforcement can no longer be accepted. Important contextual details will not be noted properly or systematically at the scene and, thus, are irretrievably and forever lost. Potential reconstructions of circumstances surrounding the death event, or even the original position and orientation of the body, suffer greatly, or may not even be possible; therefore, they may not be defendable in a court of law. "In any death scene investigation, once someone has disturbed or removed anything from the scene, the context from which it came has been destroyed" (Wolf 1986:17). The destruction of context at the *indoor* scene is certainly not tolerated by the law-enforcement and judicial system. The destruction of context at the *outdoor* scene also cannot be tolerated.

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