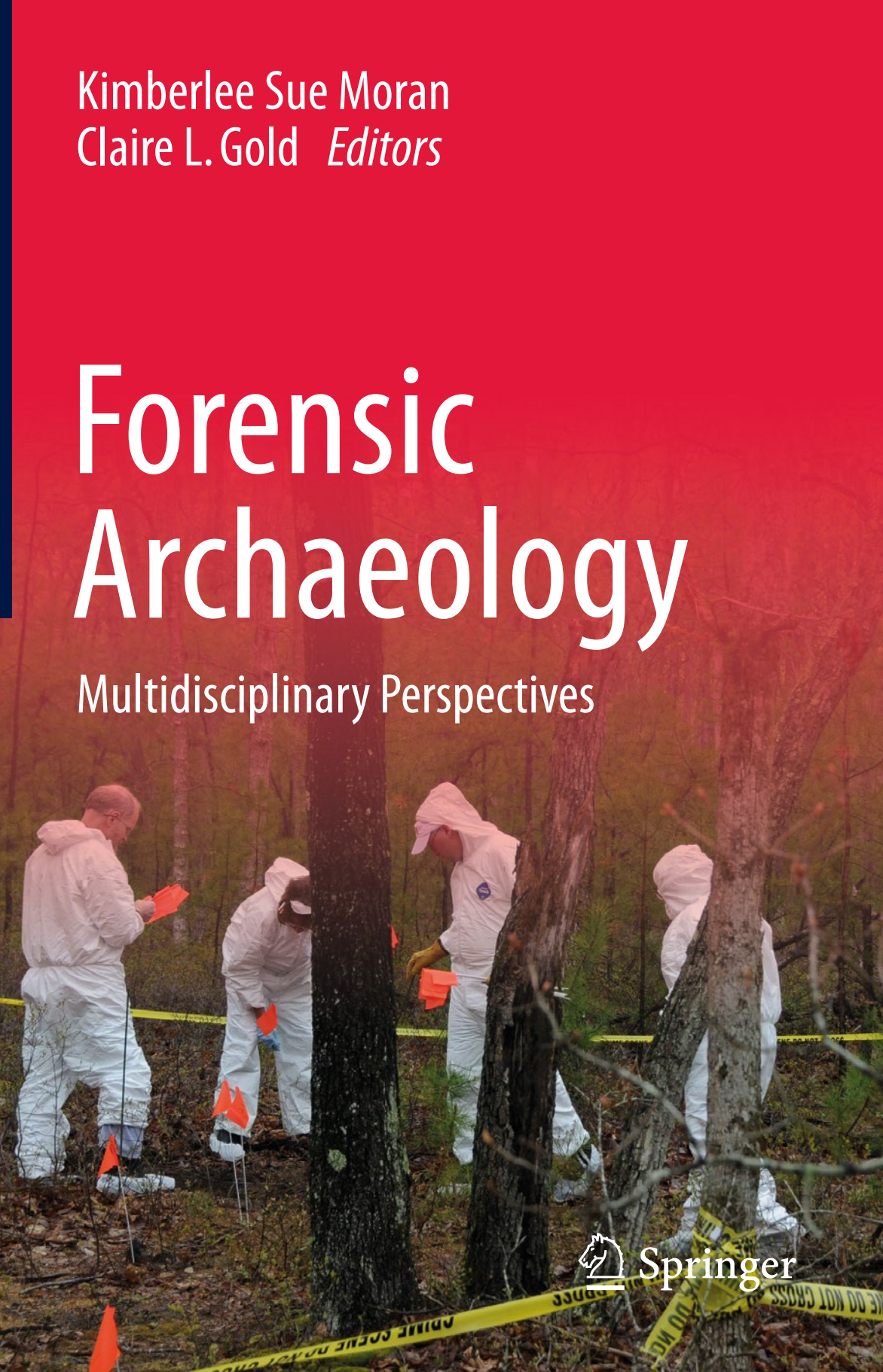
Kimberlee Sue Moran
Claire L. Gold *Editors*

Forensic Archaeology

Multidisciplinary Perspectives



Springer

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Editors
Kimberlee Sue Moran
Department of Chemistry
Rutgers University – Camden
Camden, NJ, USA

Claire L. Gold
Norwood, MA, USA

ISBN 978-3-030-03289-0 ISBN 978-3-030-03291-3 (eBook)
https://doi.org/10.1007/978-3-030-03291-3

Library of Congress Control Number: 2018966814

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

This book is dedicated to Dr. Vaughn Bryant. His kindness, tenacity, and dedication to his craft are forever inspirational.

Preface

Forensic archaeology is often a career by mistake, or serendipity, depending on one's perspective. Prior to the 1990s, forensic archaeology as a form of applied archaeology did not exist in any organized sense[1]. There were no classes in forensic archaeology; there was no set of terminology or techniques. Ask an archaeologist back then what "forensics" meant, and they would probably direct you to a debating team.

Forensic archaeology was born out of the combination of a series of events: the ethnic cleansing campaign of the 1992–1995 Bosnian War that produced scores of mass graves resulting in the deployment of many anthropologists and archaeologists; the partnering of UK law enforcement with academic archaeologists over a handful of domestic homicide cases in the mid to late 1990s; and the increased interest in all things forensic thanks to a number of TV programs from the early 2000s. As a result, many archaeologists began a relationship with law enforcement and the legal community. In some instances those relationships were short-lived – a single case or consultation, a finite deployment, or a special topics class. For others, this brave and recent world of forensic science provided multiple opportunities to engage in fieldwork (of a distinctly grisly nature), forge new territory in archaeological application, embark on new research initiatives, and create best practice and degree programs.

At the beginning of the twenty-first century, only a handful of forensic archaeology graduate degree programs existed, all of which could be found in the UK. In the USA, forensic archaeology was, and, at the time of this publication, still is, found within forensic anthropology. Therefore, no formal forensic archaeological degree programs exist in the USA. Students wishing to pursue forensic archaeology either choose to study in the UK or settle for an anthropology program, specifically one that contains a robust recovery component rather than a focus on the laboratory analysis of remains. For those that study in the UK, despite these programs often

[1] Prior to the 1990's there was a small spattering of forensic archaeology texts, most notably, the 1983 book Handbook of Forensic Archaeology and Anthropology by Morse, Duncan, and Stoutamire.

providing some casework experience, students cannot expect any sort of full-time employment upon graduation. While some police forces will occasionally stock their Scenes of Crime Units with archaeology graduates, for the US student studying in the UK, employment opportunities are limited or nonexistent.

The forensic landscape in the USA was and is vastly different from that in the UK and Europe. The fractured nature of the criminal justice system into state and county forces means that no standard structures or practices exist. Forensic services and/or dedicated crime scene personnel may be found within a city police department or a county prosecutor's office, a sheriff's department, or medical examiner/coroner's office, or not at all. Each state will have some sort of forensic lab system, but the range of techniques, services, and technology available varies widely from state to state. None of these small forensic departments maintain a forensic archaeologist on staff, and even at the state level, forensic anthropologists are rarely employed full-time.

Another confounding factor for forensic archaeology is that the private sector for forensic science is, at best, minimal in the USA. In the UK, especially after the dissolution of the Forensic Science Service in 2012, a large number of private, independent forensic service providers sprung up and, today, supply police forces with many of the lab-based and specialist techniques on a contractual basis. The rationale is that this system of a private marketplace provides better value for money thanks to a competitive bidding process. In addition, because these labs are independent from the police, often doing defense work as well, they are less prone to bias. In the USA, only 25 accredited private labs exist; nearly all of them focused on biology, toxicology, or digital forensics[2]. The result is that the practitioners who self-identify as forensic archaeologists through training, field experience, or both have mainly ended up in academia or CRM[3] and work as private consultants. Casework is fairly infrequent.

A bigger question one might ask is why, in a country with 17,250 murders[4] and 88,089 missing persons[5], is forensic archaeological casework a rarity? The answer is multifaceted, but it ultimately boils down to a singular issue: what is forensic archaeology? The average detective or investigating officer has a general sense of the methods and utility of a range of forensic techniques from DNA to pattern evidence. Forensic anthropology they will rightly associate with bones; but ask them

[2] This figure was retrieved in 2017 via a search of private labs accredited through the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD-LAB), the largest US provider of forensic lab accreditation. Recently ASCLD-LAB merged with the ANSI-ASQ National Accreditation Board (ANAB). Is it unclear whether the private labs accredited under the old ASCLD-LAB system retained their accreditation and/or whether they decided to use ANAB as their accreditation provider or change to another provider of which there are several in the US.

[3] Cultural Resource Management.

[4] Murder data is from the annual FBI report Crime in the United States. Figures are from 2016. 2017 data was still preliminary at the time of publication.

[5] Missing Persons data is from the 2017 National Crime Information Center Missing and Unidentified Persons Statistics.

what a forensic archaeologist does or when they might need one, and they will draw a blank. Doesn't the anthropologist deal with dead bodies? Why can't a crime scene unit excavate a burial? To many, archaeology means "old" and "slow"; it conjures up images of digging with dental picks and toothbrushes, museum artifacts, and the eternal, incorrect association with dinosaur fossils. Police are usually wary to engage with outside experts, especially academics. Without an understanding of the archaeology skill set or prior experience employing or working with an archaeologist, the chances of law enforcement requesting assistance are virtually nonexistent.

If forensic archaeology aspires to join the forensic family, and become a routine tool, we must begin with educational outreach[6]. We must first educate ourselves within archaeology as to what forensic archaeology is and, more importantly, what it is not. This leads us to the purpose of this volume. In 2004, the Society for American Archaeology's (SAA) annual meeting included a very small paper session, consisting of only three presentations, dedicated to forensic archaeology. The true aim of the session was to start the process of identifying those within the ranks of archaeology who were interested or engaged in forensic work and to start building a community. That session has continued every year since, and the participation from both presenters and attendees has consistently grown.

This volume is a collection of some of the paper topics from the annual forensic archaeology symposium at the SAA from 2004 through 2013. Compared to other topics within archaeology and within forensic science, there are very few books dedicated solely to forensic archaeology[7]. It is worth noting that there are many forensic anthropology and bioarchaeology books, which often include some, limited, mention of forensic archaeology. Of the forensic archaeology books that do exist, they are practical guides, outlining the "how-to" of forensic archaeology. The central focus is mostly on human remains recovery. This book expresses the multidisciplinary nature of forensic archaeology along with case studies, elements of its theoretical framework, and real-world issues and applications. A range of perspectives are expressed from the USA and the UK, from academic to researcher to practitioner. In addition, this book introduces different contexts in which forensic archaeology may be employed such as fire scene investigation, missing person searches, landfill searches, cemetery exhumations, archaeological damage assessment, and the looting of sites. Finally, just as traditional archaeology borrows analytical techniques from many fields, this book offers a few chapters exploring methods from other fields such as engineering, chemistry, psychology, and environmental science and how they lend themselves to forensic archaeological application. It is the hope of the authors that this volume will help to expand the scope of

[6] Forensic archaeology has applications beyond basic criminal investigations and as such, outreach efforts should concentrate on the wide range of forensically affiliated organizations that could benefit from archaeological input. Law enforcement, private investigators, NGOs such as the Innocence Project, attorneys, even our forensic colleagues all would benefit from learning more about what forensic archaeology is and how it could be a tool of use.

[7] A (2018) search on Amazon.com brings up around nine books on forensic archaeology or with forensic archaeology in the title.

forensic archaeology and help the reader to develop a fuller appreciation of what forensic archaeology can offer to modern crime scene examination.

This book is geared mainly toward the archaeological community in the USA[8] – students and practitioners – that look to better understand the forensic applications of their training. It is assumed that the reader understands the basic tenets of fieldwork and excavation techniques. In addition, though, this volume should be of interest to the forensic community as a primer to what archaeology has to offer.

Forensic archaeologists are archaeologists first, and we come from a range of backgrounds: historic archaeology, Near Eastern archaeology, Mesoamerican archaeology, etc. As we transition from our initial academic roots to practical fieldwork aiding law enforcement, we are drawn into the forensic world. However, the extent to which we engage with the forensic community varies. As we are responsible for identifying and collecting evidence, it is useful at the very least to have an understanding of the downstream forensic analyses to be done. However, if we want to be a recognized forensic resource ourselves, we need to more fully engage with the forensic community. We cannot be offered a seat at the table if we are not present from the outset. Forensic journal articles and presentations at the American Academy of Forensic Sciences (AAFS) will often refer to "archaeological methods" but will almost never include "forensic archaeology" in the title or list of keywords. Why is that?

Returning to the origin of this volume: the Society for American Archaeology's annual meeting. On the conference program at the 2013 SAA annual meeting were three, full paper sessions concentrating on forensic archaeology, totaling 23 papers. This was the apex of forensic presentations at the SAA, a real high point, and those of us in the community thought we had finally arrived as a firm fixture within the discipline. Since 2013, forensic archaeology presentations have retreated somewhat and remain at a consistent 8–12 papers each year. The presenters of those papers remain more or less the same year on year. On the surface this appears to be a decline. Has the prospect of forensic archaeology as a distinct discipline peaked and is now in the wane? Probably not. What is more likely the case is that the second phase of educational outreach has begun, i.e., outreach to the forensic and legal communities.

Now that forensic archaeology is recognized within the archaeological community, it is time to engage the forensic one. By publishing, presenting at the American Academy of Forensic Sciences, and participating in the Organization of Scientific

[8] Forensic archaeology is much better organized in the UK and in Europe. The Institute for Archaeologists, now the Chartered Institute for Archaeologists (CIfA) has established professional standards of practice for those operating forensically, available on their website (https://www.archaeologists.net/sites/default/files/CIfAS&GForensics_2.pdf). Also, since 2011, UK and European forensic archaeologist have organized an annual European Meeting of Forensic Archaeology within the European Network of Forensic Science Institutes (ENFSI). This meeting has produced two excellent volumes: Groen & Grant (2015) Forensic Archaeology: a Global Perspective and Barone & Groen (2017) Multidisciplinary Approaches to Forensic Archaeology: Topics discussed during the European Meetings on Forensic Archaeology (EMFA).

Area Committees (OSAC)[9], we can establish a presence and tie the acknowledgment of the importance of archaeological techniques to actual, practicing archaeologists. Once the forensic world knows who we are and what we can offer, we can then begin the last phase of outreach: outreach to the law enforcement community. Only then can we step out of the textbook and into the crime scene.

The editor of this volume would like to thank all the SAA forensic archaeology symposium paper presenters and especially those who have contributed to this book. Thank you also to Dr. Allison Grunwald, Dr. Marianne Hamel, Ms. Ani Hatza, and Jeannie Garmon for their feedback and support. Thank you to Beth Tracy and the Rutgers University Office of Faculty Development for the writing support provided to faculty including the organization of writing retreats. Much of this volume was produced as a direct result of those efforts and provisions. Thank you to all our forensic archaeology colleagues in Europe and the UK who have blazed trails and provided a model for us in the USA to aspire to. Finally, a huge debt of gratitude is owed to this volume's co-editor, Ms. Claire Gold. She is directly responsible for bringing this volume out of its languishing state and into completion.

Camden, NJ, USA Kimberlee Sue Moran
Norwood, MA, USA Claire L. Gold

[9] In 2013 a national Forensic Science Standards Board (FSSB) was established in response to the 2009 National Research Council's damning report on the state of forensic science in the United States. Coordinated by the National Institute for Standards and Technology (NIST), the Organization of Scientific Area Committees (OSACs) were created to draft standards for the myriad of forensic disciplines. While many forensic fields have a well-established history of best practice through pre-FSSB efforts, crime scene investigation has traditionally been overlooked. Finally, in 2015, over a year after the formation of the OSACs, NIST announced the formation of a CSI OSAC subcommittee that included two inaugural members from the archaeology community.

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Contributors

Vaughn M. Bryant Palynology Laboratory, Department of Anthropology, Texas A&M University, College Station, TX, USA

Anna S. Chaussée The University of Winchester, Winchester, UK

Derek Congram Munk School of Global Affairs, University of Toronto, Toronto, ON, Canada

Melissa A. Connor Forensic Investigation Research Station, Colorado Mesa University, Grand Junction, CO, USA

Richard A. Gould Brown University, Providence, RI, USA

David E. Griffel Northland Research, Inc., Tempe, AZ, USA

Emily Hammerl Department of Anthropology, University of Nebraska – Lincoln, Lincoln, NE, USA

Karl Harrison Wellcome Centre for Ethics and Humanities, University of Oxford, Oxford, UK

William T. Hawkins Independent Researcher, Los Angeles, CA, USA

Michael J. Hochrein Department of Justice, Law and Security, Special Agent, Federal Bureau of Investigation (retired), La Roche College, Pittsburgh, PA, USA

Tate Jones KCI Technologies, Lawrenceville, GA, USA

Dana D. Kollmann Department of Sociology, Anthropology & Criminal Justice, Towson University, Towson, MD, USA

Martin E. McAllister Northland Research, Inc., Tempe, AZ, USA

Ann Marie Mires Molly Bish Center and Forensic Criminology Program, Anna Maria College, Paxton, MA, USA

Kimberlee Sue Moran Department of Chemistry, Rutgers University – Camden, Camden, NJ, USA

James E. Moriarty Northland Research, Inc., Tempe, AZ, USA

Sharon K. Moses Northern Arizona University, Flagstaff, AZ, USA

Larry E. Murphy Submerged Cultural Resource Consultants, Panama City, FL, USA

John Oladapo Obafunwa Lagos State University College of Medicine, Ikeja, Nigeria

Brian D. Paulsen Chief of Police (Retired), Crofton, NE, USA

Karl Reinhard Professor and Fulbright Scholar, School of Natural Resource Sciences, University of Nebraska – Lincoln, Lincoln, NE, USA

Randi Scott Independent Archaeologist, Benicia, CA, USA

Ryan M. Seidemann Louisiana Department of Justice, Baton Rouge, LA, USA

Susan White Member of the Advisory Board, UCL Centre for the Forensic Sciences, London, UK

About the Editors

Kimberlee Sue Moran has been a forensic consultant and educator since 2002. She holds an undergraduate degree in Classical and Near Eastern Archaeology from Bryn Mawr College and a Master of Science in Forensic Archaeological Science from the Institute of Archaeology at University College London. Her archaeological research includes ancient fingerprints; artificial cranial deformation; the Whispering Woods site in Salem, NJ; and the First Baptist Church of Philadelphia cemetery also known as "The Arch Street Project."

Kimberlee has worked on a number of forensic cases in a range of capacities. She has provided forensic services to legal professionals in the UK and regularly runs training workshops for local law enforcement. She helped to launch the JDI Centre for the Forensic Sciences in 2010 and has run an educational organization, Forensic Outreach, since 2004. Her forensic research includes taphonomic studies, fingerprint development and enhancement, postmortem toxicology, and the interface of forensic archaeology and crime scene investigation. Kimberlee serves on the Crime Scene Investigation Subcommittee of the NIST-led Organization of Scientific Area Committees (OSAC).

Kimberlee is passionate about outreach and science education and is a regular participant and speaker for the Philadelphia Science Festival. She often works in collaboration with the College of Physicians of Philadelphia and the Franklin Institute. Kimberlee is an active member of the Society for American Archaeology, the American Academy of Forensic Sciences, the Association for Women in Forensic Science, and Forensic Archaeology Recovery.

Claire L. Gold received a Master's degree in Biological Anthropology from the State University of New York, Binghamton, in 1998. She completed her undergraduate degree in Anthropology at the University of Massachusetts, Amherst, in 1995. Gold has taught as a lecturer in Biological and Forensic Anthropology since 2005 at the University of Massachusetts, Clark University, and Bay Path University. Gold is dedicated to researching and developing effective teaching strategies for Anthropology and Archaeology. Of particular interest is the introduction of anthropological concepts to the K-12 classroom that reinforce current science and history

curriculum standards. She developed a traveling anthropology workshop in 2010 that has visited local Massachusetts public schools to teach younger students about the subjects of Paleoanthropology, Archaeology, and Forensic Anthropology. She has served as site photographer and researcher on several forensic archaeology projects.

Currently, Gold serves as the Northeast director of a nonprofit organization dedicated to human rights of the missing and unfound, Forensic Archaeology Recovery, and as a consulting physical anthropologist, assisting with the excavation, photographic analysis, and reinterment of the skeletal remains of 500 individuals recovered from the First Baptist Church of Philadelphia cemetery, also known as "The Arch Street Project." She continues to visit K-12 schools in Massachusetts with The Human Origins Workshop.

Part I
Theoretical Frameworks

Chapter 1
Different But Equal: The Philosophical Foundations of Forensic Archaeology

Kimberlee Sue Moran

In the autumn of 2014, an exhumation took place in a cemetery in West Philadelphia. The body under investigation was that of a teenage boy who died in the 1920s under suspicious circumstances. A forensic anthropologist from out of state had requested access to the remains to ascertain whether the injuries described in the death certificate were consistent with any skeletal trauma. State police investigators had assisted in locating the grave, liaising with the district attorney and medical examiners' offices, and would be on hand to oversee the excavation. The goal of the anthropologist was to fly in to conduct the exhumation and examine the remains in 2 days.

A colleague had told me about this interesting excursion and offered that I tag along. We could watch the exhumation as long as we didn't bother anyone or get in the way. We were guests. I jumped at the chance and invited another three colleagues with whom I regularly collaborate, all of us seasoned excavators with both forensic and traditional archaeological experience. It was a cool, gray day. I brought donuts.

When we arrived there was quite a crowd of people there to watch and possibly assist. Most were from the state police and other law enforcement agencies. The anthropologist was there along with a graduate student. A photographer from their university's PR department had also made the trip. All of the equipment on site had been provided by the state police, and much of it was new – shovels, tarps, and buckets. Shame, I thought, if I had known, I would have gladly brought equipment. One important piece of equipment that was missing, though, were screens. Small, handheld sieves were present, but no shaker screens or other equipment appropriate for large amounts of soil were available. The other worrying thing was the backhoe. Backhoes typically strike fear into the hearts of archaeologists, particularly those that work in forensic science. However, there are times when a backhoe is appropriate. In the case of this exhumation, the cemetery had good records indicating that the burial was 6 ft from the surface with no burials on top of it. With the limited time

K. S. Moran (✉)
Department of Chemistry, Rutgers University – Camden, Camden, NJ, USA
e-mail: k.moran@camden.rutgers.edu

K. S. Moran, C. L. Gold (eds.), *Forensic Archaeology*,
https://doi.org/10.1007/978-3-030-03291-3_1

available, the extremely dense clay we were to encounter, and the lack of anything of investigative use in the burial's overburden, employing mechanical assistance made sense. What was worrying, however, was that this backhoe had teeth, meaning that the bucket was shaped like a claw rather than having a straight edge. A toothed bucket tears at the soil and can damage something delicate like a decades-old wood coffin. Sadly, though, this appeared to be the only backhoe available. The exhumation commenced.

The backhoe made quick work of the soil, a very thick silty clay, impossible to screen in the flimsy sieves that were on site. When the toothed backhoe began to tear up wood, we knew the burial had been hit. The anthropologist jumped in the pit and tried to trowel away the clay from the top of the burial. Seeing that this was a struggle, I gingerly asked if we could be of assistance. After all, we were guests; I didn't want to impinge on anyone's turf. The help was accepted, and I jumped in the hole, too, to trowel and brush. The clay was thicker than anything I had ever worked in, but planks of wood slowly became visible, and we started a bucket brigade to try to remove as much loose soil as possible.

At this point, I was expecting the work to pause as a sketch was started, measurements were taken, and photography was done. To my surprise, though, the anthropologist did not do any of this nor showed any interest in doing so. When asked if we could screen the soil, the response was a shrug of the shoulders. It was clear that there was no intention to screen soil (but we were welcome to do it if we wanted to). The wood planks didn't resemble a coffin, but I assumed their size, dimensions, and arrangement were of relevance. Instead of documenting them through photography and a scaled drawing, they were torn from the ground. The objective was to get at what was under them.

Wood was brought up out of the pit and dumped into a pile. Soil was removed mainly by shovel and hauled out by the police officers present. My colleagues and I took turns "screening" the soil. There was no way the clay[1] could be sieved, so we opted to spread out the removed soil onto tarps and pick through it, breaking apart the clumps into smaller and smaller pieces until we were relatively confident there was nothing in them. Unsurprisingly, we found things. Thumb screws used to secure what was probably a box, not a coffin; a small cross pendant; the remains of a fabric bow, possibly from a burial wreath; and vegetative material that looked like straw were all recovered, though out of context since they were found in the spoil. Throughout the process, no measurements were taken and no drawings, and while there were copious amounts of photography, it was all done by the PR person without a scale or north arrow. None of the finds were photographed.

[1] The clay we encountered was truly unlike anything I had seen. Not only was it incredibly dense, it was also a strange color. I remember the first time I ever saw a Munsell Soil Color Chart. I found the gley pages to be really odd. Could soil actually be any of those colors? Fifteen years later, I got my answer: the clay at this exhumation was the strangest blue color. But for all the remarks made by those at the exhumation about the clay, no Munsell Soil Color Chart was available, and no soil samples were taken.

Strangely though, nothing resembling human remains or even a recognizable coffin had turned up. The digging continued. Eventually long vertical planks of wood, painted brown appeared. Finally, a coffin! Again, no measurements or proper photos were taken. The wood was simply taken out and thrown on the pile. Soil continued to be removed, and my colleagues and I started finding strips of black fabric, resembling black taffeta. Still no bones. One of my colleagues that had accompanied me began to inspect the woodpile and noticed a plank with a metal plate attached to it. It was smeared with clay. She took a bottle of water and poured it over the plate revealing engraved letters. The plate contained a name and date… that of the individual's great-grandmother. We all realized in an instant that the burial under investigation had been dug right through and that we were now digging into the burial underneath.

The anthropologist was visibly rattled. Apparently it was not unheard of for a container for remains to be sent home empty. However, the exhumation had been a waste of time, and without any remains to examine, there was nothing for the anthropologist to do. We were instructed to dump everything back into the pit. The backhoe filled everything in and we went home.

This experience illustrates an instance where a forensic anthropologist and archaeologist can severely differ in their approaches to burial excavation and the value of different types of evidence. Sadly, though, this example is not an unusual one. From the anthropologist's point of view, the human remains were of singular importance. The questions at the start of the exhumation were focused entirely on the remains and could only be answered by the remains. There was no way to anticipate that the excavation would produce far more questions than answers. The result of the remains-focused approach was that many alternative types of evidence, such as the soil, the construction of the container, and the other objects identified, were left undocumented, unexamined, and unable to aid the investigation. Without a record of what was unearthed that day, we will never know what was or wasn't buried at that site.

American Anthropology

In the United States, forensic anthropologists have long dominated as the experts in charge of the recovery of human remains, specifically buried remains and/or surface skeletal remains. But why is this? As human bone experts, what does forensic anthropology have to do with excavation techniques, particularly if the remains to be excavated are still fleshed? The answer first lies in the American approach to archaeological education and the four-field approach to anthropology (Anderson 2003; Kehoe 1998). Franz Boas has long been seen as the father of American anthropology and the four-field approach, but some evidence suggests that the holistic, integrated study of humanity preceded Boas' efforts (Hicks 2013). Students of linguistics, cultural anthropology, physical anthropology, and archaeology in the United States simply study in an anthropology department and receive an

anthropology degree much in the same way that ecologists, geneticists, zoologists, and botanist might all study under a biology department and receive a biology degree. Only in large universities or in some specific cases related to institutional history might any one of these fields be broken out into its own separate department or degree program. There is a connection between subdisciplines, and there is benefit from shared knowledge. An ecologist/zoologist/botanist depends on aspects of genetics to understand the relatedness of species and their evolutionary origins. The geneticist requires an understanding of botany, to know whether knocking out a specific gene will have positive or negative effects on the plant, and of ecology to understand how that effect ripples across food webs. Yet there is no doubt that each of these fields is distinct with different knowledge sets, applications, and skills required for practice. The same holds for the subdisciplines of anthropology. However, in US anthropology "four-field" degree programs, the educational approach can mean that a cultural anthropologist is also well trained in linguistics; the archaeologist may be well trained in physical anthropology. It muddies the waters with regard to titles and labels. While some graduates may be well cross-trained, others may not. An archaeologist who takes one osteology class is not instantly transformed into a bioarchaeologist. A cultural anthropologist who participated in a field school cannot claim to be an archaeologist after 4 weeks. Like botany is more than a single class on plant physiology, so, too, are archaeology and physical anthropology. Truly to be an expert in either field, one must take multiple classes, understand a range of concepts, and develop specific, practical skills. Physical anthropology is much deeper than creating a biological profile, and archaeology is more than just digging.

The second answer to how forensic anthropology came to dominate the excavation of human remains lies in the history of how physical anthropology came to be used by law enforcement. Initial testimony of physical anthropologists in court addressed the identification of human remains rather than the recovery of them (Ubelaker 2006b, 2018; Black 2013). Early pioneers of forensic anthropology such as Aleš Hrdlička and Thomas Dale Stewart worked regularly with the FBI, but both of their degrees were in medicine (Schultz 1944; Ubelaker 2006a). Stewart's successor both at the Smithsonian and as an FBI consultant was John Lawrence Angel. Unlike Hrdlička and Stewart, Angel graduated with a PhD in anthropology and studied under several eminent academic archaeologists and anthropologists (Buikstra and Roberts 2012; Buikstra 1990; Yaşar İşcan 1987; Ortner and Kelley 1988). As a graduate student, he had firsthand exposure to field archaeology working on a site in Greece. His role there was to analyze skeletal material, but it is likely that the four-field education he received at Harvard along with his field experience gave him, at the very least, a solid appreciation for archaeological methods and techniques. His research thereafter emphasized the importance of combining cultural and biological data for the purposes of analysis and interpretation. He continued archaeological collaborations throughout his life. His influence extends across the fields of bioarchaeology, paleopathology, and bio-

anthropology, all subdisciplines that blend and blur the lines between archaeology and cultural and physical anthropology.

Also in contrast to Hrdlička and Stewart, Angel embraced media attention. Angel happily took interview requests and relished his moniker – "Sherlock Bones" (Buikstra and Roberts 2012; Ubelaker 1989). This exposure thrust forensic anthropology into the public consciousness. His personality combined with his extensive and interesting casework made forensic anthropology extremely popular and probably inspired many careers. Like an early version of the "CSI effect," Angel defined forensic anthropology in the minds of the public as well as influencing law enforcement and legal professionals. Forensic anthropology became synonymous with bones and mysteries.

But what about the digging? How did forensic anthropology evolve from "bones" to "digging up bones"? The answer likely lies in the specific academic and experiential background of Dr. Angel. As a researcher, a forensic investigator, and a media personality, Angel was firmly planted in both archaeology and physical anthropology. He proudly, and rightfully for his research interests, blended the two fields. This blend would have also exhibited itself in his forensic casework. His representation of what a forensic anthropologist is and what a forensic anthropologist does, magnified by the lens of popular media, essentially defined the field in the United States. Without a forensic archaeological counterpoint, this version of forensic anthropology went unchallenged until relatively recently.

In 2002, at the Society for American Archaeology (SAA) annual meeting in Denver, Colorado, the Student Affairs Committee hosted a panel discussion titled "Interdisciplinary Research and the Future of Graduate Education in Archaeology" (Fitzpatrick and Carus 2002). The forum featured several well-known anthropologists and archaeologists such as Drs. Jane Buikstra, Ian Hodder, and Richard Leventhal, among others. The abstract for the session stated:

> *Archaeological research has historically been divided among different academic disciplines, and there has been a corresponding variation in intellectual traditions and methodological approaches between disciplines. Increasingly, graduate programs seek to educate a new kind of research scientist who is broader, more flexible, more collaborative, and more adept at linking issues in the humanities and the life, earth, and social sciences than heretofore. Participants will contribute their thoughts and answer questions on the interdisciplinary nature of archaeological research and the steps that are currently being taken by graduate programs to integrate method, theory, and data from different academic disciplines.* (ibid)

The discussion that afternoon ended with whether anthropology and archaeology are distinct fields or whether archaeology was still a subdiscipline of anthropology. To say the discussion was heated is an understatement. There were very strong views on both sides. What was clear, though, was that in the minds of many in the room, archaeology was slowly drifting out on its own. The drive to be "broader, more flexible, more collaborative" and resolutely multidisciplinary was somehow setting archaeology apart as its own distinct field of study. In addition, the increased globalization of that time as the Internet and e-mail had become ubiquitous in

academia facilitated more oversees collaborations. It is possible that the changing American mindset toward archaeology and anthropology could also be a result of influences from the UK and Europe.[2]

Since the early 2000s archaeology has continued to grow more comfortable in its identity as its own discipline. Academics and practitioners make conscious choices as to which associations they join and which conferences they prioritize, choosing archaeological ones over other options. Professionals easily self-identify as "archaeologists." This evolution, however, hasn't yet translated into degree programs. Archaeology is still found within anthropology departments in the United States, but this probably has more to do with sustaining an independent, specialist program than attitudes toward archaeology's "place" within disciplinary taxonomy. The lack of archaeology-specific programs and departments, however, has driven many US students to seek their education abroad. Particularly in the UK, the range of program concentrations, field opportunities, and the integration of the natural and physical sciences with archaeology programs make them very attractive to students seeking a graduate experience. Archaeologists who have worked in CRM and are looking to progress to the next stage in their career may choose a master's degree that will develop in them a specific and marketable skill set. In this way, many prospective students were attracted to degrees in bioarchaeology, osteoarchaeology, forensic archaeology, and paleopathology. The idea of combining "bones" with archaeology sounded both interesting and practical. Sadly, though, for those that returned to the United States, they found that "forensic archaeologist" didn't exist as a job title.

This is just one route that took US archaeologists into forensic science. Other archaeologists were co-opted into forensic work at the request of law enforcement or a medical examiner's office in need of an expert who could excavate a suspected clandestine grave. Once their involvement in the case concluded, the archaeologist went back to their day job, either in academia or at a CRM firm. If the experience was good for all involved, the archaeologist might see future work come their way. For those that entered the forensic world through experience rather than training, they learned the ropes as they went along. Often it was a lonely experience since a community of experts in this field didn't formally exist.

The group of foreign-trained forensic archaeologists and those pulled into forensic work at the request of law enforcement has slowly grown since the early 2000s. Finding the forensic community dominated by anthropologists and somewhat closed off, this fledgling group of archaeologists gravitated together within archaeological circles. Only very recently have the forensic archaeologist begun to venture

[2] Also at this time there was a lively debate within the community as to the status of those within the Cultural Resource Management (CRM) sphere of archaeology. CRM is largely where the majority of archaeologists are employed, but this practical, applied, commercial version of archaeology was very much looked down upon by the academic elites. In the early 2000s CRM archaeology was gaining acceptance and today, while many would argue, that it is still not seen as equal to academic archaeology, it has become a strong voice within the community. CRM archaeology is very field-focused and therefore deviates from more traditional anthropological archaeology. This rise of CRM might also be a contributing factor to the view by some that archaeology and anthropology are separate fields of practice.

into the forensic associations. Among "their own" forensic archaeologists have had no difficulty justifying their existence as a distinct and necessary specialty of archaeology.[3] Less easy is the justification of forensic archaeology within the forensic community, especially within forensic anthropology where archaeologists can be seen as "just diggers." Indeed, a 2013 paper argued that the nature of outdoor scenes, namely, their limited sedimentological stratigraphy, reduced the role of a forensic archaeologist to that of a technician (Dirkmaat et al. 2013). This view demonstrates a misunderstanding of or a lack of experience in basic archaeological theory and methodology – what archaeology is, how an archaeologist thinks, and what an archaeologist does.

Forensic Archaeology: A Distinct Discipline

Part of the struggle between forensic anthropology and archaeology is that forensic anthropology has always been easy to define, while forensic archaeology has been less so. In the context of human remains recovery and clandestine burial excavation, the phrase "archaeological methods/methodology" is often cited in papers and presentation abstracts. This relegates forensic archaeology to a mere series of techniques, thus echoing the sentiments of the archaeologist as technician. Forensic archaeology does contain a methodology – a robust one – that offers best practice for crime scene processing of all sorts.[4, 5] Forensic archaeology is also a set of theoretical approaches to human behavior, site formation, and site transformation that offer a framework for search, recovery, and interpretation.

The remainder of this chapter will examine four key principles on which forensic archaeology, as a stand-alone forensic discipline, is built. A disclaimer: these premises are offered in the context of clandestine burials. A clandestine burial is the disposal and/or concealment of human remains. The remains may be dumped, buried at any depth, covered, or left exposed. The remains may be the result of a homicide, suicide, or accidental death. The following principles may be extrapolated to any human remains recovery effort as well as to crime scene investigation generally, but for descriptive ease, the term "clandestine burial" will be used.[6]

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[3] What has been the challenge within the archaeological community is defining "forensic," a subject discussed later in this chapter.

[4] See the chapter in this volume dedicated to the forensic archaeologist as crime scene investigator for a fuller discussion.

[5] Many excellent books outline the "how to" of forensic archaeology, namely, burial excavation. Two recommendations for further reading on this topic include Dupras and Schultz (2011) *Forensic Recovery of Human Remains: Archaeological Approaches* and Connor (2007) *Forensic Methods: Excavation for the Archaeologist and Investigator.*

[6] These principles also apply to crime scene examination. "Crime scenes" can be used in place of "clandestine burials."

Clandestine Burials Are Products of Human Action and Decision-Making (Human Behavior and Agency)

The first tenet that defines forensic archaeology addresses site formation as a product of agency and rational choice. Clandestine burials are not random or products of chance. Perpetrators are influenced by a range of factors and select a location based upon their weighing up of options. Their choices and actions are intentional. This is no different than predicting the likelihood of traditional archaeological sites using qualities such as access to raw materials or sources of water. Some of the elements that influenced ancient activities, such as the landscape, also influence forensic actors. Humans behave predictably, and an understanding of the factors influencing site selection and site creation guides a forensic archaeologist in the search and location of a clandestine grave.

- *Time* – Time is a variable in several forms. Time can mean how much time is available before the perpetrator is detected and can, therefore, cause duress. Time could also mean the amount of time it takes to conceal/dispose of the remains due to the availability of tools and/or the perpetrator's physical ability. Ultimately the perpetrator will want to dispose of the remains as quickly as possible.
- *Landscape* – The perpetrator's relationship and interaction with the landscape will greatly influence site selection. Familiarity with the landscape may facilitate disposal. The converse is true: perpetrators unfamiliar with the landscape may opt to dump remains or may opt to transport them to an area that is more familiar. Landscape features may act as reference points for a perpetrator looking to merely conceal remains. Reference points facilitate the ability to check up on the clandestine burial as a detection avoidance strategy. Features such as pathways that provide access or vegetation that provides cover may make one area more desirable than another.
- *Physical capability* – A dead body is difficult to move, and digging a shallow grave is much more arduous and time-consuming than one might assume. The ability of the perpetrator to carry weight over terrain will influence site selection. Burial in a backyard may be easier than trying to get a body into a car. Or a body dump off the side of the highway may be easier than trying to dig a 5 ft long, 3 ft deep hole. Even if the perpetrator opts to find a secluded spot in the woods, their adeptness at digging and encounters with tree roots will determine how deep the grave is likely to be.
- *Availability of tools* – Shallow grave creation is rather difficult without the right tools, and not everyone has access to a shovel. Tool availability will influence whether a body is dumped from a car or buried, dismembered, or disposed of in other creative ways, such as a wood chipper. A suspect's vocational background and/or current employment may provide access to tools or other unique means of disposal or concealment.
- *Environmental conditions* – Some environmental conditions, such as soil composition, are products of the landscape and are, therefore, fixed. Others, such as

weather conditions, ground cover, or available light, are transient in nature and require knowledge of timing of the crime and subsequent body disposal in order to factor them into the burial search efforts. Frozen ground, for instance, would seriously impede the efforts of a ground burial, while heavy leaf coverage might make a body disposal possible without the effort of digging.

- *State of mind* – Finally, a suspect's state of mind not only drives decision-making, but it can become a confounding factor that causes a perpetrator to operate outside of the model of prediction. If the perpetrator is under the influence of drugs or alcohol, this can cause irrational or uncharacteristic behavioral choices. For instance, methamphetamine can cause an otherwise unfit individual to be overcome with the energy and desire for a repetitive task such as digging. The amount of duress the suspect is under can influence a burial choice toward a more expedient method rather than one that would better avoid detection. Another variable that influences behavior is whether the perpetrator is motivated to simply dispose of the remains or whether the remains are merely being concealed. Disposed remains are those where the suspect has no intention to ever have contact with the remains again. It could be in situations where the decedent has served his/her purpose and is no longer of use. It could be the result of some sort of disgust. It could be a case where the victim is a stranger to the perpetrator, and therefore, the perpetrator has no sense of relationship with his/her victim. Concealed remains are those where the perpetrator has some desire to check on the clandestine burial. This could be because of fear of detection or because of some sort of relationship with the victim. In such instances, site selection is very intentional because the "right" site must both protect the remains from discovery and at the same time offer a means for the perpetrator to find the site in the future.

None of the described elements is independent; each influences or is influenced by the others. The perpetrator's state of mind may influence the landscape chosen for remains disposal. Environmental conditions can influence the tools required for burial creation. All these factors can be simplified to "ease and speed." The perpetrator will be driven to the easiest, quickest way to dispose of the remains. This understanding of agency-driven site selection is a foundational tenet of archaeological, and forensic archaeological, practice. It helps create a predictive model to be leveraged during the search and location phase of a forensic investigation. One such model worth noting is that of "winthropping," also known as the Winthrop Method (Morewitz and Colls 2016; Humphrey et al. 2010). This search and location system was developed by the British Army to help detect caches of weapons concealed by Northern Irish paramilitaries. It is based on identifying primary and secondary reference points that ultimately lead to the site of the concealed object. Published information on this method is scant as it had, for years, been classified information. A few decades ago, forensic archaeologists in the UK began to incorporate elements of the Winthrop Method into their searches, realizing that it dovetailed with archaeological theory of human/landscape interaction. More research on this method is needed, including validation studies to determine the predictive power of winthropping.

A Clandestine Burial Represents a Series of Events (Depositional History)

It is easy to become hyper-focused on the recovery of human remains. After all, "bones are cool!"[7] For those with specific training in the identification and analysis of human remains, it is only natural to be driven toward the crux of their expertise. The next foundational principle of forensic archaeology recognizes that a clandestine burial is more than the human remains. In the case study discussed at the start of this chapter, the remains were unexpectedly absent. There were other objects and elements in the burial pit that may have provided useful information. Those items, sadly, were not properly documented or removed from the excavation and thus their usefulness was lost. In the process of producing a clandestine burial, a huge range of processes and actions take place to transform a location into a crime scene. Site selection has already been discussed. Once the site is selected, it must be entered. Just that action alone alters the site as new elements are introduced. If a shallow grave is chosen as the method of concealment, the ground will be disturbed. Objects will be deposited either in the ground or on the surface. Once the perpetrator is finished, bits of the site may be taken away with the perpetrator.

To illustrate this, suppose a homicide has taken place. The perpetrator (we'll call him "Bob") has had a dispute with his buddy in his home over drugs and killed his friend with a kitchen knife. Bob's car is in the shop, so he decides the best idea is to bury his friend in the backyard. His yard has a tall fence, shielding him from prying eyes, and Bob has a shovel in his shed. Bob goes out to the yard, transferring some blood from his shoes onto the paved walkway. He gets a shovel and selects a spot along the fence. He proceeds to dig a hole, which he makes rectangular in shape. He piles the soil from the hole to one side on the grass. Bob decides to throw the knife in the hole since it's the murder weapon. He covers it with some soil from the backpile. Bob goes inside and drags his friend from the kitchen out the backdoor. He drags him across the lawn. As he does, more blood gets on the grass, and his friend's shoes and clothing pick up dirt and grass stains along the way. One of his friend's shoes comes off. Bob pulls his friend into the hole, goes back for the shoe, and throws it in the hole, too. Bob begins to fill the hole back in. It's tiring work. Bob stops for a beer. He drinks the beer, smokes a cigarette, and throws both into the hole. He finishes filling the hole but there is still a small pile of dirt. He stomps on top of the grave to try to compact the soil and adds some more soil on top. He tries to arrange the dug-up grass back on top of the hole. The remaining soil he kicks about to try to scatter it around. He puts the shovel back in the shed and goes back inside.

Anyone who has taken an Archaeology 101 class will be familiar with the concepts related to depositional history. Human action at a site will be represented by strata deposited in temporal succession. The law of superposition, another foundational concept of archaeology, states that the oldest action is deposited first and the

[7] A very funny video on the "coolness" of bones was produced by The Onion in 2014. It is currently available on You Tube, https://youtu.be/QDlCW7FROtI.

most recent action will be the last deposited (Hamblin 1978; Harris 1989). In the hypothetical case described, there is an order in which things are deposited into the grave. First the knife, then some soil, then the friend, then his shoe, then more soil, then a beer can and a cigarette butt, and finally the rest of the soil. An archaeologist excavating the grave will find each deposit in reverse order. A better term to use than "strata" is "archaeological context" or just "context." Strata are often associated with geological strata or soils. In forensic settings, such as the one above, the soil encountered is usually unstratified grave fill, hence, the assertion that an archaeologist's skills are unnecessary for forensic excavations. An archaeological context is the evidence of any human action. It may be a deposit, such as the grave fill, but it may also be a negative context – something removed – like soil removed to create the burial. It may also be an action, like the cut of the burial or the compaction of the soil. It may be a positive context – something inserted – like the body into the burial cut or the other items tossed into the hole as it is being filled. The excavation process is more than just the recovery of these actions; it is the documentation of the actions so that an interpretation of the order in which these actions took place can be assembled. One way of depicting this is through the Harris matrix, a graphical representation of depositional history (Harris et al. 1993). Also, plan and profile drawings are essential in the reconstruction of the excavation results, the physical proximity of evidence, and the final interpretation of what happened.

Depositional history facilitates another interpretive tool common in archaeological fieldwork: relative dating. Relative dating is the ability to "date" an action or item in relation to the things around it. If older layers are further down, then items deposited in a clandestine grave exhibit the same principle: older actions are further from the surface; more recent actions are closer to the surface, like in the shallow grave scenario described above. By excavating a grave in layers, the items discovered therein provide a sequencing of events. A case from 2015 provides a real-world example of relative dating in practice: a group of volunteer archaeologists conducted a search to locate the remains of a young girl who went missing in 1989.[8] The area to be searched was a backyard associated with the homicide suspects. Cadaver dogs were employed and one dog "indicated" in an area of overgrown vegetation. Volunteers began clearing the vegetation and hit a large slab of concrete. Many cases exist where human remains are concealed under concrete or a patio, so the discovery energized the search party. The vegetation and overlying soil were quickly removed. It was, indeed, a concrete slab, probably the pad for a shed or similar structure. As the concrete was being brushed, one of the volunteers noticed something embedded in it: a coin. Coins are superb for relative dating because they are stamped with the date of their minting. The coin was cleared and the date revealed: 1987 – 2 years before the girl's disappearance.[9] Anything under the slab

[8] This case is still active and further details cannot be provided at this time.

[9] Also embedded in the concrete was a figurine: a "Kermit" from the series "Muppet Babies." The volunteer instantly recognized the figurine as coming from a McDonald's Happy Meal from sometime in the 1980s. An Internet search produced similar figurines that provided a date – 1987. The coin and the figurine were contemporaneous.

would predate 1987, disassociating the concrete from any involvement in the case. While the discovery was disappointing for the team, it ultimately saved time and resources. The area could be eliminated from the search. This case provides another example where no human remains were found, but the information gathered through archaeological methods were still of value to the investigation.

A Clandestine Burial Is Changed over Time by A Range of Processes (Taphonomy)

Archaeological sites and crime scenes are not static entities. Just as a series of forces and factors influence site selection, so too, are there forces and factors at work transforming the site from its original state to that in which it is found. These processes are collectively known as taphonomy. Originating from the field of paleontology, taphonomy was first used to understand the means by which a living creature, such as a dinosaur, was transformed into a fossil to be excavated millions of years after the creature's last breath. What had to happen was complex and involved geophysical, biological, environmental, and chemical processes. Archaeology was quick to recognize that the theory behind taphonomy was well suited to describe how and why an excavated site or an artifact changed from antiquity to present day. Forensic science, specifically forensic anthropology, has only just recently adopted taphonomy into its toolbox. Human remains that were initially buried can later be discovered as surface scatter. Taphonomy is a handy way to explain how this can happen. Taphonomy can also be used as a predictive model to inform search and recovery methodology. As taphonomy has become more embedded into forensic anthropology and anthropological research, it has begun to veer toward a body-centric application. It is often cited in a limited sense, as referring to human decomposition. In fact taphonomy is sometimes treated as a synonym for human decomposition. It is true that decomposition is a series of processes, biological and chemical, that are impacted by internal and external variables. But to remove an understanding of taphonomy from the scene as a whole is to examine one piece of evidence out of context.

In a way, taphonomy is a good illustration of the difference in perspective between forensic archaeology and forensic anthropology. For the forensic anthropologist, human decomposition and the taphonomy that affects it is the end game. Establishing a postmortem interval and analyzing bone is the focus of their work. For the forensic archaeologist, site taphonomy will affect human decomposition, and human decomposition is one of the taphonomic processes transforming the site. In the earlier example of "Bob," his clandestine grave had more dirt than it could contain once the body was deposited. Over time, however, as the body decomposes, volume is lost, and the soil will slump, creating a depression and thus altering the clandestine grave from its original form.

A Holistic Approach Is Necessary When Investigating a Clandestine Burial (Context and Association)

Crime scene personnel have very specific protocols when processing a crime scene such as a residence or a vehicle. Some units have a strict sequence of actions to be performed known as standard operating procedures (SOPs). Deviation from the (SOP) is not allowed unless a reasonable justification is documented along with documentation of the form in which the deviation manifested. The aim of the SOP is to ensure proper and thorough documentation of all aspects of the scene, not just the decedent found there or the obvious items of evidence, such as a firearm. Indeed, decades ago, it was not uncommon for a responding officer to enter a scene, spot something like a firearm and immediately collect it. Once the body was removed, the scene would be reopened. Today, as crime scene investigation, analysis, and reconstruction have become formalized professions, those that perform these functions understand that the scene must be processed, documented, and interpreted as a whole rather than as a series of isolated objects. The firearm on its own will have some forensic value in terms of fingerprints, DNA, and the tool marks it can produce on a cartridge. However, its spatial relationship to other items of evidence and its position within the crime scene provide information of equal or even greater importance. Consider three scenarios:

(a) A firearm is found on a table across the room several feet from the decedent. A spent cartridge case is found on the floor immediately adjacent to the decedent.
(b) A firearm is found in the hand of the decedent. A spent cartridge case is found on the floor across the room from the decedent.
(c) A firearm is found in the hand of the decedent. A spent cartridge case is found on the floor immediately adjacent to the decedent.

In scenarios A and B, the spatial relationship between items suggests homicide. Scenario B suggests the attempt to stage the homicide as a suicide. Scenario C suggests a suicide, but even then, information as to whether there are signs of forced entry or the presence of another person in the room at the time of the incident could point to homicide. In all three scenarios, the entirety of the scene, not each individual item is what informs the investigation.

Like the early days of evidence collection, the earliest form of archaeology was not much more than treasure hunting. The goal of archaeological expeditions of the nineteenth century was to bring back interesting artifacts to populate museums or the parlors of landed gentry. As archaeology evolved, the focus shifted to an interest in sites and cultures. Artifacts were recognized as a tool along with stratigraphy and other analyses through which the history of a site and its inhabitants could be reconstructed. While artifacts were and are still of interest, the context of the artifact is what really provides information.

Typical crime scene protocol is sometimes abandoned in instances of clandestine burials. Certainly in the exhumation scenario at the start of the chapter, there was no